







JOINING FORCES:
Adding Public Health Value to Healthcare Reform

The Prevention and Wellness Trust Fund

FINAL REPORT

PREVENTION & WELLNESS TRUST FUND

JANUARY 2017



HEALTH CARE IS VITAL TO ALL OF US SOME OF THE TIME, PUBLIC HEALTH IS VITAL TO ALL OF US ALL OF THE TIME.

— C. EVERETT KOOP, U.S. SURGEON GENERAL 1982-1989

JANUARY 2017

PREVENTION AND WELLNESS TRUST FUND FINAL REPORT

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PREVENTION & WELLNESS TRUST FUND

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ABOUT THE PREVENTION AND WELLNESS ADVISORY BOARD

This report includes the final evaluation and the Prevention and Wellness Trust Fund (PWTF) sustainability recommendation report of the Prevention and Wellness Advisory Board. Under Chapter 224, the Advisory Board is responsible for the following:

- Making recommendations to the Commissioner of the Department of Public Health on the administration and allocation of PWTF
- Advising the Department of Public Health on its annual report to the legislature
- Evaluating PWTF and making a report to the legislature on the findings of this evaluation with a recommendation to the legislature about whether PWTF should continue*

THE ADVISORY BOARD MEMBERS ARE:

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Chair, Joint Committee on Healthcare Financing

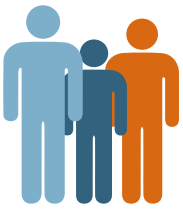
Representative Kate Hogan
Chair, Joint Committee on Public Health

* Sections 60 and 276 of Chapter 224, the 2012 Massachusetts health care reform law, along with Chapter 165 of the Acts of 2014 outline the responsibilities of the Advisory Board.


¿Se lavó
las manos?

EXECUTIVE SUMMARY

Established by the legislature in 2012 as part of Chapter 224, the Prevention and Wellness Trust Fund (PWTF) is an integral part of the state's multifaceted approach to healthcare transformation. Two programs, the Prevention and Wellness Trust Fund Grantee Program and the Massachusetts Working on Wellness, form PWTF.



Together, these two programs have ***expanded disease prevention and wellness efforts across the state***, reaching over **372,000 people** in the Commonwealth.

The impact of prevention and wellness activities on the health of the Commonwealth is best represented in the story of Arnetta (see next page).

PWTF has demonstrated positive outcomes and potential cost savings. Two independent evaluations confirm the importance of a program like PWTF. This Executive Summary highlights findings from both evaluation reports along with a final progress report.

In the PWTF Grantee Program, the Harvard Catalyst independent evaluation found preliminary indications of improvements in health outcomes and costs along with important systems changes. Data was analyzed from the first year and a half of implementation

- PWTF communities had improvements in systolic blood pressure, which if sustained over the lifetime of PWTF clinical patients, could result in 500 to 1,000 fewer heart attacks and strokes per million residents, and lead to 125 to 250 fewer deaths due to cardiovascular disease per million residents treated. The hypertension interventions are highly cost effective – on par with mammography screening, treatment for heart attacks, and treatment for elevated cholesterol. Over enough time, these interventions should have a positive ROI as intervention costs diminish with more routine screening and interventions.
- The asthma interventions had promising results with decline in overall healthcare costs in PWTF communities when compared to comparison communities. Although available data is incomplete, data suggests that asthma interventions may give very good value and may result in net costs savings.
- Significant infrastructure was developed to address the growing public health concern of older adult falls and more than 900 falls were prevented in one year of PWTF. The interventions are cost effective.
- Important systems changes occurred in all nine partnerships for all four conditions resulting in important infrastructure and capacity development.

For the PWTF Massachusetts Working on Wellness Program, the independent evaluators found an estimated savings for medical care ranging from $0. 76 million to $4.07 million for the combined top three health behaviors (diet and nutrition, leisure-time exercise, and stress reduction) targeted by the programs.

These early outcomes bode well for more significant returns if PWTF were to continue.

MEET ARNETTA

Arnetta Baty, age 64, is a woman of conviction. She runs a business with her husband Carl, called Rounding the Bases, Inc., which is a recovery-oriented program in Dorchester. They are both fierce advocates in their community.

Arnetta tries to maintain a full life, despite experiencing more than 10 falls in the past year alone. Her last bad fall happened in her bathroom, slipping into a vent and damaging her hip and leg. She also lives with several other health conditions such as diabetes, lung disease, asthma, and poor eyesight. But, Arnetta is aware of the burden and possible consequences of just one fall. She's seen her mother experience terrible falls and knows that "...it's the fall that puts someone in the hospital."

Through PWTF, the Batys met Tammy, a Community Health Worker through Boston Senior Home Care, who conducted a home safety assessment. This led to several practical improvements, such as securing handrails on the outside of their home, raising the bathroom toilet seat, and installing bathtub grab bars. Gratified by the assistance of Tammy, Arnetta recommended the program to 10 of her friends and even her 94-year-old mother. She's also enrolling in the Matter of Balance class through PWTF.

Arnetta hasn't had a fall in the last few months thanks to the services of PWTF. The Batys shared that building trust is important to engage older adults with services, especially those who are isolated. "Although we are old, we still like to be social and mobile."



THE CREATION OF THE PREVENTION AND WELLNESS TRUST FUND

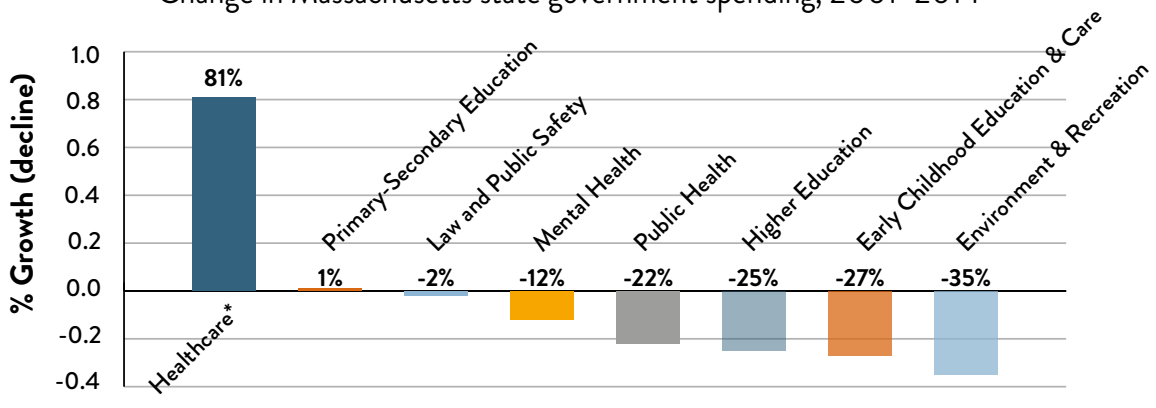
Massachusetts Lawmakers created PWTF, a $57 million resource included in the 2012 healthcare reform law called Chapter 224. The funding itself doesn't come from taxes, but from the healthcare system itself: hospitals and commercial insurers. By directing healthcare funding into community disease prevention, the legislature created a new opportunity for attaining the dual goals of Chapter 224: improving health and reducing spending. In addition, PWTF focuses on:

- reducing rates of the most prevalent and preventable health conditions;
- increasing healthy behaviors;
- increasing the adoption of workplace-based wellness or health management programs that result in positive returns on investment for employees and employers;
- addressing health disparities; and
- developing a stronger evidence-base of effective prevention programming.

WHY MASSACHUSETTS NEEDS PWTF

Healthcare spending in Massachusetts is unsustainable. In 2015, Massachusetts spent $57 billion on healthcare. While healthcare spending slowed, it stayed above the state's benchmark of 3.6% yearly increase. Burdensome healthcare spending diverts resources from public health, early childhood education and care, and mental health. Meanwhile, studies show that clinical services account for approximately 20% of overall health while other factors including individual health behaviors, a person's income, and physical environment account for the other 80%. PWTF provides a model for shifting spending to activities that help maintain or improve the health of citizens rather than spending on costly "sick care."

Change in Massachusetts state government spending, 2001–2014



*** Healthcare expenditure is Group Insurance Commission spending plus MassHealth (Medicaid)**

Source: Healthy People/Healthy Economy: An Initiative to Make Massachusetts the National Leader in Health and Wellness. 2015. Data from Massachusetts Budget and Policy Center Budget Browser. http://www.tbf.org/tbf/56/hphe/Health-Crisis.

CHRONIC DISEASE IN MASSACHUSETTS – A COST DRIVER

The Commonwealth needs a program like PWTF that focuses on those conditions that drive healthcare costs.

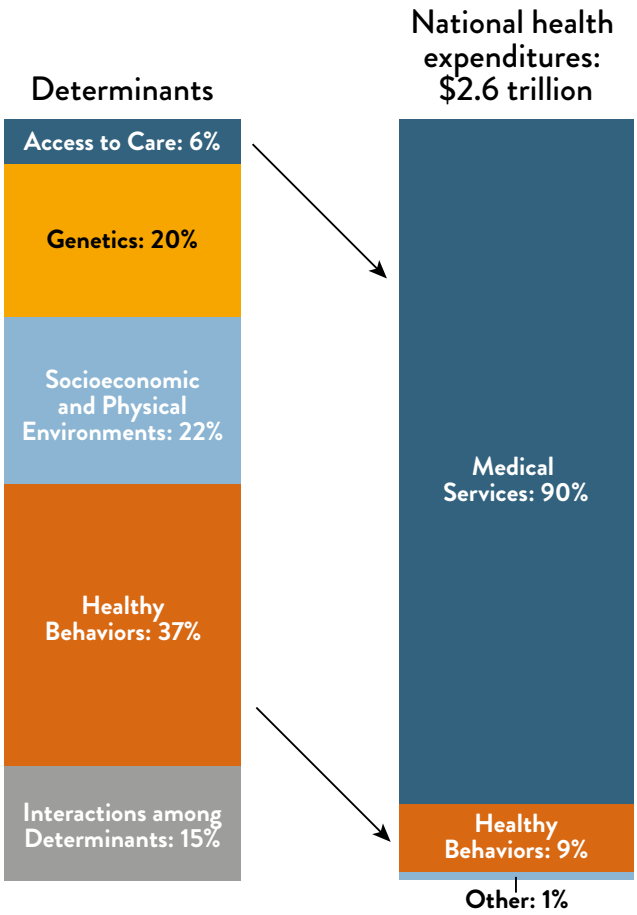
Chronic conditions* affect 52.8%** of Massachusetts' population and ***chronic disease is the ***leading cause of death and disability*** in Massachusetts.[1]

According to the Agency for Healthcare Research and Quality, 82% of all healthcare spending in the United States was on one or more chronic conditions.[2] Massachusetts has higher healthcare utilization compared to the nation with higher rates of readmissions, preventable hospitalizations, and emergency department utilization.[3] These rates are two times higher in lower income communities than in higher income communities, highlighting the stark disparities in outcomes by income, race, and community.[4]

THE PWTF MODEL

The creation of PWTF is a recognition that public health and healthcare need to join forces to improve the health of the Commonwealth's people by directing resources to community interventions that address the most costly health conditions. Targeted investments in healthcare and public health in high-need areas yield a high value for the state. These concentrated efforts, when well organized and well resourced, have an impact not just on people like Arnetta, but on everyone in the community and with time, on the whole state.

The spending mismatch: Health determinants vs. health expenditures



Source: Healthy People/Healthy Economy: An Initiative to Make Massachusetts the National Leader in Health and Wellness. 2015. Data from NEHI 2013. http://www.tbf.org/tbf/56/hphe/Health-Crisis.

PWTF Grantee Program

The PWTF Grantee Program supports nine partnerships, representing both urban and rural communities and covering 15% of the state's population, with a focus on populations with higher burdens of disease.[5] The partnerships have a combined disease burden that is 23% higher than the state and have a 28% higher hospitalization rate for Blacks and Hispanics for the health conditions that the program addresses.[6] The Grantee Program has five key elements:

- extending care into the community ,
- promoting sustainable change,
- focusing on priority conditions and evidence-based interventions,
- targeting sufficient resources to sufficient population levels, and
- using data-driven quality improvement.



The partnerships focus on improving clinical care to keep people well, referring to prevention and wellness services in the community and providing services that are accessible and evidence-based. Community organizations play a vital role by providing culturally appropriate evidence-based interventions and promoting community-wide policies. Community health workers (CHWs) play a central role in the partnerships – they deliver interventions, help patients navigate clinical and community systems, create supportive environments for patients, and eliminate barriers to care. This program is allocated 75% of the Trust funding and focuses on four priority conditions that have a high burden of disease in Massachusetts and can be improved in three to five years. These conditions are: pediatric asthma, high blood pressure, falls in older adults and tobacco use. Arnetta received home assessments services from the Boston Partnership for her falls risk and enrolled in the Matter of Balance community classes.



To date, clinical interventions supported ***better treatment of*** **300,000** ***patients*** across the state.[7] It also ***created*** **317** condition-specific ***clinic and community connections*** resulting in **15,404** ***referrals*** to community prevention programs and **6,992** ***individuals*** who have completed their programs.[8]

PWTF built significant capacity in **48** ***communities*** – **over 13%** ***of cities and towns*** in Massachusetts. ***More than*** **340** ***people*** were supported by PWTF with **148** ***new jobs*** created and **194** ***additional jobs*** expanded.



Massachusetts Working on Wellness

The Massachusetts Working on Wellness Program includes worksite health promotion activities and policies that support employees' efforts to adopt a healthier lifestyle. The Trust allocates up to 10% of the funding for these activities. Working on Wellness provides training, technical assistance, and seed funding to Massachusetts employers to initiate this work for their employees, by teaching the skills to plan and implement a comprehensive wellness initiative.

One hundred and fifty-six employers are actively participating in Working on Wellness, impacting over 70,000 employees, 21% of which are lower-wage workers. Half (50%) of the organizations in Working on Wellness have 200 employees or less.

Massachusetts Department of Public

The Massachusetts Department of Public Health (DPH) has been responsible for the design of the PWTF model, managing and monitoring the resources, and facilitating successful implementation of the programs. Changing healthcare delivery to include public health takes planning. The Department spent over one year developing the PWTF model and procuring the partnerships and vendors to implement the programs. The Department received guidance from the Prevention and Wellness Advisory Board to support alignment of PWTF with healthcare reform efforts as well as to select the partnerships and develop the evaluation strategies.

THE RESULTS

According to the independent evaluators and the Prevention and Wellness Advisory Board, the results of PWTF so far, in terms of outcomes, cost effectiveness and Return on Investment potential, and potentially sustainable system change, are promising.

PWTF Grantee Program Results

PWTF partnerships have successfully linked clinical and community organizations to address the four conditions of pediatric asthma, hypertension, older adult falls, and tobacco use. The program reached a large number of community residents and built the capacity of many clinical and community organizations in communities with significant health burden and health disparities. In some cases, such as older adult falls, PWTF built from scratch health and public health initiatives. In others, such as hypertension, PWTF expanded existing efforts to reach larger numbers of people at risk for poor health. Partnerships have had two years to implement clinical and community interventions that typically require three to five years, or more, to demonstrate results. However, the independent evaluation only had data for a year and a half of implementation. Even at this early stage, the independent evaluation found encouraging results.

Harvard Catalyst's independent evaluation of the Grantee Program found:

HEALTH OUTCOMES AND COSTS

Pediatric Asthma



PWTF Results

- $ Interventions appear to be very cost effective at current rates
- ↓ Decline in overall healthcare costs in PWTF communities compared to comparison communities
- ↓ Declining prevalence in several PWTF communities
- ↑ Almost 6,000 school-based education and care management completions

Hypertension



PWTF Results

- ↓ 0.515 to 0.945mmHg drop in Blood Pressure
- ↑ Increase in Hypertension screening from 58 to 62%
- ↑ Increase in controlled and treated hypertension in several PWTF communities

Projected Impact

5-Year

- ↓ Decrease of 21 to 28 Ischemic Heart Disease hospitalizations
- ↓ Decrease of 96 to 145 stroke hospitalizations
- ↓ Decrease of 28 to 48 Cardiovascular Disease deaths
- $ $2 million to $3 million healthcare costs averted

Lifetime

- ↓ Decrease of 81 to 140 Ischemic Heart Disease hospitalizations
- ↓ Decrease of 444 to 784 stroke hospitalizations
- ↓ Decrease of 127 to 251 Cardiovascular Disease deaths
- $ $9 million to $16 million healthcare costs averted

Older Adult Falls



PWTF Results

- ↓ Decrease in falls by 901 and 220 less injuries
- ↓ Decrease in 7 hospitalizations and 48 other cases requiring medical care
- ↓ $188,000 healthcare costs averted

5-Year Projected Impact

- $ Decrease in falls by 3,000 and 730 less injuries
- ↓ Decrease in 25 hospitalizations and 160 other cases requiring medical care
- $ $660,000 healthcare costs averted

Tobacco Use



PWTF Results

- ↑ 6,396 Housing Units implemented smoke-free policies

Lifetime Projected Impact

If PWTF results in 1 out of 1,000 people quitting smoking:

- ↓ 7 less people would be hospitalized for Ischemic Heart Disease
- ↓ 28 less people would be hospitalized for stroke
- ↓ 8 less people would die from Cardiovascular Disease
- $ $622,118 to $5.6 million in healthcare costs averted

SYSTEM CHANGES

Clinical and Community Linkages 	• Increased capacity and coordination among clinical and community organizations • Enhanced teamwork, task reallocation, and cross-training • Community organizations added value in addressing health equity • New infrastructure developed for older adult falls
Community Health Workers 	• Over 72 community health workers employed to implement interventions • Succeeded in engaging and creating trust with hard-to-reach populations
Building Capacity 	• 304 jobs created or supported by PWTF • Over 500 people trained on PWTF model and interventions
Improving Environments 	• 27 policies implemented in 10 schools, 11 housing authorities, and six affordable housing management companies • Reaching over 22,000 students with asthma • Impacting 45,696 affordable housing units

Working on Wellness Results

The Working on Wellness program has successfully reached and delivered services to organizations that previously had no formal wellness program and few wellness policies or environmental support. In particular, this program has reached a large number of small and moderate-size employer organizations, and a substantial number of low-wage, non-college-educated, and racial/ethnic minority workers. A substantial proportion of these employees had moderate to high health risks, especially being overweight or obese and not consuming the recommended amount of fresh produce per day. The independent evaluation of the PWTF Massachusetts Working on Wellness Program found an estimated savings for medical care ranging from $0.76 million to $4.07 million for the combined top three health behaviors (diet and nutrition, leisure-time exercise, and stress reduction) targeted by the programs.

THE FUTURE OF PWTF

The independent Prevention and Wellness Advisory Board, by a vote of the membership, recommends the legislature reauthorize PWTF (Note: DPH abstained given its role as administrator of the program). Massachusetts needs a program like PWTF. It represents the future of healthcare – a system that focuses on keeping people healthy instead of one primarily focused on treating the sick. As the independent evaluations found, this approach can save Massachusetts money and result in a healthier Commonwealth.

In the coming years, the Advisory Board recommends that PWTF expand its focus to include community wide-approaches aimed at improving population health. This extension of PWTF will allow the Commonwealth to tackle factors outside the healthcare system that significantly impact health, such as poor housing conditions or access to nutritious foods. Continuing the current program will provide an additional year of data to supplement the evidence for PWTF.

Simultaneously, components of PWTF can and should be adopted by Massachusetts healthcare systems, including insurers, now. PWTF has shown prevention programs can work. As the state moves to value-based payments, the evidence-based community interventions in PWTF offer opportunities for health systems to realize savings by preventing illness. Health systems also should incorporate the lessons learned in creating clinical-community partnerships. These lessons will help jump start efforts to expand care outside of clinical settings.

PWTF plays an important complementary role in the evolving healthcare landscape. As Accountable Care Organizations develop, PWTF can foster innovation in healthcare delivery by testing innovative models that can later be adopted by health systems. At the same time, PWTF can extend beyond healthcare to prevent disease by directly impacting the social determinants of health. While some components of PWTF will be incorporated into Accountable Care Organizations in the future, there remains an important role for PWTF that is distinct from, but complementary to, Accountable Care Organizations and value-based payments. These community-wide interventions support Accountable Care Organizations to take on risk by tackling the cost drivers that are beyond the scope of health system intervention.

References

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2. The National Institute of Diabetes and Digestive and Kidney Diseases (2013, February). Chronic Disease and the Health Care Delivery System. niddk.nih.gov. Retrieved November 15, 2016 from https://www.niddk.nih.gov/health-information/health-communication-programs/ndep/health-care-professionals/team-care/chronic-diease-health-care-delivery-system/Pages/publicationdetail.aspx.
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6. Massachusetts Acute Hospital Case Mix Database, Center for Health Information and Analysis. FY2012-2014. Prepared by the Massachusetts Dept. of Public Health.
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PWTF TIMELINE

2012

AUGUST 2012
State legislature created Chapter 224 allocating **$60 million over 4 years to PWTF**

MAY 2013
First funding placed in trust

2013

JUNE 2013
The Prevention and Wellness Advisory Board convenes for first time

AUGUST 2013
Grantee RFR released

2014

JANUARY 2014
Massachusetts Department of Public Health awards **9 grantees across the Commonwealth**

MARCH 2014
Contracts issued for the PWTF Grantee Program

MARCH 2014 – JANUARY 2015
PWTF Grantee capacity building

2015

JANUARY 2015
PWTF Grantee Program implementation begins

FEBRUARY 2015
Harvard selected as independent evaluator for Grantee Program

JUNE 2015
Worksite Wellness contracts awarded to training and TA vendor

AUGUST 2015
Worksite Wellness employers implement worksite wellness activities

2016

SEPTEMBER 2016
317 clinical and community connections made
15,404 patient referrals to community prevention programs
Over 72 Community Health Workers employed through PWTF funding

JANUARY 2017
Independent evaluation report finalized and submitted to the legislature

2017

JUNE 2017
PWTF funding winds down

INTRODUCTION TO THE PREVENTION AND WELLNESS TRUST FUND

The Prevention and Wellness Trust Fund (PWTF) represents an unprecedented investment by the Commonwealth of Massachusetts in combining public health and healthcare strategies with the goal of improving health outcomes and containing healthcare spending.

The goals of PWTF are ambitious. Given rising healthcare costs, any initiative that achieves a measurable decrease in the prevalence of preventable health conditions and the healthcare costs associated with these conditions in less than four years would stand as a model for healthcare redesign in Massachusetts and be a model for other states embarking on this path. In this, PWTF has demonstrated a measure of success. Preliminary analysis by Harvard Catalyst and University of Massachusetts Lowell project PWTF will reduce chronic disease burden in Massachusetts and result in statewide cost reduction.

Over the course of the last four years, PWTF has focused on evidence-based interventions within healthcare settings, community settings, and worksites. PWTF has also aimed to develop a strong linkage between healthcare providers and community-based programs to expand the care of individuals beyond the walls of the health clinic.

The PWTF Grantee Program funds nine partnerships to focus on at least two of four priority conditions, with three optional conditions, that are a significant burden on the healthcare system. The four priority conditions are: pediatric asthma, hypertension, older adult falls, and tobacco use. The three optional conditions are: obesity, substance use, and diabetes.

The four priority conditions were selected so that funded partnerships could demonstrate both improving health outcomes and decreasing costs within three to five years.

The Massachusetts Working on Wellness Program includes worksite health promotion activities and policies to support employees' efforts to adopt a healthier lifestyle. Working on Wellness provides training, technical assistance, and seed funding to Massachusetts employers to initiate this work for their employees, by teaching the skills to plan and implement a comprehensive wellness initiative. To date, 165 employers have participated in the program.

PWTF is funded through a one-time, $57 million assessment on acute hospitals and payers. Under the law, PWTF funds must be allocated as follows: no less than 75% ($42,750,000) must be expended for a grantee program; up to 10% ($5,700,000) can be used for worksite wellness initiatives; and no more than 15% ($8,550,000) can be spent by the Massachusetts Department of Public Health (DPH) on the administration and evaluation of these initiatives.

In accordance with Chapter 224 of the Acts of 2012, this report summarizes the activities that have taken place over the course of the implementation of PWTF.

PWTF GRANTEE PROGRAM



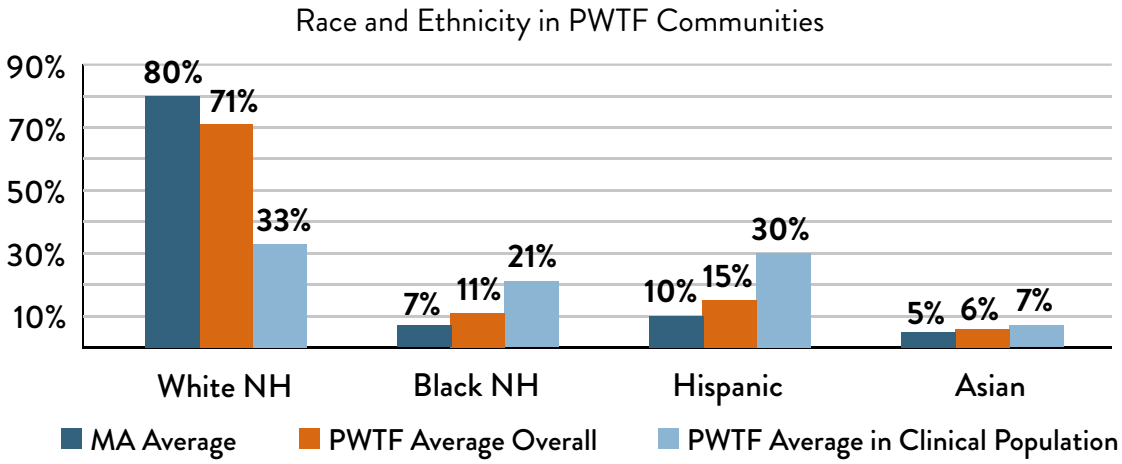
PWTF GRANTEE PROGRAM

REACHING COMMUNITIES MOST IN NEED

The PWTF model reduces disease burden by focusing on community-based prevention and wellness programs and creating a strong connection to clinical care. Using a health equity lens, PWTF focused resources on those communities most affected by disease and impacted by the social determinants of health. PWTF communities have higher disease burden, higher preventable healthcare utilization, and significant disparities in health outcomes by race, ethnicity, and age.

High-Risk Population

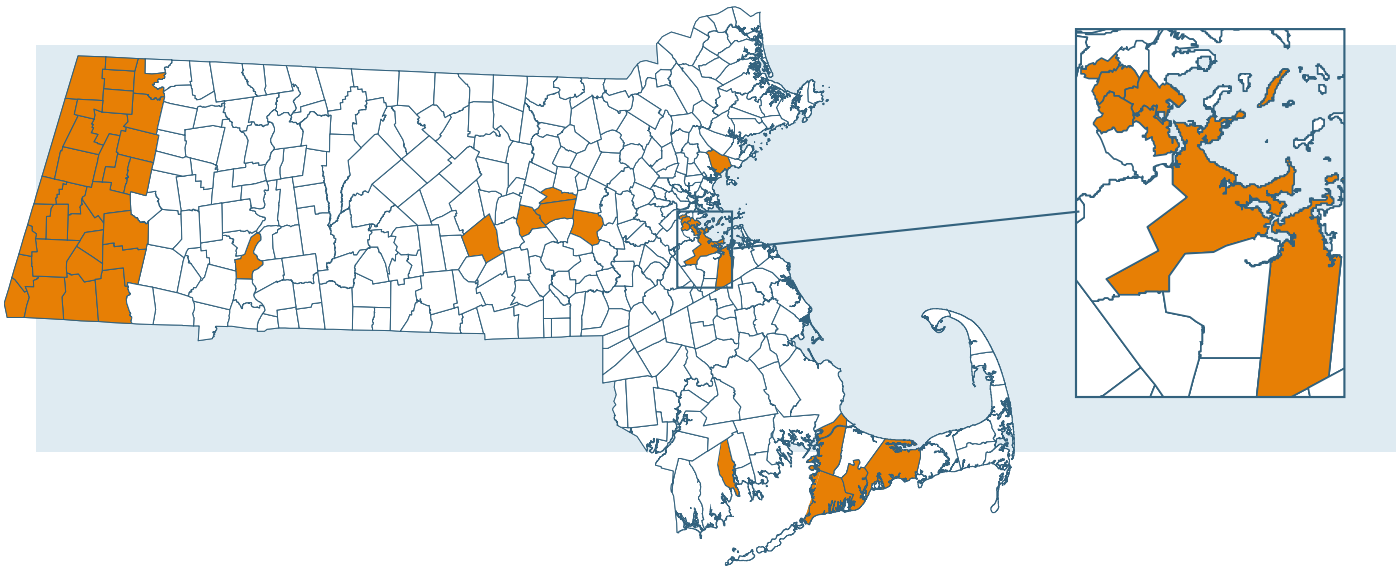
PWTF strategically invested resources in communities of high need. Over 900,000 people reside in the communities implementing PWTF – representing 15% of the state population.[1] Together, these communities are 71% White, 11% Black, 15% Hispanic, and 6% Asian (compared to 80% White, 7% Black, 10% Hispanic, and 5% Asian for the state).[2] Approximately 300,000 people are seen in PWTF clinics every year.[3]



Sources: MA Average & PWTF Average Overall – American FactFinder, United States Census Bureau. 2010-2014. Prepared by the Massachusetts Dept. of Public Health; PWTF Average in Clinical Population - PWTF Clinical Data, Massachusetts Dept. of Public Health. 2015. Prepared by the Massachusetts Dept. of Public Health.

Within those communities, PWTF targeted resources to low-income communities of color with the funded clinics serving 33% White, 21% Black, 30% Hispanic, and 7% Asian patients.[4] The percentage of individuals who speak a language other than English at home is 21% (compared to 16% for the state). Twenty percent of families living in PWTF communities have incomes less than the Federal Poverty Level, compared to the state average of 12%. For individuals in PWTF communities the rate is 17% of Federal Poverty Level compared to state average of 11%.[5] To test the model in various settings, the funded communities represent both urban and rural communities and are spread across the state.

Map of PWTF Communities



Barnstable Prevention Partnership

Barnstable, Mashpee, Falmouth, and Bourne

Coordinated by: Barnstable County Department of Human Services

Berkshire Partnership for Health

Berkshire County

Coordinated by: Berkshire Medical Center

Boston Partnership

Roxbury and North Dorchester

Coordinated by: Boston Public Health Commission

Healthy Holyoke Partnership

Holyoke

Coordinated by: Holyoke Health Center

Lynn Partnership

Lynn

Coordinated by: City of Lynn Public Health Department

MetroWest Prevention & Wellness Partnership

Framingham, Hudson, Marlborough, and Northborough

Coordinated by: Town of Hudson Health Department

Quincy Weymouth Wellness Initiative

Quincy and Weymouth

Coordinated by: Manet Community Health Center

Southeastern Health Initiative for Transformation (SHIFT) Partnership

New Bedford

Coordinated by: City of New Bedford Health Department

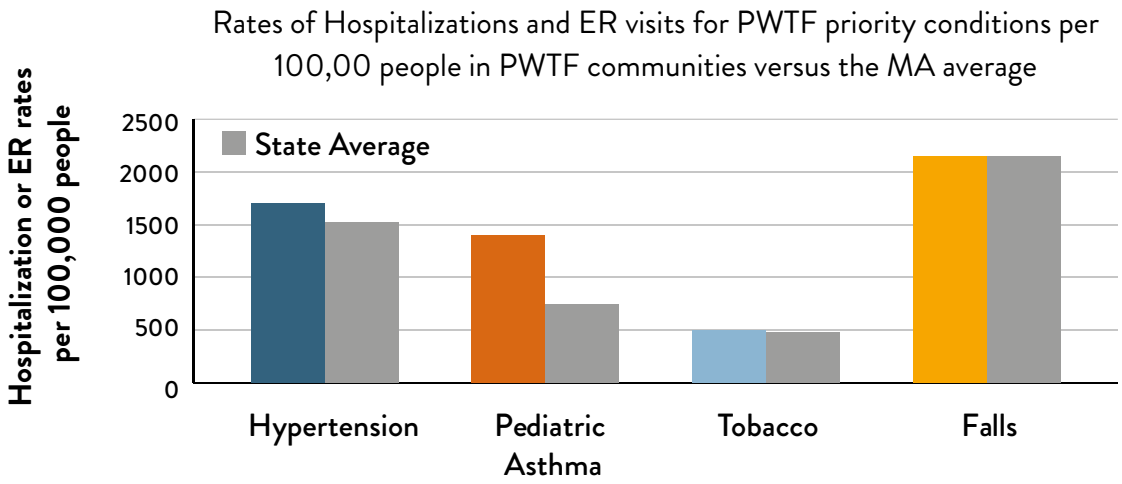
Worcester Partnership

Worcester

Coordinated by: City of Worcester Division of Public Health

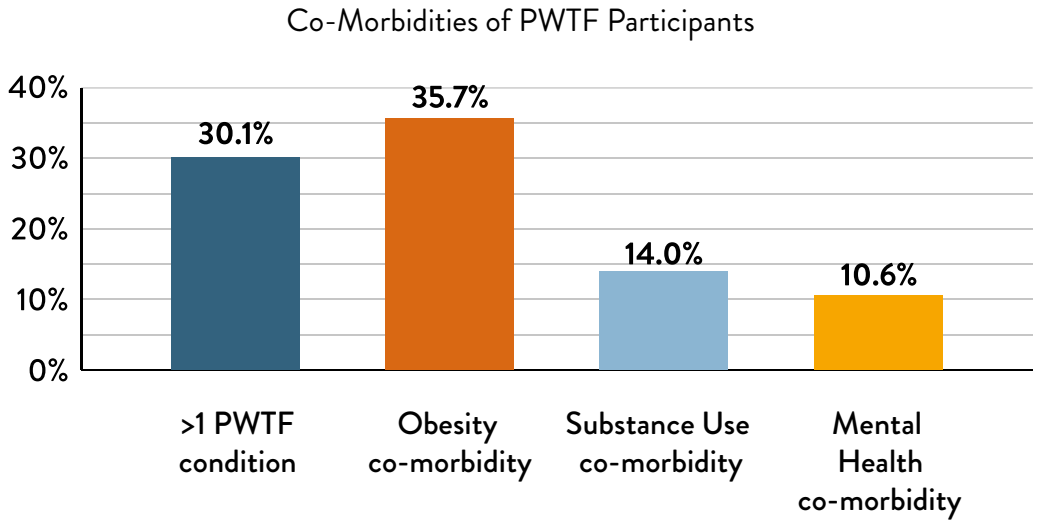
Higher Disease Burden

The nine PWTF partnerships represent 15% of the state's population and have a combined disease burden in the four health priority areas of 23% above the state average.[6] These selected communities carry a higher disease burden than the state as a whole.



Numerator – source: Massachusetts Acute Hospital Case Mix Database, Center for Health Information and Analysis. FY2012-2014. Prepared by the Massachusetts Dept. of Public Health. Denominator – source: American FactFinder, United States Census Bureau. 2010-2014. Prepared by the Massachusetts Dept. of Public Health.

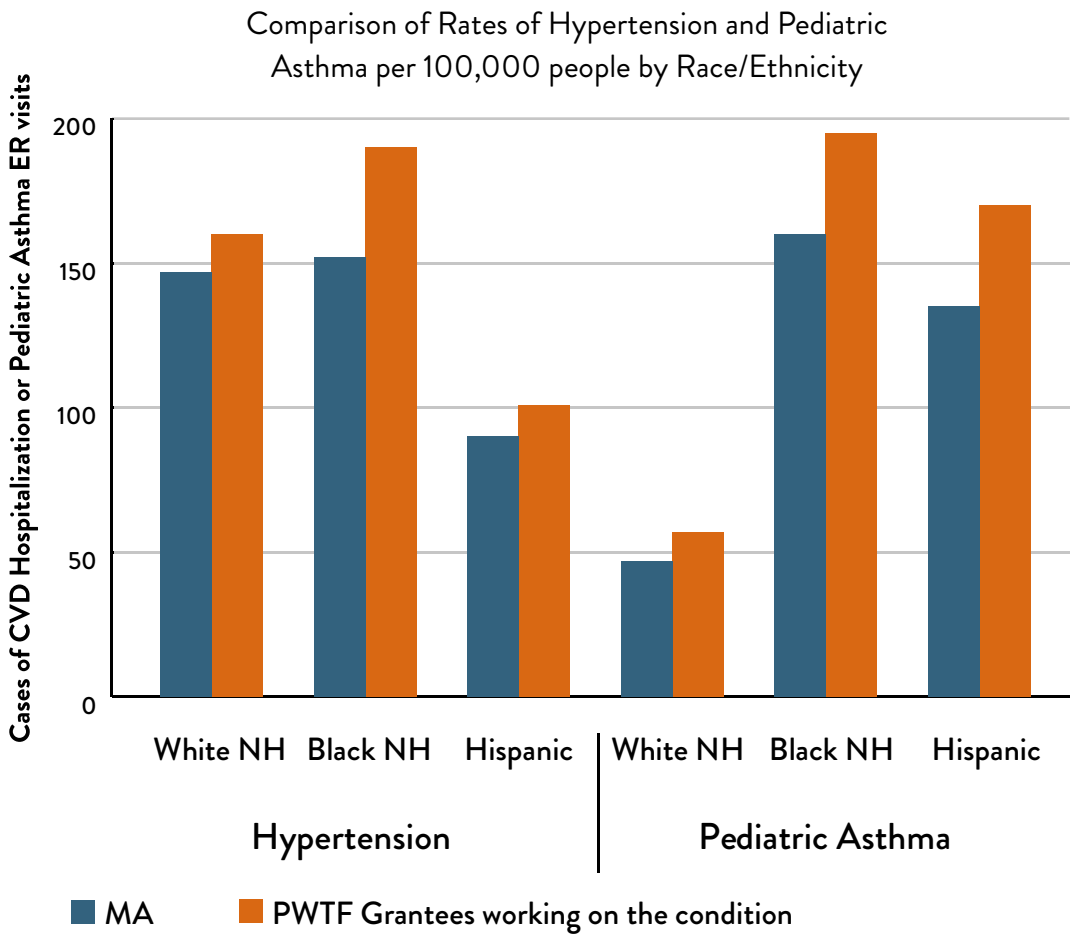
Addressing these conditions is further complicated by co-morbidities: 30.1% of PWTF participants have more than one of the priority conditions.[7] Additionally, there are significant co-morbidities with obesity, depression, and substance use.



Source: PWTF Clinical Data, Massachusetts Dept. of Public Health. 2015. Prepared by the Massachusetts Dept. of Public Health.

Significant Health Disparities

While PWTF communities have a higher burden of disease compared to the Commonwealth, these diseases disproportionately impact certain populations: people of color, children, and families and individuals with incomes below the Federal Poverty Line. In heart disease, asthma, older adult falls, and COPD, PWTF communities have combined hospitalization and emergency department visit rates for Blacks and Hispanics that are 28% higher than the state average.[8]



Numerator – Source: Massachusetts Acute Hospital Case Mix Database, Center for Health Information and Analysis. 2011-2014. Prepared by the Massachusetts Dept. of Public Health. Denominator – Source: American Fact Finder "Sex by Age (Race)" Tables, US Census Bureau. 2013 Five Year Estimates. Prepared by the Massachusetts Dept. of Public Health.

Also, people in PWTF communities tend to die approximately a half-year earlier from the priority conditions than the rest of the state (mean age at death from a priority condition is 73.87 for PWTF versus mean age 74.39 for Massachusetts).[9] This half-year difference translates into PWTF communities losing an additional 7,840 extra years of life annually when compared with the state.

The Social Determinants of Health

The social determinants of health — where people live, learn and play — have an important role in the quality of life, health status, and healthcare utilization of many individuals in PWTF communities. Based on 2010-2014 American Community Survey data, 16.6% of residents in PWTF communities do not have any vehicles in their household, compared to the state average of 12.6%. Additionally, 47.1% of residents of PWTF communities rent their homes (versus 37.7% of all residents) and for 42.5% of these renters covering the cost of rent required more than a third of their total household income.[10] Over 8% of Massachusetts's Behavioral Risk Factor Surveillance Survey respondents in PWTF communities for 2013-2015 forwent a needed medical visit due to cost of care (the state average for this time period was 7.8%).[11] The unemployment rate in PWTF communities was 10.4% compared to 8.4% in Massachusetts overall.[12] Lastly, federally-qualified health centers participating in PWTF treat over 9% of the state's total MassHealth population and over 51% of patients at the PWTF federally qualified health centers are covered by MassHealth.[13]



PARTNERSHIP FEATURE STORY

KEEPING HEALTH EQUITY AT THE FOREFRONT: BOSTON PARTNERSHIP

As Coordinating Partner for the Boston Partnership, the Boston Public Health Commission has focused its efforts on Boston's Roxbury and North Dorchester neighborhoods. Community health data shows that Black and Latino residents, who are concentrated in these neighborhoods, are most affected most by chronic conditions. Out of the 140,000 residents in these two neighborhoods, 42% identify as Black and 23% identify as Hispanic/Latino.

"We are working in Boston to achieve health equity and are doing so by addressing the social determinants through a population-based approach with our clinical and community partners. The social determinants are influenced by the economic and physical environments as wells as social injustices," says Nicole Rioles, Program Director of the Boston Partnership. "As a result, on average, Boston residents who are White experience better health than many residents of color."

In 2013, only 18.6% of White residents had hypertension, as compared to 36.7% of Blacks and 26.2% of Latinos.[14] To address this disparity and to increase access to services to non-English speaking patients, the Boston Partnership launched Tomando – the Spanish-speaking, culturally-adapted hypertension program.

Many agencies played a vital part in the rollout of Tomando programs: Ethos initiated communication among partners and provided training and materials to DotHouse, the clinical partner; a CHW identified a community venue that led to new relationships with the Boston Housing Authority; and community-based sites supported outreach and recruitment. This collaboration led to eight multilingual trained leaders and eventual implementation of the programs. Participant engagement strategies included hosting a number of "Session 0s" to get qualified residents to understand the program. And, participants were encouraged to call each other during the week for peer support.

The additional recruitment and engagement effort for Tomando resulted in better completion rates (on average 28% higher) than its English-speaking counterpart, the Chronic Disease Self-Management Program. As this inter-agency collaboration shows, if partners can cross barriers working together, then social and economic barriers can also be diminished.



PWTF GRANTEE PROGRAM

PWTF GRANTEE MODEL: MEETING PEOPLE WHERE THEY LIVE, LEARN, AND PLAY

The Massachusetts Department of Public Health (DPH) in conjunction with the Prevention and Wellness Advisory Board designed the PWTF Grantee Model around five key elements:

1. **Extending Care into the Community**
   With the shared goal of improving the health of the people in the community, a strong community and clinical linkage can coordinate and extend care, fill gaps in needed services, and identify and address non-clinical barriers to care. In recent years, healthcare has increased its efforts to link more effectively with community services by leveraging community resources and supportive environments to complement and strengthen delivery of clinical care.

2. **Promoting Sustainable Change**
   PWTF invested in partnership development, health system changes and institutionalizing the clinical-community linkage to ensure a lasting impact beyond the trust. While creating sustainable change required a significant investment, the connections made will have a lasting impact on PWTF communities, clinics, and organizations.

3. **Focusing on Priority Conditions and Evidence-Based Interventions**
   DPH and the Prevention and Wellness Advisory Board worked together to select health conditions that had a high statewide prevalence with significant healthcare costs, a strong intervention evidence-base that showed improvements in three to five years and access to data for evaluating impact. Four conditions met these criteria: **pediatric asthma, hypertension, older adult falls, and tobacco use**.

4. **Targeting Resources – Sufficient Population Size and Funding Levels**
   To meet the ambitious goals of PWTF, DPH and the Advisory Board limited the number of awards to nine. Funding went to those communities with a sufficient population size that could reach enough residents to allow for evaluation of PWTF.

5. **Using Data-Driven Quality Improvement**
   In order to make real-time intervention corrections using current data, DPH uses continuous quality improvement as its main technical assistance approach. Based on the Institute for Healthcare Improvement Learning Collaborative model,[15] DPH supports three condition-specific collaboratives on asthma, hypertension, and older adult falls.



BUILDING STRONG CLINICAL AND COMMUNITY PARTNERSHIPS – SHARED LEADERSHIP

To meet the goals of improving outcomes while controlling costs, health systems need to engage non-traditional partners who can extend care into the community and address the social determinants of health. However, a recent national study found that only one in five Accountable Care Organizations (ACOs) engage community partners, with 89% citing lack of funding for the disconnect.[16]

A strong partnership between clinical and community partners is the foundation of PWTF. In PWTF, healthcare clinics, such as community health centers, ally with community-based organizations, like YMCAs and Boards of Health, to improve community outcomes. PWTF required partnerships have a minimum of three distinct partners: a municipality or regional planning agency, a community-based organization, and a clinical partner. All partnerships added significantly more partners – an average of eight per partnership with a range of 5 to 16 partners.

Across the state, 97 partners work in the 9 partnerships to revolutionize the delivery of healthcare and are reaching approximately 300,000 patients in the clinic per year and are extending care to at least an additional 13,000 individuals outside of the clinic walls.[17]

"I think this clinical-community connection is the future of healthcare, and it's really the only way we're going to be able to improve population health, and so I think there's so much work that's done to kind of getting these systems up and going, and we just – it would be a shame for it to just stop here because I think when we're changing people's health it doesn't happen overnight. It happens over years." – **Partnership Member, Harvard Evaluation**



PWTF Partnership Approach

To ensure successful collaboration on its ambitious goals, PWTF adapted the Collective Impact approach for partnership formation and implementation.[18] The five main principles of this approach include a common agenda, shared measurement, mutually reinforcing activities, continuous communication, and backbone support.

1. **DPH required the lead agency, called Coordinating Partner, to have a governing body whose membership reflects the key partners doing the work of PWTF.** This body sets a common agenda through shared decision-making on the overall approach to each condition as well as the budget and partners needed to accomplish its goals. Condition-specific working groups implement and coordinate the interventions using work plans.

2. **DPH provides partnerships with measures embedded in condition-specific guidance documents, called charters, that all partnerships receive from DPH to guide their work.** DPH continuously tracks these shared measures for each condition – providing reports to each partnership on a quarterly basis, which the partnerships then regularly use to evaluate their work.

3. **The PWTF model centers on mutually reinforcing activities.** It links clinical care to community interventions, thus extending the support an individual receives for their condition from the clinic to the community. Community health workers (CHWs) provide additional support as they guide patients from the clinic to the community and assist with overcoming any barriers to care, such as accessing transportation or addressing social needs.

4. **Developing trust among partners takes time and effort.** PWTF partnerships have built solid foundations because they invested in their partnership and supported open communication. In PWTF partnerships, the actions of each partner depend on the actions of the others. Thus, if a clinic doesn't screen patients for falls risk, the community program will have no individuals for a falls prevention class. If the CHW doesn't send a feedback report for her asthma home visit, the physician will be unaware that the child's asthma is poorly controlled. This bi-directional communication is core to the PWTF model and essential to integrating care outside of the clinic.

5. **Lastly, central to the PWTF model is the Coordinating Partner that guides the vision, coordinates the work, and provides fiscal management.** This backbone agency plays a very important role in making sure the resources are allocated and expended appropriately and in creating a culture of collaboration and cooperation. Organizational capacity and stability are important to fulfill this role.

Highlight on Shared Leadership

As health systems embark on new partnerships with community organizations, understanding how to craft a successful relationship has significant value. These non-traditional partnerships require good communication, shared goals, and trust to work. In order to ensure equal footing of clinical, municipal, and community partners, PWTF requires funding go to a partnership of organizations instead of one organization, although the Coordinating Partner is the fiscal lead for the contract. PWTF also required governance structures that encourage active participation of all partners. All partnerships developed executive committees or governing boards that had representation from all the major partners and that made key decisions about program delivery, budget, and membership.

Shared Decision-Making

This partnership approach has paid off. In a survey conducted by DPH, 94% of partners believe that their organization has the ability to weigh in on partnership decisions and 77% feel that all partners have comparable levels of decision-making when compared to the Coordinating Partner.[19] Over 96% of the partners felt that PWTF enhanced their capacity to address the health issues that were most important to their community, developed their capacity to handle a large-scale project like PWTF, resulted in valuable relationships, allowed them to have a larger health impact than when acting alone, and provided an opportunity to improve health equity in their community.[20]

"PWTF has deepened our working relationship with other organizations in the community. We also have tremendous advantages within our clinical team, focusing on population health in a new and fully dedicated way. Our providers are ON-BOARD with these quality improvements!" [21]
– Worcester Partnership Member

Importance of the Coordinating Partner

Partnership doesn't happen without intention, especially when undertaking such a large-scale project. It also requires vision and leadership. The Coordinating Partner plays an integral role to the success of the partnership. It has a difficult job of both motivating and coordinating the work while also holding the partners accountable. A successful Coordinating Partner needs sufficient organizational capacity and managerial experience to manage multiple relationships with a variety of partners to bring them together under a common shared vision. As the anchoring institution, it also must have a stable organization that can handle the fiscal responsibilities. Partnerships managed five to 16 partners focused on two to four priority conditions with each condition including an average of three interventions each. Without this function, PWTF would not have been so successful.

CREATING STRONG PARTNERSHIPS: BARNSTABLE PREVENTION PARTNERSHIP

Cape Cod is known for its unique geography and demography – a peninsula with a sub-urban to rural rapidly aging population. This has encouraged a unique way of organizing an effective partnership. Coordinated by the Barnstable County Department of Human Services, the Barnstable Prevention Partnership is comprised of three clinical sites and two community-based organizations. Although small in numbers, these partners were selected because of their impact in the community. While most of these partners were already familiar with each other's work and collaborated in other areas, the Barnstable Partnership benefitted from putting in place systems that guide the project's financial reporting and program implementation.

The Barnstable County Department of Human Services, as Coordinating Partner, established a system of accountability and transparency for each cooperating partner organization. Since the beginning of the work, in 2014, each has submitted monthly expenditure reports, programmatic narrative reports, and referral data. This allowed the Coordinating Partner to track program performance and focus on areas for improvement in a timely manner.

The Barnstable County Department of Human Services meets monthly with the Chief Executives of the five implementing partners as a Governing Team to set and oversee the direction of the Partnership, its budget, and its work products. As Vaira Harik, Program Manager for the Barnstable Partnership, notes, "From the very outset of this work the PWTF model has required transparency within the partnership—to the point where we openly discuss budgets and productivity as a group."

Workflows are clearly defined as is each partner's role in the clinical-community linkage and these delineations have contributed greatly to the success of the Partnership. According to one implementing partner, "I can testify to how functional our partnership is and I think that is mostly because there is a lot of cohesion and everyone owns their share of the work; that helps us more than you know."

Additionally, the Partnership established an Interventions Workgroup, which meets monthly. The Workgroup brings together middle management and front-line staff—nurses, care coordinators, and CHWs—to implement interventions for all three conditions being addressed by the Partnership.

As a result of the workgroups, executive committee meetings, internal reporting, and shared decision-making, the Partnership's referral numbers have steadily increased and the new working relationships between the clinical and community providers have become standardized and routine.



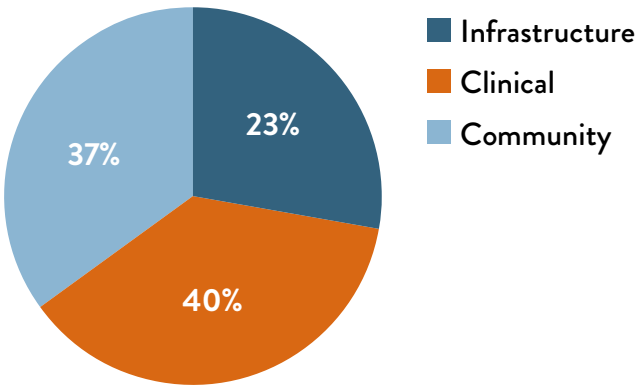
Building Capacity in Communities

PWTF built significant capacity in 48 communities – over 13% of cities and towns in Massachusetts. Over 342 people were supported by PWTF with 148 new jobs created and 194 additional jobs supported.

The chart below breaks down overall spending in all nine partnerships by the main focus areas of infrastructure, clinical, or community. Infrastructure spending encompasses the expenses of the Coordinating Partner as the backbone agency and includes staffing, information technology, quality improvement support, communication expenses, and other related backbone agency expenses. The expenses in clinical cover all the funding received by clinical organizations; it covers medical providers, CHWs, and site-specific quality improvement support, training, site-specific information technology, among other items. The community expenses are all the funding received by community-based organizations; it includes staffing such as trainers, CHWs and health educators, client transportation, and training, among other items.

Partnership Spending by Focus Area

March 2014 – June 2016



BAAs, MOUs and Data Sharing Agreements

Making clinical-community partnerships work requires clear agreements about roles, responsibilities, resources, data, and data protections. PWTF partnerships used memoranda of understanding, business associate agreements and data-sharing agreements to formalize their relationships.

FUNDING LEADERSHIP

PWTF requires that each Coordinating Partner dedicate resources to managing the partnership. Each partnership had to have, at a minimum, a dedicated coordinator or manager position, paid by PWTF funds. The percent effort on this position ranges from part-time to full-time. Each partnership also dedicates a small percentage of a senior manager's time to champion the effort internally and provides additional guidance. Often this person's time is in-kind. Their time commitment ranges from 10 – 25%. Other partnership coordination roles funded by PWTF include Grants Manager or Administrator, Quality Improvement Coordinator, Administrative Assistant, Evaluator or Data Analyst, and Information Technology or Electronic Health Record Specialist. These roles vary by partnership and sometimes are performed by consultants or contractors.

LESSONS LEARNED ON BUILDING PARTNERSHIPS

1. **As mentioned in previous reports, forming relationships and ramping up interventions takes time.** PWTF provided six to nine months for capacity building but most partnerships needed one year to prepare for full-scale intervention implementation. Dedicating time to formalizing the relationship is important. The capacity-building period should focus on: formalizing relationships with business associate agreements, memoranda of understanding and data-sharing agreements; hiring and training staff; reviewing clinical data and assessing patient populations; developing work flows; creating work groups or teams; developing work plans; and making any needed electronic health record changes.

2. **Shared governance structures allow for strong partnerships.** Clinical-community partnerships should make clear the governance structure and decision-making process. While shared decision-making may not be feasible for all partnerships, consider developing an Advisory Board for the clinical-community activities that has equal representation from clinical and community organizations.

3. **The importance of the Coordinating Partner or backbone agency role cannot be understated.** Investing in a backbone agency or office to coordinate and lead the complex work of a program such as PWTF is essential. Accountable Care Organizations (ACOs) and other initiatives should consider investing in a Coordinator and other supportive positions (such as Quality Improvement Coordinator or Data Analyst) to make their clinical-community partnership successful.

4. **Technical assistance is needed to support this model.** Funders supporting clinical-community partnerships should invest in technical assistance to make these partnerships successful. DPH provided technical assistance in the areas of developing referral work flows, adapting IT, mapping electronic health record data pulls, developing common metrics, training staff, developing work plans and budgets, and supporting hiring with sample job descriptions. This type of technical assistance can speed the partnership process and ensure good communication.

PWTF GRANTEE PROGRAM

TRANSITIONING CARE INTO THE COMMUNITY: CLINICAL-COMMUNITY LINKAGES

"One of the most inspiring parts of my job has been witnessing the incredible journeys of our patients as they venture through the Chronic Disease Self-Management Program curriculum. The stories they share, the vulnerabilities they face, and the progress they make when they become truly engaged in their own healthcare is humbling. I feel very fortunate to walk alongside these patients as they strengthen my commitment to and belief that improving health involves strengthening and fostering community." **-Alison Quinn-Beitscher, FNP**

In PWTF, good health is created in the community where people spend most of their time. Clinical providers, who treat disease, link to community organizations that provide disease management and prevention programs. This linkage extends care into the community to promote healthy behaviors. Research has found clinical-community linkages reduce and prevent diseases in the community.[22] PWTF focuses on linkages that are bi-directional, real-time, and data-driven.

FROM JANUARY 2015 – SEPTEMBER 2016:

317 condition-specific ***clinic and community connections***

15,404 patient referrals to ***community prevention programs***

6,992 individuals ***completed the programs***

The PWTF clinical-community linkage model has three main components:

1. clinical systems change to treat and screen for health conditions or risk,
2. linkage of clinical patients to community programs to provide education and support to effectively prevent or manage these conditions, and
3. expansion of community capacity to provide prevention and wellness programs.

Aligning with the Chronic Care Model, PWTF gave shape to these three components.[23] CHWs play a central role in this model – navigating patients from the clinic to the community, conducting the community interventions, and addressing patients' social needs. **Over 72 CHWs are employed through PWTF – the most of any Massachusetts initiative.** PWTF has many supporters in healthcare with providers reporting that their patients are healthier and more engaged in care.

DPH guides the clinical and community work using the Institute for Healthcare Improvement's Model for Improvement framework.[24] This framework focuses on goal-based teamwork that uses small tests of change (called Plan-Do-Study-Act cycles or PDSAs) to address opportunities for improvement. The Learning Collaborative model includes developing common goals and metrics outlined in charter documents, offering shared learning through individual team and PWTF-wide meetings, conducting small tests of change before wide-scale implementation, and using performance data to assess progress. DPH wove this model throughout the design of PWTF, its delivery of technical assistance, and the grant deliverables.



IMPROVING CLINICAL CARE: MOVING FROM SICK TO WELL CARE

PWTF focuses its clinical efforts on improving care delivery for chronic conditions in the primary care setting. The PWTF clinics see 300,000 patients annually.[25] Primary care settings manage approximately 70-80% of chronic disease[26] and play a central role in preventing hospital use. According to the Agency for Healthcare Research and Quality, 82% of all healthcare spending in the United States was on one or more chronic conditions.[27] Compared to the national average, Massachusetts has higher rates of readmissions, preventable hospitalizations, and emergency department utilization.[28] These rates are two times higher in lower-income communities than in higher-income communities, highlighting the stark disparities in outcomes by income, race, and community.[29] **Enhancing primary care's ability to identify, treat, and refer patients with chronic conditions is a cornerstone of improving outcomes and controlling cost in the PWTF model.**

"Primary care providers are often the first contact people have with the healthcare system. Adults who have a primary care physician have 33% lower costs and 19% lower chance of dying than those who see only a specialist. By investing in primary care, PWTF is investing in preventative medicine." **Dr. Paul Mendis, Medical Director of Neighborhood Health Plan and Prevention and Wellness Advisory Board Member**



THE PWTF CLINICAL APPROACH

PWTF focuses on transforming health systems from caring for the sick to ones that are proactive and focused on keeping patients healthy. The goals of PWTF align with the triple aim for healthcare to improve the patient experience, achieve better health outcomes, and reduce healthcare costs. PWTF clinical teams aim to improve their efforts to identify, treat, and refer patients with childhood asthma, hypertension, diabetes, or at risk of falling, and are 65 years or older or engaging in the high-risk behaviors of tobacco and substance use. The core elements of this transformation, aligned with the Chronic Care Model, include 1) delivery system redesign, 2) guidelines-based care, and 3) population health management. **All these elements combined to enable 32 clinics to better treat 73,614 patients with chronic conditions across the state.**[30]



THE TRIPLE AIM

1. **Delivery System Redesign**

   PWTF clinical sites focus on redesigning their care delivery to better identify, treat, and refer patients. PWTF provided technical assistance to clinics to support care delivery redesign. These efforts included staff training on PWTF interventions and quality improvement, support with workflow development, data collection tools, data reports on charter measure performance, coaching from subject matter experts, and shared learning from peers at statewide learning sessions. System redesign is not possible, however, without clinical champions. DPH strongly encourage clinical sites to find and support provider champions. These champions are physicians, nurses, or physician assistants. They are the lynchpin of health system redesign because they motivate the care team and work with leadership to institutionalize changes.

   Some clinical sites have teams of champions that include a senior level clinician and several nurse champions focused on different conditions or one for each clinical team or pod. PWTF funding supported 164 clinical team members, trained 59 CHWs on CHW core competencies, and trained almost all of the clinical members on quality improvement. Thirty CHW supervisors were also trained. Many of the changes in care delivery, specifically EMR changes, are now embedded in the organizational processes and sustainable.

PWTF SUBJECT MATTER EXPERTS

Condition	Specialty*	Name	Title
Falls	STEADI	Patricia MacCulloch, DNP, MS	Clinical Asst. Professor, College of Health Sciences School of Nursing, UMass Lowell and Adult NP at UMass Memorial, Worcester
Falls	Assisted Home Safety Assessment	Julie St. John, DPH	Assistant Professor, Dept. of Public Health, Graduate School of Biomedical Sciences, Texas Tech University Health Sciences Center
Falls	Assisted Home Safety Assessment	Kalpana Shankar, MD, MPH	Assistant Professor, Dept. of Emergency Medicine, Boston University School of Medicine
Falls	MOB/Tai Chi	Jennifer Raymond, MBA, JD	Healthy Living Center of Excellence
Falls/ Hypertension	MOB/Tai Chi and CDSMP	Robert Schreiber, MD	Medical Director of Evidence-based Programs, Hebrew SeniorLife Department of Medicine, Medical Director of the Healthy Living Center of Excellence, Clinical Instructor of Medicine, Harvard Medical School
Falls/ Hypertension	MOB/Tai Chi and CDSMP	Susan Poludniak RD, LDN	Healthy Living Center of Excellence
Falls/ Hypertension	MOB/Tai Chi and CDSMP	Jonathan Howland, PhD, MPA, MPH	Director, Public Health and Injury Prevention Research Center, Boston University Medical Center, Dept. of Emergency Medicine
Hypertension	Clinical Care	Naomi Fisher, MD	Director, Hypertension Specialty Clinic at Brigham and Women's Hospital, Associate Professor, Harvard Medical School
Hypertension	CDSMP	Ana Karchmer	Caregiver Family Support Manager, Executive Office of Elder Affairs
Tobacco	Tobacco Cessation	Nanette Vitali	Contract Manager, Center for Tobacco Treatment Research and Training, UMass Medical School
Tobacco	Smoke-Free Housing	Christopher Banthin, JD	Director, TCRC/Senior Staff Attorney, Public Health Advocacy Institute, Northeastern University, School of Law
Tobacco	Smoke-Free Housing	Kathleen McCabe, MPA	Managing Director, Policy & Practice, Health Resources in Action
Tobacco	Smoke-Free Housing	Katherine Connolly	Program Associate, Policy & Practice, Health Resources in Action
Asthma	Pediatric Asthma	Megan Sandel, MD, MPH	Associate Professor of Pediatrics, Boston University School of Medicine

*CDSMP: Chronic Disease Self-Management Program MOB: Matter of Balance

PARTNERSHIP FEATURE STORY

EMBEDDING QUALITY IMPROVEMENT: BERKSHIRE PARTNERSHIP FOR HEALTH

Unique compared to other Partnerships, Berkshire Partership for Health strategically placed a quality improvement advisor within their clinical backbone, the Berkshire Medical Center. Darlene Blanchette's formal title is Performance Improvement Specialist, which only suggests part of her role – instead one could call her the "Quality Connector."

As a connector, she participates in all partnership-wide meetings and trainings to ensure consistency – standard methodologies must be incorporated across all settings. She leads the development of partnership-related algorithms, Plan-Study-Do-Act cycles, and workflow processes. Often, Darlene is used as a resource for practice and partnership staff, including CHWs, by providing new employees with quality improvement orientation and booster trainings for existing staff.

By having a pulse on the progress made and an understanding of the Partnership's connections with other work, Darlene can also assist in the assurance of metric and data alignment (Patient Centered Medical Home, PWTF, Medicare Access and CHIP Reauthorization Act, Merit-based Incentive Payments) within the clinical continuum of care. "I know that keeping consistent data is at the forefront of the Partnership," says Darlene. "As a result, my role acts as the connector of all data submission and analysis."

Quality improvement was a challenging undertaking for most of the clinical and community partners in the Berkshires. Prior to PWTF, many of the sites did not use Plan-Study-Do-Act cycles consistently. Berkshires Partnership Manager, Kimberly Kelly stated, "This role allowed the Berkshire Partnership to integrate practical quality improvement processes into nearly every aspect of their work. We know we can continue to improve the quality of service and care for our rural populations."



2. Guidelines-Based Care

Providing guidelines-based care is the second element of the clinical model.

National guidelines, developed by the National Heart, Lung, and Blood Institute for asthma; Joint National Committee on High Blood Pressure for hypertension; Centers for Disease Control and Prevention for older adult falls; and U.S. Public Health Service for tobacco use, codify the best available evidence on the identification, diagnosis, treatment, and patient education on the specific diseases.

An estimated 30 - 35% of healthcare spending is waste, with 14% coming from clinical care.[31,32] One reason cited for clinical waste is lack of adherence to national clinical guidelines. DPH supported guidelines-based care for all patients through training and support from Quality Advisors and subject matter experts. **Over 30 different trainings have been provided reaching over 500 clinical staff[33] to support the best clinical management for the priority conditions.** For example, since January of 2016, 14 clinical sites have trained 256 staff on falls risk assessment and treatment in older adults. In addition, subject matter experts work one-on-one with clinical sites to troubleshoot the barriers to guidelines-based care. This support has resulted in 47.8% of patients who are 65 and older being screened for falls risk in PWTF clinics, up from the baseline of virtually zero percent.[34] In addition, in the last two years, clinics made 2,000 new hypertension diagnoses for previously undiagnosed patients.[35]

CULTURALLY COMPETENT CARE: THE ROLE OF A CLINICAL COMMUNITY HEALTH WORKER

Culturally competent care ensures access and quality for patients from different backgrounds and languages. Not only does such care include medical interpretation, but it also includes an understanding of how different cultures approach illness. In PWTF, CHWs have played a critical role in creating a bridge from the patient to the clinic — creating trust and advocating for patient needs. CHWs are hired for their community background and experience. They come from the community they serve and represent the culture or ethnicity of that population. CHWs in PWTF speak a variety of languages from English to Spanish and Portuguese. Forty-eight community health workers supported PWTF clinical care. They provided patient navigation, referral support, patient education, assistance with mitigating barriers to controlling their chronic conditions, translation support, and acted as a liaison to the primary care team.



3) Population Health Management

PWTF focuses on ensuring primary care clinicians have the information and systems needed to effectively manage their patients' care within their limited amount of time. A patient panel population health management approach assists providers in identifying their patients at the highest risk and strategically addressing their needs. This work includes having patient registries that identify all people with or at risk for PWTF priority conditions. Using electronic health records to identify and track patients with PWTF conditions is important. PWTF clinical providers have nine different electronic health record vendor systems, all which track conditions differently using different measures.

DPH partnered with the Massachusetts League of Community Health Centers to extract data from community health center electronic health records using Azara DRVS – an application that extracts data from multiple electronic health records, maintains a data warehouse, and generates health reports. With DRVS, PWTF was able to extract data from 14 health centers and monitor progress. However, even with this extraction tool, many of the measures needed for population health management did not exist in the electronic health records. For example, most electronic health records do not have templates for falls screening and assessment, as falls prevention is not widely adopted as a priority for primary care. Even with these limitations, DPH used the data to create quarterly data reports based on the shared measures for all clinical teams. Overall, PWTF disseminated hundreds of data reports each quarter.

ASSESSING FOR HIGH-RISK PATIENTS

Clinical providers refer patients who meet designated risk criteria to PWTF community interventions. Each intervention has different enrollment criteria depending on the evidence-base and the cost of the intervention. For example, children with uncontrolled asthma qualify for the asthma home visits because the study design in the literature focused on poorly controlled asthma. Also, the cost of the intervention (approximately $440 per visit/child) makes it expensive to offer to all children. At the same, all older adults (aged 65 and older) qualify for Tai Chi and Matter of Balance because the literature suggests all older adults benefit from these programs and the costs are smaller (approximately $15 per class).

PWTF CLINICAL PARTNERS

Barnstable Prevention Partnership
Harbor Community Health Center Hyannis
Community Health Center of Cape Cod
Duffy Health Center

Berkshire Partnership for Health
Lenox Family Health
Hillcrest Family Health
Dalton Medical Associates
Suburban Internal Medical
Fairview Internal Medicine
Berkshire Medical Center
Fairview Hospital

Boston Partnership
Bowdoin Street Health Center
The Dimock Center
Whittier Street Health Center
Harvard Street Neighborhood Health Center
Neponset Health Center
Codman Square Health Center
DotHouse Health

Healthy Holyoke
Holyoke Medical Center
Holyoke Health Center
Western Mass Physician Association
Holyoke Pediatric Associates

Lynn Partnership
Lynn Community Health Center

MetroWest Prevention and Wellness Partnership
Edward M. Kennedy Community Health Center – Framingham
Charles River Medical Associates
MetroWest Medical Center

Quincy Weymouth Wellness Initiative
Manet Community Health Center
South Shore Hospital

SHIFT – New Bedford
Greater New Bedford Community Health Center

Worcester Partnership
Family Health Center of Worcester
Edward M. Kennedy Community Health Center - Worcester
UMass Memorial Medical Center

LESSONS LEARNED IN THE CLINIC

1. **Provider champions play an important role in changing healthcare delivery.** Nurses, physicians, and physician assistants all have the potential to create change in the clinical settings. PWTF invests in these champions by dedicating resources. Given the current pressures providers face in seeing patients, providing some resources that allow them to set aside time for this work is recommended.

2. **A dedicated team – focused on changing workflow and providing quality care – makes a difference in managing and referring patients with chronic conditions**. The use of quality improvement processes ensures the changes have positive results. However, support from clinic leadership is necessary for the model to work. Without leadership commitment, health system redesign cannot occur.

3. **Using data to improve care is central to quality improvement and population health management.** Given the different electronic health record systems and changing or differing quality standards (as now exists for hypertension or falls), health systems should consider data needs early. Clinics may want to modify their electronic health record systems to track key measures, and these modifications can be costly. PWTF did not have all the measures needed in the funded clinics' electronic health records, which made it difficult to track clinical progress in older adult falls and pediatric asthma.

CONNECTING PATIENTS TO COMMUNITY SERVICES: BI-DIRECTIONAL REFERRALS

Connecting clinical patients to community public health programs has tremendous benefit for patients. It involves them in their community and connects them to their neighbors. It provides a holistic approach to patient wellness, instead of a fragmented care system. The connection also provides benefits to the organizations involved. It extends the clinics' reach outside their four walls, enabling continued patient engagement beyond the short office visit. It also connects clinics to organizations that focus on broad community health and wellness, while community programs can engage their local health experts. Strong clinical-community partnerships can result in improved patient health and community health.

CLINICAL PWTF PARTICIPATION FROM JANUARY 2015 - SEPTEMBER 2016:

15,404 PWTF clinical patients
were referred to services and programs

7,499 clinical patients
were enrolled

4,196 clinical patients
completed the programs

The literature supports the benefits of clinical-community linkages. Linkages have been found to result in patient behavior change with improved diet and physical activity, improved diabetes self-management, and increased numbers of smokers who quit.[36] It has also resulted in improved health outcomes resulting in reductions in blood sugar levels, cholesterol, blood pressure, body mass index and weight, and predicted coronary heart disease mortality.[37] Lastly, clinical-community linkages have changed clinician behavior finding that clinicians are more likely to discuss exercise, diet, and weight when having a program to which they can refer patients.[38]

PWTF focuses on optimizing the referral process to ensure that everyone who wants to participate in a community program has access. The greatest risk of losing a PWTF participant is at the referral stage. PWTF participants have many barriers to care, such as transportation, pressing social needs, language barriers, and mental health issues. All these obstacles can interfere with patient's follow-through on a referral. In addition, changing a behavior is difficult. For example, it can take up to 30 quit attempts before a smoker successfully quits.[39] The PWTF model focuses on ensuring successful transitions from clinical to community care and back again, so no patient who wants services is lost.



PARTNERSHIP FEATURE STORY

DEVELOPING STRONG REFERRAL SYSTEMS: METROWEST PREVENTION & WELLNESS PARTNERSHIP

PWTF partners use a variety of mechanisms to create referrals: fax, secure e-mail, web applications, and the innovative Massachusetts e-Referral Program. For the MetroWest Prevention & Wellness Partnership, the task of facilitating communications among partners was paramount. Sam Wong, Director of the Hudson Board of Health and PWTF Coordinating Partner, spearheaded the effort to find a solution. "Our partners absolutely did not want to manage paper referrals," he says. "They wanted real-time updates and the ability to input data wirelessly." Sam explored options and came upon Google for Work, a secure, HIPAA compliant, cloud-based communication system.

The robust Google system features a referral utility, data collection, easy updating for all partners, feedback fields, and a reports function, as well as a secure email application for use by all partners. Sam also borrowed on the experience of one of the community partners, the YMCA of Central Massachusetts, which had successfully set up a Google for Work system to manage fundraising and Board activities. With the Google system in place, Sam trained all PWTF users. "It lets us run reports in real-time," says Sam, "which enables us to monitor the referral process and troubleshoot challenges. It's been critical to facilitating clinical to community linkages in our partnership."



The elements of a PWTF linkage are:

1. good bi-directional communication,
2. consistent monitoring through data sharing, and
3. meeting patients where they are and addressing social barriers to care.

1. Bi-Directional Referrals

Having community organizations communicate back to clinicians is an indispensable part of PWTF referrals. A feedback loop ensures that the primary care providers have information on a patient's progress in the community intervention and any resulting health improvements or health concerns. For example, during an asthma home visit, a CHW may document that a child's asthma is very poorly controlled allowing the primary care provider to schedule a visit to monitor the child's asthma and adjust medications. This feedback loop coordinates clinical and community care, avoids fragmentation, and makes patients' health and safety the priority. While the PWTF model focuses on generating referrals from the clinical sites to the community organizations, PWTF also allows referrals to initiate in the community and go to the provider. This "reverse referral" has the benefit of reaching individuals who have not recently seen their provider, whose primary care is not part of PWTF, or who may not have a medical home and need to be enrolled. Since January 2015, community organizations have sent 8,000 feedback reports to clinical providers.

2. Data Sharing

Prior to making referrals, PWTF clinical and community providers develop a plan for information sharing. They select a limited number of data elements that are particular to their collaboration. All feedback must include the minimum required PWTF data elements: whether the referred client enrolled in the community program and whether they completed the program. Additional data elements depend on the condition and community intervention provided and the needs of the organizations. Examples of data shared in the feedback loop include: resulting weight loss, home blood pressure measurements, and asthma severity. PWTF Partnerships address the privacy requirements of the Health Insurance Portability and Accountability Act (HIPAA) by committing to data-sharing agreements or business associate agreements developed in the capacity building phase of PWTF.

"We now have a greater realization that health happens in the community by all partners, thanks to PWTF." [40]
– Lynn Partnership Member

Referral Advancement:
The Massachusetts e-Referral Program

One new PWTF referral mechanism is the Massachusetts e-Referral Program, a program developed under the Massachusetts State Innovation Model Testing Award from the Center for Medicare & Medicaid Services.[41] The e-Referral system allows clinical sites to send referrals directly from their electronic health records to the e-Referral Gateway, a secure web-enabled system in which community-based organizations can manage these referrals. The Massachusetts e-Referral team works closely with the state health information exchange (Mass HIway) to support end-to-end transmission of these referral messages. The Massachusetts e-Referral Program leads the nation in connecting electronic health record-initiated referrals directly to several types of community-based organizations and enabling these community-based organizations to close the feedback loop electronically. National organizations, federal agencies, and other state departments of health have been following the Massachusetts e-Referral Program to understand how to implement these connections in their state.

"Given the intense support needed to launch each individual site, the timeline for 'going live' was impacted. The grantees realized the commitment needed to get it right…It was time well invested and we are now reaping the rewards of those efforts."
– Susan Svencer, PWTF e-Referral Liaison

To enable successful use of e-Referral, DPH deployed a support team to help:

- facilitate conversations between clinical and community partners;
- develop workflows;
- make decisions around the types of data elements and information to include in the referral and feedback reports;
- the technical integration with connection to electronic health records; and
- provide initial and ongoing training for use of the e-Referral Gateway.

This technical assistance enables collaborative and streamlined onboarding and continued use of e-Referral. Sites new to e-Referral face a large learning curve. Today, 10 PWTF clinical sites use the e-Referral system to send eight referral types to 11 community-based partners. **As of December 2016, 2,535 referrals have been sent through the e-Referral system and 4,482 feedback reports.**[42]

Future of e-Referral

DPH plans to continue supporting the e-Referral infrastructure into the foreseeable future. The need to formalize linkages from the clinical setting to the community will only continue to grow under payment system redesign. The pilot and early adoption of the Massachusetts e-Referral system has provided proof-of-concept that an electronic tool can add structure to the clinical-community relationship in the emerging Accountable Care Organization landscape.

PARTNERSHIP FEATURE STORY

A COMMUNITY HEALTH WORKER WITH THE WORCESTER PARTNERSHIP

Meet Lily Collazo

Lilibette Collazo, a CHW with the UMass Memorial Medical Center Pediatric Primary Care unit in Worcester, funded by PWTF, makes pediatric asthma home visits to around 80 patients and their families who receive a referral for a four-visit program. Lily provides health education to her patients and their families to better understand their Asthma Action Plans, improve their adherence to medication, and to make recommendations for creating a safe and healthy home. "Home visits allow you to be in a comfortable place to have one-on-one time with the family," says Lily. "They are more likely to express their concerns."

To strengthen the bridge between the clinic and community, Lily also connects with her patients' school nurses to ensure her patients are on track with care at school.

This past year, she worked with Moisés, a 4-year old who comes from a Spanish-speaking family. Moisés worked with Lily to practice using a spacer and inhaler, and Moisés' mom learned about the importance of rescue medicines. Moisés is now doing much better.

Lily is proud to say that "the community is seeing UMass Memorial beyond its buildings, clinics, and offices – we are meeting families where they are at by expanding our care team."



3. **Meeting Patients Where They Are**
   Creating a personal connection and helping patients overcome barriers to accessing community services is the third element of a PWTF referral. CHWs meet patients where they are – in the clinic, at their home, or in the community – to help them navigate to the community intervention. They help overcome barriers such as a lack of understanding about the risk of their health condition and the benefits of the intervention or pressing social needs like a pending eviction or utility shut off. CHWs come from the communities they serve, speak the same language, and have the same cultural heritage, and so are particularly well-situated to connect and create trust with patients. To assist CHWs in encouraging patients to accept referrals, DPH offered trainings on motivational interviewing. Motivational interviewing is a patient-centered counseling approach that uses the patient's own intrinsic goals to assist in behavior change. Another strategy employed by PWTF partnerships to engage patients is to provide transportation to and from classes. Many PWTF participants don't own vehicles and have lengthy bus commutes to services.

LESSONS LEARNED USING LINKAGES

1. **Good referrals require good planning.**
   At a minimum, clinical and community organizations looking to create a bi-directional referral process should develop workflows, create data-sharing agreements, provide relevant training such as CHW core competency training, take a team collaborative approach to planning and implementation, set targets and track results, and have a system for accountability.

2. **The importance of CHWs facilitating referrals cannot be overstated.** CHWs make strong connections with high-risk patients and facilitate their engagement in community services. For populations of different cultural backgrounds, experiencing language barriers, and with many competing priorities for their time, a CHW makes the difference in accessing community services in a way that a mere phone call or handout cannot.

3. **Technical assistance throughout the implementation process is required to ensure successful integration of e-Referral.**
   Initially, partnerships were unsure how to navigate not only the e-Referral process, but the resulting change in relationship between clinical and community organizations. The development of a step-by-step guide to assist implementation, as well as a hands-on approach supporting e-Referral connections, can lead to a successful rollout, which in turn can foster ongoing use.

ENHANCING COMMUNITY CAPACITY: A PUBLIC HEALTH ROLE IN HEALTHCARE REFORM

Investing in community public health programs has significant benefit not only for individual health, but also for the health of high-risk populations and whole communities. Strong public health programs can create healthy communities and people that are more able to learn, work, interact, and participate in a civil society. For example, community asthma home visiting programs can also use the information collected during a home visit to identify buildings or communities that would benefit from improved building maintenance or better housing policies. Investing in community public health can reach beyond a particular patient population to benefit a whole community.

Community-based organizations and municipalities lead the community efforts of PWTF. Both have experience in community engagement and working with the public. Community-based organizations put the needs of the community at the heart of their mission and values. They provide important health services and community programs as well as advocate for community improvements. Their boards and staff often reflect the community they serve. Municipalities and local boards of health also have a significant role in affecting the health of the community. Both in implementing municipal services, such as providing education or implementing public health interventions, to regulating community activities through smoke-free worksite enforcement, municipalities can promote healthy behaviors and wellness. Municipalities bring intimate knowledge of their communities, have experience in multi-sector collaboration, and represent the broad interest of their communities. **In PWTF, 61 community-based organizations and municipalities partnered with 35 clinical sites to enroll 13,156 community residents in prevention and wellness programs.**[43]

"Improving population health outcomes for vulnerable and at risk communities has been shown to be mostly impacted by individual behaviors and social determinant needs. The PWTF model of connecting clinical to community prevention programs is critically important and an essential approach to help activate community members to improve health behaviors and develop strategies to meet their social needs."

– Dr. Robert Schreiber, Medical Director, Healthy Living Center of Excellence



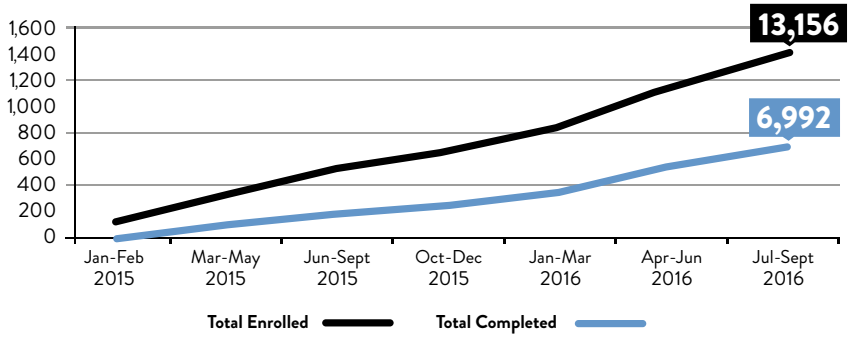
Providing Evidence-Based Preventive Services

In PWTF, community-based organizations and municipalities provide important evidence-based preventive services. Despite improvements in healthcare delivery, many patients do not receive the recommended clinical preventive services like the counseling or education that they need to manage their disease or prevent its progression. In Massachusetts, only 8% of children with asthma have received formal education on how to manage their asthma.[44] Fifty-three percent of adults aged 18 years and older with diagnosed diabetes reported they ever received formal diabetes education.[45] Forty-four percent of adults 65 or older who have physical or mental limitations meet the objectives for aerobic physical activity and for muscle-strengthening activity.[46,47] These preventive services are largely uncovered by healthcare[48] and thus, there exists little incentive for wide-scale adoption by health systems. Promisingly, the movement to global payments may allow health systems to begin supporting their costs. The disease management and prevention programs in PWTF all have a strong evidence-base for improving outcomes and being cost effective, and offer tremendous value to health systems as they move to alternative payment methodologies.

Changing the Environment

While the majority of PWTF community work focuses on influencing individual health behaviors, creating environmental change is also part of the work on pediatric asthma and tobacco. Known as "changing the context," this work makes the healthy choice the default choice through policy and systems changes. PWTF recognizes that improving pediatric asthma requires a comprehensive school-based approach that includes school policies on managing asthma and improving the indoor environment. In addition, PWTF focuses on improving the housing environment through integrated pest management policies in public housing that reduce toxic chemical use while reducing pests. Lastly, smoke-free housing policies protect non-smokers from secondhand smoke, decrease the smoking rates among youth, and result in increased quit attempts.[50] Efforts to "change the context" have the benefit of reaching larger populations with lower-cost strategies. In PWTF, 27 policies are being implemented in 10 schools, 11 housing authorities, and six affordable housing management companies impacting 22,348 potential students with asthma, 6,396 housing units for smoke-free policies, and 39,300 housing units for integrated pest management policies.[51]

From January to September 2016, 7,499 clinical patients and an additional 5,657 community residents enrolled in community programs, totalling 13,156 people. Of those enrollees, 6,992 completed the program.[49]



Sources: PWTF Community Data, Massachusetts Dept. of Public Health. 2014-16. Prepared by the Massachusetts Dept. of Public Health; PWTF Clinical Data, Massachusetts Dept. of Public Health. 2014-2016. Prepared by the Massachusetts Dept. of Public Health.

PARTNERSHIP FEATURE STORY

REACHING THE ASIAN COMMUNITY WITH THE QUINCY WEYMOUTH WELLNESS INITIATIVE

Meet May Yin Lam Chan

May Yin Lam Chan, a tenant in Quincy public housing, is full of life and energy. If you were to tell that to May one year ago, May wouldn't believe it. "I used to get around with a walker and always felt tired" says May. Fortunately, her provider, Dr. Lily Yung, at Manet Community Health Center assessed May for being at risk for falls and referred her to the Matter of Balance program, which was led by a Chinese-speaking trainer from EACH – Enhance Asian Community on Health. Language was an undeniable barrier for May, and she claims her success with the program was because of EACH. May is now more comfortable on her feet. She's also a recent graduate of the Chronic Disease Self-Management Program. "I never knew that white rice wasn't something I should eat every day! I've lost weight and now I want to become a health coach for my peers." May was so motivated that she became a Matter of Balance coach in August of 2016.



EACH was founded in 2014 by President and Executive Director, Sara Tan. "The mission is to enhance the well-being of all people in the Asian community," says Sara. "We help provide quality access to information on healthcare options and social services, which can reduce health inequities." EACH staff volunteered at Manet Community Health Center as certified healthcare access counselors and patient navigators. Since 25% of Quincy residents are Asian, and the Quincy Weymouth Wellness Initiative (QWWI) had a critical gap in serving this population, EACH officially became a funded partner.

EACH was able to improve engagement and access to PWTF programming through outreach, translated materials, and ensured that classes were culturally appropriate (e.g., food). They provide Chinese-speaking trainers for Chronic Disease Self-Management Programs, Matter of Balance classes, diabetes education, and tobacco cessation counseling. As a driving force at the table, EACH is on the Governing Board and all Workgroups. They have also taken a leadership role in advocacy and promotion of QWWI – engaging with Quincy cable access TV, Asian media, and faith-based organizations. "In the near future, our plan is to expand our reach to other Chinese dialects, Vietnamese, and West Asian," says Sara. "QWWI has been a great partner and supporter and we hope to continue to make a difference in Quincy and the greater area."

Broad Spectrum of Community Organizations in PWTF

YMCAs, Elder Services, public schools, and Boards of Health are some of the community-based and municipal organizations that provide valuable prevention and wellness activities as part of PWTF. The interventions range from physical activity, improving older adult mobility, and implementing school policies that focus on removing asthma triggers. Over 60 community-based organizations and municipalities provided interventions in PWTF.



PWTF COMMUNITY PARTNERS

Barnstable Prevention Partnership
- Healthy Living Cape Cod
- YMCA Cape Cod

Berkshire Partnership for Health
- Berkshire Visiting Nurse Association
- Berkshire South Regional Community Center
- Berkshire Public Health Alliance
- Community Health Programs
- Northern Berkshire Community Coalition
- Berkshire Family YMCA
- Berkshire County Boards of Health Association
- Tri Town Health Department
- Volunteers in Medicine

Boston Partnership
- Boston Commission on Affairs of the Elderly
- Boston Senior Home Care
- Central Boston Elder Services
- Ethos
- Boston Public Schools
- Action for Boston Community Development/ Head Start
- Health Resources in Action

Healthy Holyoke
- Holyoke Public Schools
- City of Holyoke
- Greater Holyoke YMCA
- River Valley Counseling Center
- Holyoke Housing Authority
- Pioneer Valley Asthma Coalition

Lynn Partnership
- City of Lynn
- Greater Lynn Senior Services
- Lynn Public Schools
- Massachusetts Coalition for the Homeless
- Lynn Housing Authority & Neighborhood Development



Building the Capacity of Community Organizations on Prevention and Wellness

PWTF built significant capacity in community organizations to deliver the PWTF interventions. As health systems seek to partner with community organizations, the capacity of these organizations to meet increased demand will be a major factor in the success of the partnership. In PWTF, many organizations had never provided the interventions in PWTF. An estimated half of the organizations offered PWTF interventions but had to expand their staffing to accommodate the need. To support this expansion of community capacity, partnerships used PWTF resources to hire an additional 129 full- or part-time staff. In addition, DPH provided significant training to community organizations on the PWTF interventions, data collection, and effective methods for community engagement. Overall, DPH offered over 30 trainings to 402 people. DPH also supported quality improvement of the community programs by offering quarterly data reports on their progress in engaging residents in the programs, shared learning through learning collaboratives, and one-on-one technical assistance with subject matter experts.

MetroWest Prevention and Wellness Partnership
- MetroWest YMCA
- Framingham Health Department
- Hudson Health Department
- Marlborough Board of Health
- Latino Health Insurance Program
- YMCA of Central Massachusetts, Boroughs Family Branch
- Northborough Board of Health

Quincy Weymouth Wellness Initiative
- South Shore Elder Services
- Enhance Asian Community on Health, Inc.
- City of Quincy
- South Shore YMCA
- Town of Weymouth
- Bay State Community Services

SHIFT - New Bedford
- Community Nurse Home Care
- New Bedford Health Department
- Seven Hills Foundation

Worcester Partnership
- Worcester Senior Center
- St. Paul Elder Services
- Worcester Public Schools
- Head Start
- Community Legal Aid
- Massachusetts Audubon Society

Meeting Residents Where They Are: Cultural Competency and Accessibility

PWTF community organizations deploy a variety of strategies to engage residents in the services they offer. As with the clinical approach, CHWs play a central role in engaging community residents. In addition, CHWs provide many of the community interventions – they are the asthma home visitors, the falls home assessment worker, the Tai Chi instructor, and the chronic disease self-management trainer. Many community interventions are offered in multiple languages and, in some cases, PWTF has paid for the translation of some programs (Matter of Balance in Chinese and asthma home visit materials in Portuguese) to ensure accessibility. Partnerships also locate the interventions in a variety of spaces to ensure maximum enrollment. While partnerships offer most classes in the community, sometimes they are offered in the clinical setting when requested by patients.





LESSONS LEARNED IN THE COMMUNITY

1. **Established community organizations have trusting relationships with their community residents and can engage patients on health and wellness in a unique way.** Their knowledge of the community allows community organizations to adapt programs to their clients' needs fairly quickly. As Accountable Care Organizations seek to focus on wellness and prevention, partnering with existing community organizations and municipalities are an efficient and effective means of building a trusting relationship with patients while also building local community capacity.

2. **Community partners need support collecting and analyzing data.** While health systems have experience collecting and reviewing patient data to use for quality improvement, this approach is new to many community providers. Some of the PWTF community partners underestimated the time and resources necessary to adequately track participants health and their work. And, they were unprepared to submit extensive data to DPH. While some community organizations have experience in this area, many community partners will need support to develop strong data collection.

OTHER SUPPORTING PARTNERS

Beyond PWTF clinical and community partners, other organizations and businesses were enlisted to support the success of the partnerships. Their roles range from referring patients to providing partnership support and training.

Berkshire Partnership for Health
- Berkshire Regional Planning Commission
- Elder Services of Berkshire County

Boston Partnership
- Boston Medical Center Injury Prevention Center
- Health Resources in Action

Lynn Partnership
- Metropolitan Area Planning Council

MetroWest Prevention and Wellness Partnership
- Center for Health Impact
- Metropolitan Area Planning Council

Quincy Weymouth Wellness Initiative
- South Shore Workforce Investment Board

SHIFT – New Bedford
- Immigrants' Assistance Center, Inc.
- New Bedford Housing Authority
- New Bedford Parks Recreation & Beaches Department
- YMCA Southcoast
- Hawthorn Medical Associates

Worcester Partnership
- Fallon Health
- Elder Services of Worcester Area



THE INTERVENTIONS: TACKLING IMPORTANT PUBLIC HEALTH CONDITIONS FOR MASSACHUSETTS

Chronic diseases pose a significant barrier for Massachusetts' residents to engaging in everyday activities such as learning or working. It can significantly reduce a person's quality of life and ability to care for oneself and one's family members. And when unchecked, chronic disease can result in disability and death. Over 50% of Massachusetts residents have one or more chronic diseases. Living with a chronic condition also has emotional effects. Thirteen percent of Massachusetts residents with a chronic illness also report poor mental health more than 15 days out of the month.[52] For older adults, chronic disease or injury can threaten their independence. Fortunately, many chronic illnesses can be prevented or controlled.

PWTF concentrated resources and efforts on four priority conditions. These conditions affect a significant portion of Massachusetts' residents and can improve in three to five years. Pediatric asthma, hypertension, older adult falls, and tobacco use meet these four criteria:

1. high prevalence,
2. prohibitive healthcare costs,
3. strong evidence-base demonstrating improvements in health outcomes and healthcare costs in three to five years, and
4. associated data that can be used to track progress.

The percentage of Massachusetts adults with hypertension whose blood pressure is uncontrolled is at 29% and the percentage of Massachusetts adults with diagnosed diabetes whose A1c value is greater than nine percent is at 15%.[53] Of those with asthma, 67% of children[54] and 73.8% of adults[55] have uncontrolled asthma. Massachusetts' population 60 and older is growing more rapidly than any other age group of the population.[56] In 2014, more than one in four (28.6%) adults in Massachusetts 65 or older reported a fall in the past 12 months with 10.6% reporting an injury during the fall.[57]

All partnerships have to focus on a minimum of two priority conditions but most are doing three or all four. Three optional conditions – diabetes, substance use, and obesity – that did not meet strict criteria, but showed promise are addressed by five of the PWTF partnerships. Within the conditions, PWTF tiered interventions with Tier One having the strongest evidence on outcomes and cost along with data for evaluation and Tier Three having the least evidence or accessible data. Concentrating resources in these conditions and interventions allows for success in meeting the dual goals of Chapter 224 – improving outcomes and controlling costs – in a four-year time frame.[58]

PWTF partnerships had discretion to allocate resources as needed between conditions.

Partnerships have made significant progress in the two years of intervention implementation – changing people's lives by making them healthier and more in control of their health. However it should be noted that all the interventions selected for PWTF have an expected return in three to five years. As the independent evaluation demonstrates, early indications show promise and with more time, PWTF should be able to make inroads on outcomes and costs in the state.

PEDIATRIC ASTHMA

Massachusetts has one of the highest pediatric asthma prevalence rates in the country.[59] Approximately one out of every seven children has asthma in the state; but in PWTF communities is it one out of six.[60] Low-income communities and communities of color have a higher burden of the disease than the rest of the state. The starkest disparities are in asthma hospitalizations. Black children are four times more likely to be hospitalized for asthma than White children; and Hispanic children are three times more likely to be hospitalized for asthma than White children.[61] In addition, asthma is costly. The American Lung Association estimates that asthma burdens our nation with an annual economic cost of $50.1 billion in direct healthcare costs and another $5.9 billion in indirect costs (lost productivity) for a total of $56.0 billion (in 2007 dollars).

PWTF BY THE NUMBERS

4,385 children with asthma in PWTF clinics

802 referrals to community programs
657 enrolled
352 completed

1,680 home visits
5,909 received asthma self-management
4 asthma policies in **59 schools** affecting
22,348 students with asthma
6 integrated pest management policies in
39,300 housing units

Source: PWTF Clinical and Community Data, Massachusetts Dept. of Public Health. 2014-2016. Prepared by the Massachusetts Dept. of Public Health.

Interventions

To improve asthma management and reduce exposure to asthma triggers, PWTF selected four asthma interventions. The clinical interventions are:

1. Care Management for High-Risk Patients, a three-component intervention that includes case management, self-management education and team coordination (Tier 1).
2. Asthma Self-Management Education in Primary Care, a clinical intervention that focuses on providing personalized instruction to patients and their families using a care management plan (Tier 2).

The community interventions include:

3. Home-Based, Multi-Trigger, Multi-Component Intervention, CHW-led home visits that provide asthma education on self-management and trigger reduction along with supplies (Tier 1).
4. Comprehensive School-Based or Head Start-Based Asthma Management, an approach that includes teaching of asthma self-management skills to children and parents and the creation of "asthma-friendly" environments (Tier 2).

In addition, DPH's Asthma Prevention and Control Program provided additional funding to hire a consultant to work in PWTF asthma communities. This consultant worked with affordable housing property managers to promote system-wide integrated pest management policies. While not an approved PWTF tiered intervention, this additional resource expanded the efforts to address asthma in PWTF.



Partnerships

PWTF built on and significantly expanded existing asthma efforts in many partnerships. Six partnerships work to improve pediatric asthma, focusing especially on low-income communities and communities of color: Boston Partnership, Healthy Holyoke Partnership, Lynn Partnership, New Bedford SHIFT Partnership, MetroWest Prevention and Wellness Partnership, and Worcester Partnership. They implement clinical and community interventions and ensure strong linkages of these efforts. Partners working on this effort include: community health centers, public schools, Head Starts, legal services, a local board of health, a housing authority, and a homeless coalition.

Technical Assistance

The partnerships have the support of the DPH Asthma Prevention and Control Program, which implements the Strategic Plan for Asthma Control and Prevention with many partners across the state, and Dr. Megan Sandel, a pediatrician with Boston Medical Center and a national expert on health and housing, who serves as the PWTF subject matter expert. They, along with the PWTF staff, provide trainings, one-on-one consultations, toolkits, and guidance documents within the framework of a learning collaborative.

PEDIATRIC ASTHMA: OUTCOMES FROM THE HARVARD CATALYST EVALUATION

- **All PWTF communities addressing asthma show declines in total costs per year compared to comparison communities. Although available data is incomplete, data suggests that asthma interventions may give very good value and perhaps result in net cost savings.**
- **Prevalence of pediatric asthma (among 0-9 year olds) dropped in PWTF communities at higher rates than the state average. Prevalence among adolescents and teens was stable.**
- **Almost 6,000 youngsters completed school-based asthma education and care management interventions.**

Source: Harvard Catalyst: The Harvard Clinical and Translational Science Center; The Massachusetts Prevention and Wellness Trust Fund Grantee Program, Final Evaluation Report, January 2017.

"The Prevention and Wellness Trust Fund is the best of clinic-community partnerships at work. It's building capacity and relationships that will live beyond the grant. You can't treat asthma in a silo. Working across sectors is the only effective approach." – **Dr. Megan Sandel, PWTF Subject Matter Expert and Associate Professor of Pediatrics and Public Health, Boston University School of Medicine.**

PARTNERSHIP FEATURE STORY

PREVENTING PEDIATRIC ASTHMA TRIGGERS: HEALTHY HOLYOKE

Children spend most of their time in one of two places: either at home or at school. For children with pediatric asthma, it is critical that both of those environments are "safe," or free of conditions that may worsen their asthma. While areas may appear safe on the surface, it is not uncommon for persistent environmental factors like allergens, smoke, or indoor air pollutions to cause greater difficulty breathing, chest pain, coughing, and wheezing, as well as repeated trips to the Emergency Room.

Meet Jo-Either

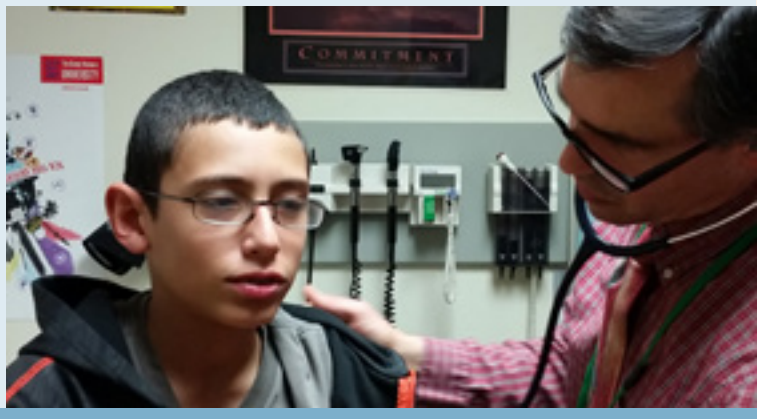
Jo-Either Pacheco is 13 years old and a student in the Holyoke Public School District. He also suffers from asthma and is a patient of Dr. Vinny Biggs, a PWTF Provider Champion at the Holyoke Health Center. Dr. Biggs referred Jo-Either and his family to the Community Health Worker Home Visiting Program to help with his asthma medication management and to conduct a home assessment. "The community health worker taught me how to control his asthma," said Jo-Either's mother, Francis Cruz. "She showed me how to control the dust inside my apartment." With the support of the CHW, after discovering that her home contained significant levels of mold and mildew, Jo-Either and his family were able to relocate to new housing, one that posed far fewer asthma triggers. "The community health worker was very supportive in guiding us to a new and healthier apartment." Jo-Either and his mother met with the CHW over the course of four visits to the new home.

Since that time, Dr. Biggs noted, "I've seen an amazing difference in Jo-Either and his asthma requires much less medication; he is able to do the things he wants to do." Jo-Either's mother was also glad to report, "We now have a safe place to live, and my son is doing great." Jo-Either noted, "I hardly use my pump anymore." They are both very grateful for Dr. Biggs and the CHW.

Improving Holyoke Public Schools

The Holyoke Public School District is also tackling pediatric asthma by addressing indoor air quality, asthma management, and education. Through an EPA Tools for Schools grant, a team of Holyoke Public School leaders and staff has worked for the past six years conducting inspections and upgrading their facilities, such as reducing clutter and dust in the school. With PWTF involvement, the project now can institutionalize the work underway in Holyoke. A short-term project has evolved into a long-term vision supported by the City and Holyoke Health Center. The transition allows the team to identify and address building conditions more effectively, and enhance students' ability to manage their asthma during the day.

"We bring individual expertise, complementary skills, and resources from multiple sources," says Vicki Van Zee, Project Manager for Healthy Holyoke. "We are committing significant staff time and project resources to work on activities to support the district. And we're seeing residents like the Pacheco family begin to thrive."



HYPERTENSION

Hypertension is the most common chronic cardiovascular condition in the state. In Massachusetts, 28.8% residents have high blood pressure; however, in PWTF communities the rate is higher at 31.8%.[62] Hypertension is deadly. Blood pressure is a leading modifiable risk factor for stroke and heart disease.[63] It contributes to approximately 1,000 deaths a day.[64] Hypertension disproportionately affects low-income communities and communities of color. About 40% of African American adults have high blood pressure, and less than half of them have it under control.[65] Total costs associated with high blood pressure in 2011 in the US were $46 billion in healthcare services, medications, and missed days of work.[66]

PWTF BY THE NUMBERS

41,080 people with hypertension in PWTF clinics

5,408 of referrals
4,740 enrolled
2,410 completed

813 adults took self-management classes
1,556 adults were supported to self-monitor their blood pressure
800 adults were loaned a cuff

Source: PWTF Clinical and Community Data, Massachusetts Dept. of Public Health. 2014-2016. Prepared by the Massachusetts Dept. of Public Health.

The Interventions

PWTF selected three interventions for controlling hypertension. The clinical intervention is:

1. Evidence-Based Guidelines for the Management of High Blood Pressure in Adults with nine specific recommendations for initiating and modifying pharmacotherapy for patients with elevated blood pressure (Tier 1).

The community interventions are:

2. Chronic Disease Self-Management Program, small group interactive workshops designed to help people gain self-confidence in their ability to control their symptoms and learn how their health problems affect their lives (Tier 1).
3. Self-Measured Blood Pressure with Supports, an intervention that involves a clinical provider offering education and a blood pressure monitoring device (or cuff) to patients with hypertension to monitor their blood pressure at home with community health worker support (Tier 2).

"The Prevention and Wellness Trust Fund provides tremendous opportunity and support for providers in all facets of the healthcare spectrum to work together towards the same goal. I continue to be impressed by the commitment and dedication of all members of the Partnerships as they pursue optimization of blood pressure control for all their patients." – **Dr. Naomi Fisher, PWTF Subject Matter Expert and Director of Hypertension Service and Hypertension Specialty Clinic at the Brigham and Women's Hospital**

Partnerships

PWTF built on and significantly expanded existing hypertension efforts in many of the partnerships. All nine partnerships work to improve hypertension, focusing especially on low-income communities and communities of color. All partnerships are implementing Chronic Disease Self-Management Program and six of the nine partnerships are implementing Self-Measured Blood Pressure.

Technical Assistance

Through a learning collaborative structure, the partnerships have the support of Dr. Naomi Fischer, Director of Hypertension Service and Hypertension Specialty Clinic at the Brigham and Women's Hospital and a national expert on hypertension. DPH has offered trainings, Learning Sessions, and webinars on clinical best practices such as how to accurately measure blood pressure, how to identify undiagnosed hypertensive patients, and how to implement and track effective blood pressure home monitoring.

PEDIATRIC ASTHMA: OUTCOMES FROM THE HARVARD CATALYST EVALUATION

- **The number and percentage of people screened for hypertension increased from 58% to 62% between 2014 and 2016 demonstrating significant systems change.**
- **PWTF communities had improvements in systolic blood pressure from 0.515 to 0.945mmHg drop which if continued could result in 500 to 1,000 fewer heart attacks and strokes per million residents, and lead to 125 to 250 fewer deaths due to cardiovascular disease per million residents treated.**
- **The hypertension interventions are highly cost effective – on par with mammography screening, treatment for heart attacks, and treatment for elevated cholesterol – and more cost effective than other interventions approved for care by Medicare and Medicaid. Over enough time, these interventions should have a positive ROI as intervention costs diminish with more routine screening and interventions.**

Source: Harvard Catalyst: The Harvard Clinical and Translational Science Center; The Massachusetts Prevention and Wellness Trust Fund Grantee Program, Final Evaluation Report, January 2017.

REVEALING UNDIAGNOSED HYPERTENSION: METROWEST PREVENTION AND WELLNESS PARTNERSHIP

In stark contrast to the state average of 28.8%, the Edward M. Kennedy Community Health Center of Framingham initially reported that only 23.8% of its patients have hypertension.

To tackle this disconnect, the Edward M. Kennedy clinical team first underwent an extensive medical record review that identified an additional 190 patients at high risk of hypertension. The clinic's Provider Champion at the time, Dr. Mary Seibel, designed a Provider Directed Plan of Care. This involved contacting at-risk patients, educating patients about hypertension, and scheduling a visit with an Edward M. Kennedy nurse.

While relatively new, this protocol of extensive hands-on patient education has already yielded positive outcomes. In addition to the care they've received from Edward M. Kennedy's nurse and CHW, patients are extremely appreciative of the team's effort to help them understand the dangers of hypertension. They now have new tools and guidelines to both improve and control their blood pressure. While it is too early to see an impact on the clinical hypertension prevalence rate, Edward M. Kennedy is using targeted nurse visits to diagnose undiagnosed hypertension. The health center has 67 nurse visits planned; the Department expects an estimated 25 new diagnoses to result from the nurse visits.

Meet Ana

Ana is a 66-year-old Hispanic mother of four sons; she is also a light smoker. Ana makes regular visits to Edward M. Kennedy for checkups, dental exams, and treatment for a variety of non-life threatening health issues. Based on her past healthcare history, Ana was among the patients identified by Dr. Seibel as a potential high-risk candidate for hypertension.

Enrolled in the Edward M. Kennedy program, Ana received extensive education on the importance of early detection of high blood pressure as a means to avoid more serious complications. She was taught how to take accurate blood pressures at home; she kept a log of the results over 10 days and reported them back to Edward M. Kennedy.

With an average blood pressure above 140/90, Dr. Seibel diagnosed Ana with hypertension. She recommended a hypertension medication for her, and designed a follow-up Provider Directed Plan of Care. Ana has since taken a more active role in her healthcare decisions. Her medication compliance is checked at her pharmacy and she continues to take her blood pressure medication. Ana is also happy to know that, if she has any questions, she can contact Edward M. Kennedy without hesitation.

OLDER ADULT FALLS

Falls are the third leading cause of injury-related death in Massachusetts and the leading cause of injury-related hospital stays and emergency department visits. Each year, 2.8 million older people are treated in emergency departments across the United States for fall injuries.[67] In Massachusetts from July 2013 to June 2014, 13,551 people were admitted to the emergency department for fall-related injuries.[68] Falls are costly. In 2010, total hospital charges associated with fall-related injuries for those over the age of 65 in Massachusetts exceeded $630 million. In that same year, unintentional falls were the main reason older adults received treatment in acute care hospitals (61,466 nonfatal older adult fall-related injuries were treated with 35% of those cases requiring hospitalization).[69]

The Interventions

PWTF selected four interventions for preventing falls among older adults. The clinical intervention is the implementation of the:

1. Centers for Disease Control and Prevention's STEADI (Stopping Elderly Accidents, Deaths and Injuries) toolkit, a resource that contains tools to help clinicians make fall risk assessment and prevention an integral part of clinical practice (Tier 1).

The three community interventions include:

2. Tai Chi, a traditional martial art that involves slow flowing movements and deep breathing (Tier 2).
3. Matter of Balance, an eight-week structured group intervention focusing on practical strategies to reduce the fear of falling and increase activity levels (Tier 2).
4. Assisted Home Safety Assessments, CHW visits to identify and address environmental fall risk factors (Tier 2).

Partnerships

Very few partnerships had existing falls prevention efforts. PWTF had to initiate these programs and the clinical and community connections from scratch. Eight PWTF partnerships work on older adult falls. Those partnerships are: Barnstable Partnership, Berkshire Partnership for Health, Boston Partnership, Healthy Holyoke, Lynn Partnership, Metrowest Prevention and Wellness Partnership, New Bedford SHIFT Partnership, and Worcester Partnership.

PWTF BY THE NUMBERS

34,245 older adults in PWTF clinics

4,856 referrals
4,497 enrolled
1,983 completed

20,317 older adults were screened for falls risk
2,133 received a plan of care
125 took Tai Chi
1,383 took Matter of Balance
1,546 received Assisted Home Safety Assessment

Source: PWTF Clinical and Community Data, Massachusetts Dept. of Public Health. 2014-2016. Prepared by the Massachusetts Dept. of Public Health.



Technical Assistance

PWTF developed standardized training and tools for the Assisted Home Safety Assessment. Home visits conducted by the home health providers, physical therapists, and occupational therapists have proven effective in reducing falls and are included in the American Geriatrics Society/British Geriatrics Society Clinical Practice Guideline for the Prevention of Falls in Older Persons. Research is still underway, however, to evaluate the effectiveness of home safety assessments. Working with subject matter experts, DPH consolidated various nurses, physical therapists, and occupational therapists' home safety assessments (approximately 20) into a single screening tool appropriate for use by a trained CHW. Given the novelty of this intervention, the workflow required multiple iterations that were developed and tested over the course of two years, between the six-month planning and intervention implementation phases of PWTF. DPH developed and provided a toolkit for the home visits. The partnerships are supported by Dr. Kalpana Narayan Shankar, Patricia MacCullouch RN, and Dr. Julie St. John to troubleshoot implementation efforts. They have conducted various calls with individual teams and webinars on specific topics. From January to October 2016, 14 on-site STEADI trainings for clinical staff were conducted reaching a total of 256 individuals. Several in-person group trainings were offered to home visit staff to ensure a standardized approach. A falls learning collaborative was created that provides the structure for shared learning among teams with in-person learning sessions, webinars, and a listserv to facilitate communication.

OLDER ADULT FALLS: OUTCOMES FROM THE HARVARD CATALYST EVALUATION

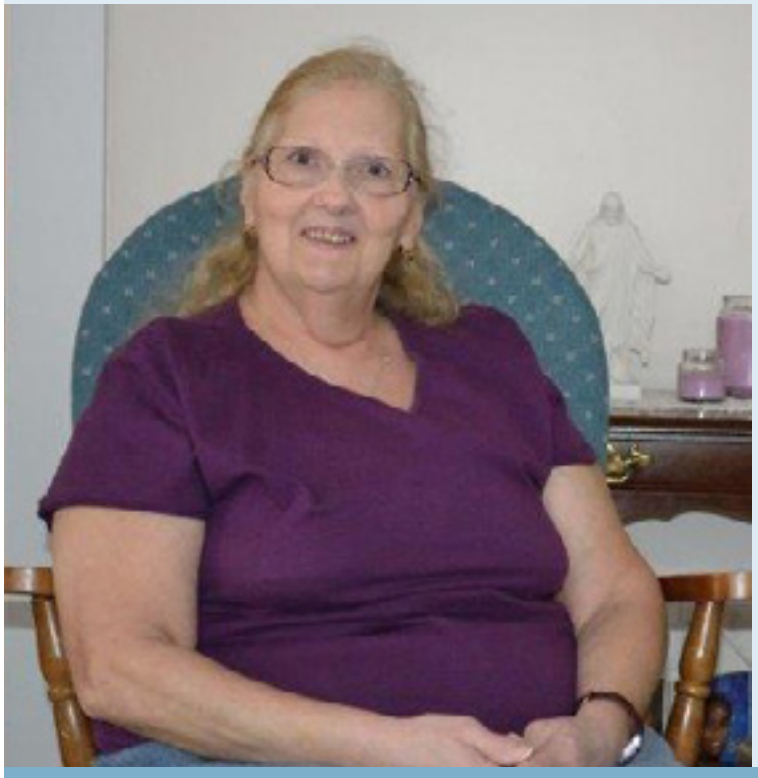
- **Prevention of estimated 900 falls, including 200 fall-related injuries and seven hospitalizations occurred in intervention period.**
- **Falls prevention efforts of PWTF had the most pronounced systems innovation. About half of falls partners had never collaborated before. From April-June 2016, half of enrollments in community-based programs originated from clinical referrals, and half from community outreach, illustrating the synergy of the PWTF strategy.**
- **Falls interventions are likely to prove cost effective as the interventions mature, particularly when data on quality of life improvements due to reduced fear of falling are taken into consideration.**

Source: Harvard Catalyst: The Harvard Clinical and Translational Science Center; The Massachusetts Prevention and Wellness Trust Fund Grantee Program, Final Evaluation Report, January 2017.

PARTNERSHIP FEATURE STORY

DECREASING FALLS BY INCREASING PATIENT ENGAGEMENT: SHIFT - NEW BEDFORD PARTNERSHIP

Historically, older adults have enrolled themselves in the Matter of Balance program. In order to increase enrollment, SHIFT introduced a recruitment process and manual guiding healthcare providers and CHWs in referring patients to programs like Matter of Balance. "The manual incorporates scripts that apply motivational interviewing techniques and algorithms for various recruitment scenarios," says Dr. Jonathan Howland, Professor of Emergency Medicine at Boston Medical Center and Director of the Injury Center. "The overall aim is to incorporate best recruitment practices, based on the CHW experience, to ensure consistent and effective patient participation in Matter of Balance." As a result, SHIFT saw an enrollment conversion rate from 66% in January 2016 to 77% in September 2016.



Meet Patricia

Patricia, age 67, had fallen twice in six months. Fearing that she would keep falling, she stopped participating in her favorite social activities and had become quite isolated. She even stopped grocery shopping for herself and left home only to see her doctor. On one such visit, Patricia's primary care physician decided that she was a perfect candidate for the Matter of Balance program.

Skeptical at first, Patricia eventually overcame her anxiety about attending the workshops through the help of a CHW named Chantelle. She found a neighborhood workshop for Patricia in a location that was accessible and comfortable. Patricia was also excited and relieved to learn that PWTF provides a small stipend for taxi transportation to and from the workshops. Patricia also formed close relationships with other workshop participants and coaches. "I regained a sense of confidence and independence that I thought I had lost!" She even went on to become a coach for other older adults.

TOBACCO USE

More than 8,000 Massachusetts residents die each year from tobacco use, and many more face tobacco-related illnesses that cause disability and pain, including: cancers of the lung, larynx, throat, esophagus and mouth, heart disease, stroke, emphysema, and other respiratory illnesses.[70] Communities in PWTF partnerships have a higher prevalence of tobacco use than the state as a whole with 18.08% of adults reporting that they currently smoke, compared to just 14.7% statewide.[71] Between FY 2012 and FY 2014, the prevalence of lung cancer COPD cases among patients in PWTF communities was 501.7 cases per 100,000 patients, compared to 466.3 cases per 100,000 patients statewide.[72] In 2012, 11.01% of health insurance claims were lung cancer and/or COPD-related in PWTF communities, compared to 9.95% statewide.[73] Each year, healthcare expenses due to smoking costs Massachusetts citizens $3.9 billion. The Massachusetts economy loses another $1.5 billion in lost productivity.[74]

PWTF BY THE NUMBERS

43,670 current smokers in PWTF clinics

1,315 referrals
940 enrolled
558 completed

11 housing authorities have implemented or will implement smoke-free policies affecting **6,396 housing units**

558 individuals received tobacco cessation counseling

Source: PWTF by the Numbers Source: PWTF Clinical and Community Data, Massachusetts Dept. of Public Health. 2014-2016. Prepared by the Massachusetts Dept. of Public Health.

The Interventions

PWTF has three interventions for tobacco use prevention. The clinical intervention is:

1. The U.S. Preventive Services Task Force's Guide to Clinical Preventive Services that focuses on counseling and pharmacotherapy (Tier 1).

There are two community interventions:

2. Tobacco Cessation Counseling and Support in the Community, group of individual sessions that provide information and resources to help tobacco users develop a quit plan, address specific barriers to quitting, and manage withdrawal symptoms and stress to prevent relapse.
3. Promoting Smoke-Free Environments, smoking bans in housing that does not prohibit smokers from living in the building, but prohibits smoking inside the building.

Partnerships

PWTF built on and expanded existing tobacco efforts in all of the partnerships. Five partnerships focus on reducing tobacco use: Berkshire Partnership, Healthy Holyoke, Lynn Partnership, MetroWest Prevention and Wellness Partnership, and the Quincy Weymouth Wellness Initiative.

"The Prevention and Wellness Trust Fund communities have done an amazing job increasing the number of smoke-free multi-unit housing units across the Commonwealth. Through partnership development, training, capacity-building and education, PWTF Partnerships have helped public and private landlords understand how and why to implement smoke-free housing policies. Thousands of more individuals and families in PWTF communities can now breathe easier because they live in buildings with cleaner indoor air." **– Kathleen McCabe, PTWF Subject Matter Expert and Managing Director of Policy and Practice at Health Resources in Action**

Technical Assistance

Through a learning collaborative structure, the partnerships focused on tobacco cessation and smoke-free housing efforts. They have had the support of subject matter experts Nanette Vitali from the Center for Tobacco Treatment Research & Training UMass Medical School, Chris Banthin from the Public Health Advocacy Institute, Kathleen McCabe from Health Resources in Action, and Katherine Connolly from Health Resources in Action. DPH, in collaboration with these experts has offered trainings, in-person Learning Sessions, webinars, and training scholarships for partnership staff providing cessation counseling. Trainings have focused on best practices for screening, treatment, and counseling.

In addition, support has been provided to those implementing smoke-free housing programs in coordination with the local housing authorities including how to advocate, implement, and support compliance of smoke-free housing policies within public and private residences.

OLDER ADULT FALLS: OUTCOMES FROM THE HARVARD CATALYST EVALUATION

- **There has been a substantial increase among Massachusetts community health centers in screening and recording smoking status; by October 2016, 88% of adults had their smoking status recorded.**
- **Data was insufficient to assess referrals for tobacco cessation counseling.**

Source: Harvard Catalyst: The Harvard Clinical and Translational Science Center; The Massachusetts Prevention and Wellness Trust Fund Grantee Program, Final Evaluation Report, January 2017.

BRINGING CESSATION SUPPORT TO SMOKE-FREE HOUSING: LYNN PARTNERSHIP

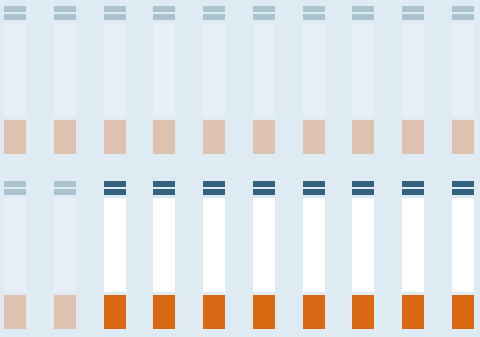
A few years ago, the goal of creating smoke-free housing in Lynn was deemed all but impossible for its 1,300 residents. "Resident support was not there," says Jeff Weeden of the Lynn Housing Authority and Neighborhood Development office. Addressing the resistance head-on, the Lynn Housing Authority conducted public meetings to talk about the process and to illustrate successful examples from other communities. It also gave residents a forum to share feedback and concerns. The well-attended sessions ultimately helped smoke-free housing proponents in Lynn refine their implementation plan. The interactions also served to cultivate support and champions among the residents who would be affected. The final plan included providing tobacco cessation assistance for residents, as well as designated smoking areas.

To help implement the Smoke-Free Housing initiative, Jeff Weeden tapped into the financial support and clinical expertise provided by PWTF. Resources encompassed on-site trainings, education, stakeholder input, and funding for free tobacco cessation counseling and nicotine replacement therapy. "Instead of asking residents to leave the premise to get counseling support, we were able to provide the resources where they live," adds Jeff. "The community needed this."

The results to date have been impressive. With overwhelming support from the residents, 10 Lynn apartment buildings totaling 950 living units have gone smoke-free over the past year. In addition, many residents have attended on-site cessation counseling to help quit smoking.

AS OF DECEMBER 2016, the Lynn Partnership's Quit-Smoking Counseling Sessions resulted in the participants reduction of cigarette use.

20.14 ***cigarettes per day*** to
8.33 ***cigarettes per day***





OPTIONAL CONDITIONS AND VULNERABLE POPULATIONS

Five partnerships address three optional conditions for which the evidence base and the potential for reducing healthcare costs with the four years of PWTF is less certain. All optional conditions are ranked as Tier 2 or Tier 3 interventions. Tier 3 interventions have a 5% cap on spending. These conditions are diabetes, obesity, and substance use. A fourth condition, oral health, was addressed for a short time by one partnership but dropped within the first six months of intervention implementation. The most progress and promising practices in the optional condition work has emerged from diabetes.

In addition, DPH and the Prevention and Wellness Advisory Board required partnerships to focus on specific strategies to reduce disparities in outcomes for the priority and optional conditions along with addressing co-occurring mental health conditions. As mentioned throughout this report, partnerships have infused health equity principles and cultural competency in their work on all conditions and in their partnership composition and approach. CHWs have been the lynchpin for work with vulnerable populations. They help partnerships reach different racial and ethnic populations and also help reduce isolation and loneliness which can lead to depression or other mental health conditions.

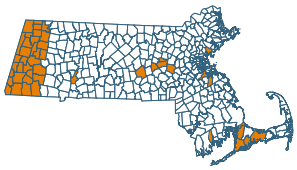
A Focus on Diabetes

In 2012, 8.5% of Massachusetts adults reported that they were told by a healthcare professional that they have diabetes. The percent of Massachusetts adults who reported being diagnosed with diabetes has nearly doubled from 1992 to 2012. Black, non-Hispanics (11.1%), and Hispanics (10.7%) have a higher prevalence of diabetes compared to White, Non-Hispanics (8.1%). Nearly four Massachusetts residents die from diabetes every day. It is estimated that every one dollar out of five dollars of healthcare spending goes to diabetes care.

Three partnerships address diabetes. This work includes treating existing diabetes and preventing the development of diabetes. For PWTF, clinical programs focus on improving screening and treatment for diabetes while community programs, including YMCAs, offer diabetes self-management education and diabetes prevention programs. PWTF is fortunate to have a large existing network of providers working on both diabetes management and diabetes prevention led in part by the Division of Prevention and Wellness at DPH and the Alliance of Massachusetts YMCAs.

Preliminary analysis by DPH finds promising outcomes from this work. The Department created a cohort of diabetic patients seen in 2014 who had at least two documented elevated A1cs (one of which occurred during the intervention implementation timeframe of 2015 and 2016). Patients of PWTF clinical sites working on diabetes had 2.1 times the odds of having an A1c in control (<7.5) at their lab test during the intervention period than the PWTF clinical sites not addressing diabetes.[75]

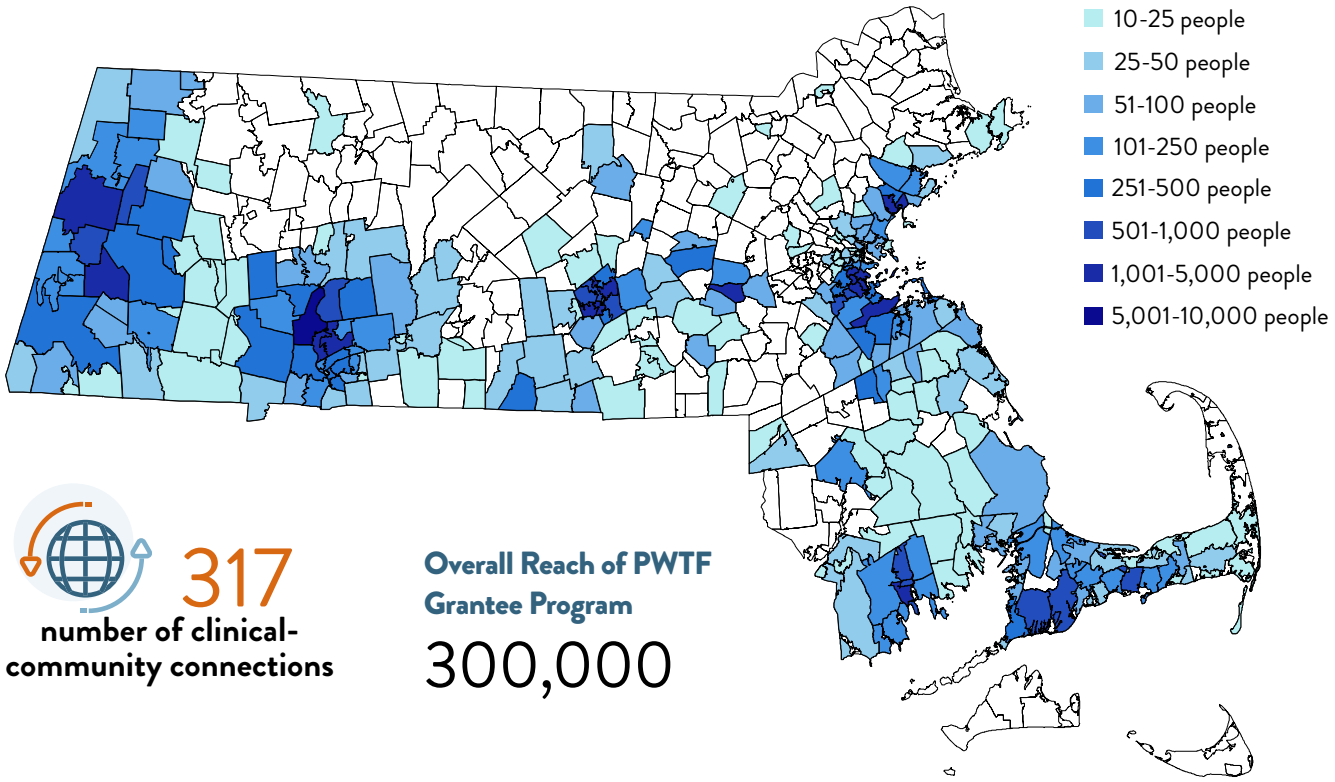
References for Section One are located in the back of this report.



THE PARTNERSHIPS AT-A-GLANCE

PWTF funded communities serve beyond their municipal borders, reaching people in need across the Commonwealth. PWTF funding went to specific geographic areas of high need – totaling 47 cities and towns. However, the reach of the PWTF has extended beyond those areas to encompass about 200 cities and towns total. The map below shows the reach on PWTF's clinical efforts.

PWTF CLINICAL POPULATION WITH PRIORITY CONDITIONS



317
number of clinical-community connections

Overall Reach of PWTF Grantee Program
300,000

PWTF partnerships represent diverse communities from urban to rural with different ethnic and racial make-ups. The priority health concerns for each community vary. To address their particular health issues, PWTF partnerships assembled unique partners to meet their community needs. They built on existing resources and created new capacity. In addition, interventions were tailored to meet the cultural, linguistic and social needs of the community residents. Partnership developed systems to enable the community and clinical linkage. This important work has results –in the systems developed, the number of people reached and the improvements in health outcomes.

Sources: PWTF Community Data, Massachusetts Dept. of Public Health. 2014-16. Prepared by the Massachusetts Dept. of Public Health; PWTF Clinical Data, Massachusetts Dept. of Public Health. 2014-2016. Prepared by the Massachusetts Dept. of Public Health.

PREVENTION & WELLNESS TRUST FUND | BARNSTABLE PREVENTION PARTNERSHIP

PARTNERS

Coordinating Partner: Barnstable County Department of Human Services

Community Partners: Healthy Living Cape Cod, YMCA Cape Cod

Clinical Partners: Community Health Center of Cape Cod, Duffy Health Center, Harbor Community Health Center-Hyannis

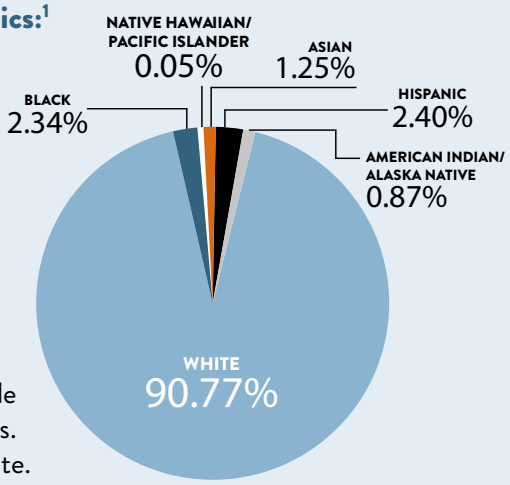
Communities Served: Barnstable, Bourne, Falmouth, Mashpee

HEALTH CONDITIONS ADDRESSED:

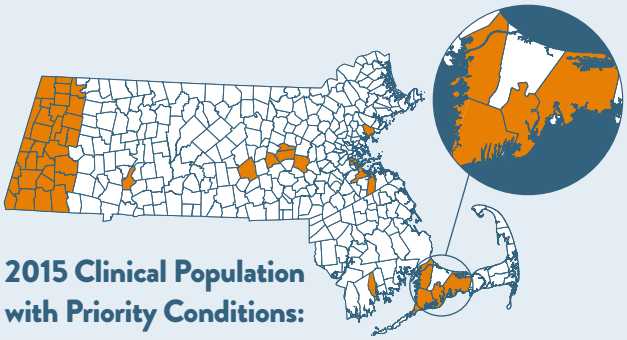
- Hypertension
- Older Adult Falls
- Diabetes

Census Demographics:[1]

110,484



HEALTH DISPARITY:
In 2015, **1 out of 4** Barnstable residents was **65+** vs. **1 out of 7** in the state.



2015 Clinical Population with Priority Conditions:

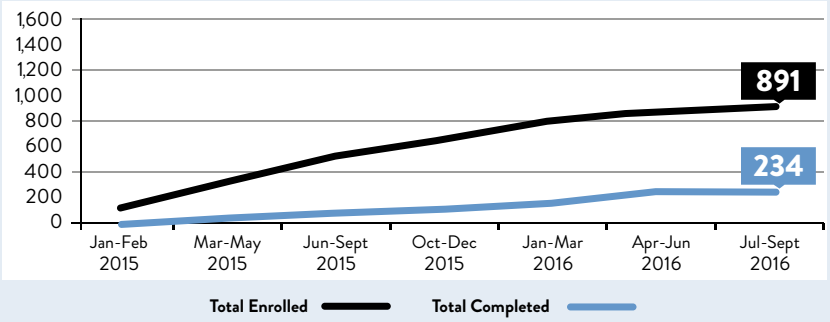
5,076[2]



29 **jobs supported by PWTF**

JANUARY 2015 - SEPTEMBER 2016[3]

COMMUNITY INTERVENTION PARTICIPATION



84%
Average rate of referral increase for each quarter

1,886
total number of referrals

PARTNERSHIP HIGHLIGHT

DIABETES PREVENTION

Diabetes is a public health concern in Barnstable. To meet the needs of community residents, the YMCA, a partner in the Barnstable Prevention Partnership, offers the Diabetes Prevention Program in both English and Portuguese, and offers flexible scheduling. To encourage patients to accept referrals to the YMCA, the Partnership personalized the referral process by developing a joint letter that includes the name of the referring physician and the CHW who will be providing the services. This warm hand-off strategy has increased participation rates to make Barnstable a referral leader for diabetes. Building on that new process, the Partnership embedded the referral mechanism into the health center workflows and continues to train clinicians on the evidence-based interventions.

DIABETES PREVALENCE [4]

9.6% vs. 11.8%

STATE AVERAGE BARNSTABLE

APRIL - JUNE 2016 [5]

A1cs

Barnstable patients with diabetes had A1cs < 7.0% at their last visit **63%** of the time vs. only **46.7%** for the PWTF average.

JANUARY 2015 - SEPTEMBER 2016 [6]

Barnstable had 731 diabetes referrals - **6X MORE** than the next closest Partnership

83% of the PWTF diabetes referrals are from Barnstable

[1] American FactFinder, United States Census Bureau. 2010-2014. Prepared by the Massachusetts Dept. of Public Health.

[2] PWTF Clinical Data, Massachusetts Dept. of Public Health. 2015. Prepared by the Massachusetts Dept. of Public Health.

[3] PWTF Community Data, Massachusetts Dept. of Public Health. 2014-2016. Prepared by the Massachusetts Dept. of Public Health.

[4] Behavioral Risk Factor Surveillance System, CDC and Massachusetts Dept. of Public Health. 2012-2014 for grantee small area estimate average; 2014 for state estimate. Prepared by the Massachusetts Dept. of Public Health.

[5] PWTF Clinical Data, Massachusetts Dept. of Public Health. 2016. Prepared by the Massachusetts Dept. of Public Health.

[6] PWTF Community Data, Massachusetts Dept. of Public Health. 2014-2016. Prepared by the Massachusetts Dept. of Public Health.

PREVENTION & WELLNESS TRUST FUND | BERKSHIRE PARTNERSHIP FOR HEALTH

PARTNERS

Coordinating Partner:
Berkshire Medical Center

Community Partners:

- Berkshire County Boards of Health Association
- Berkshire Family YMCA
- Berkshire Public Health Alliance
- Berkshire South Regional Community Center
- Community Health Programs
- Northern Berkshire Community Coalition
- Tri-Town Health Department
- Volunteers in Medicine

Clinical Partners:

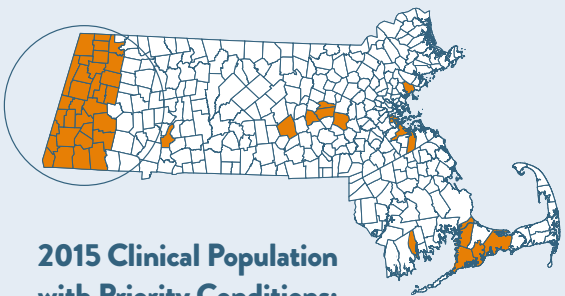
- Berkshire Medical Center
- Dalton Medical Associates
- Fairview Hospital
- Hillcrest Family Health
- Fairview Internal Medicine
- Lenox Family Health
- Suburban Internal Medicine

Supporting Partners

- Berkshire Regional Planning Commission
- Elder Services of Berkshire County

Communities Served:

Berkshire County



2015 Clinical Population with Priority Conditions:

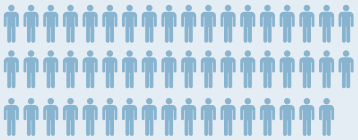
10,622[2]

HEALTH CONDITIONS ADDRESSED:

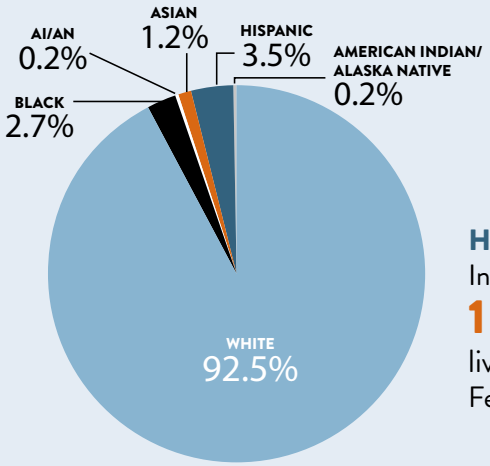
Hypertension | Tobacco Cessation | Older Adult Falls | Diabetes

Census Demographics:[1]

131,219



jobs supported by PWTF 53



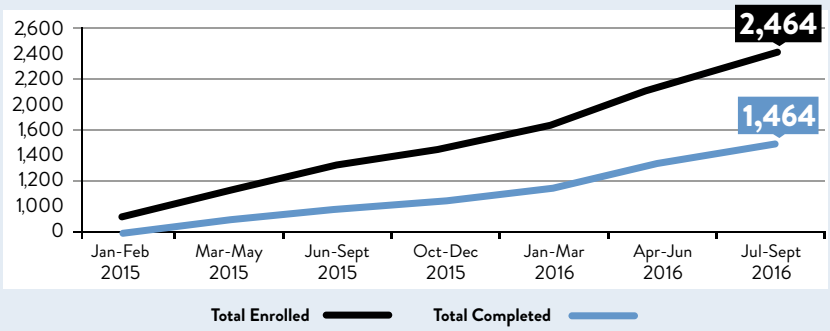
HEALTH DISPARITY:
In these neighborhoods,
1 in 6 families
lives **below** the Federal Poverty Level

JANUARY 2015 - SEPTEMBER 2016[3]

46%
Average rate of referral increase for each quarter

2,087
total number of referrals

COMMUNITY INTERVENTION PARTICIPATION



PARTNERSHIP HIGHLIGHT

TOBACCO CESSATION & SMOKE-FREE HOUSING

The Berkshire Partnership for Health is dedicated to providing a tobacco referral to all smokers in the entire Berkshire County. They use a number of strategies to reach this goal, first being provider awareness. The Tobacco Treatment Specialist (TTS) provides practices with an in-service training. Training includes discussion of self-assessment, the 5 A's, medication/NRT review, emerging tobacco products, services offered, etc. Second, all CHWs in the Partnership have been trained to perform a readiness to quit survey, which asks several questions related to "what matters to you" and "what motivates you." Third, to further enhance patient and provider knowledge, the Partnership developed educational toolkits for dissemination to both patients and providers. Lastly, the Partnership makes it as easy as possible to access services, offering transportation, translation services, and group glasses. Tobacco treatment services are offered to all housing units going smoke-free. Tenants are able to participate in group and individual cessation sessions and offered NRT, as needed.

TOBACCO USE PREVALENCE [4]

15.9% STATE AVERAGE **vs.** **18.3%** BERKSHIRE



89% of housing authorities have adopted smoke-free housing policies[5]



As of June 2016, added an additional

1,748

Smoke-Free Housing units

(from the baseline: 1,478)

exceeding the

10% unit increase charter goal.[6]



849

clients referred for tobacco cessation counseling from Jan 2015-Sept 2016.[7]

TOBACCO USE OUTCOMES – 5 PARTNERSHIPS:

There has been a substantial increase among MA community health centers in screening and recording smoking status; by October 2016, **88%** of adults had their smoking status recorded.[8]

[1] American FactFinder, United States Census Bureau. 2010-2014. Prepared by the Massachusetts Dept. of Public Health.

[2] PWTF Clinical Data, Massachusetts Dept. of Public Health. 2015. Prepared by the Massachusetts Dept. of Public Health.

[3] PWTF Community Data, Massachusetts Dept. of Public Health. 2014-2016. Prepared by the Massachusetts Dept. of Public Health.

[4] Behavioral Risk Factor Surveillance System, CDC and Massachusetts Dept. of Public Health. 2012-2014 for grantee small area estimate average; 2014 for state estimate. Prepared by the Massachusetts Dept. of Public Health.

[5] PWTF Smoke Free Housing Data, Massachusetts Dept. of Public Health. 2015-2016. Prepared by the Massachusetts Dept. of Public Health.

[6] Ibid.

[7] PWTF Community Data, Massachusetts Dept. of Public Health. 2014-2016. Prepared by the Massachusetts Dept. of Public Health.

[8] Harvard Catalyst: The Harvard Clinical and Translational Science Center; The Massachusetts Prevention and Wellness Trust Fund Grantee Program, Final Evaluation Report, January 2017.

PREVENTION & WELLNESS TRUST FUND | BOSTON PARTNERSHIP

PARTNERS

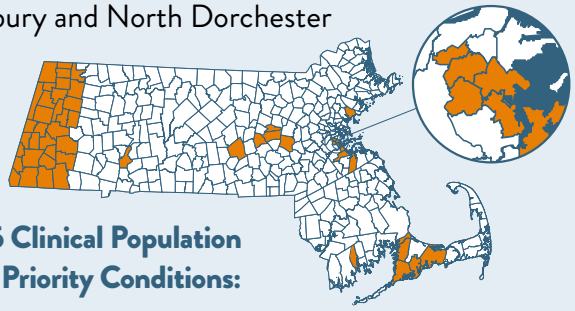
Coordinating Partner:
Boston Public Health Commission

Community Partners: Boston Public Schools, Action for Boston Community Development, Head Start, Boston Commission on Affairs of the Elderly, Ethos, Boston Senior Home Care, Central Boston Elder Services

Clinical Partners: Bowdoin Street Community Health Center, Codman Square Community Health Center, DotHouse Health, The Dimock Center, Neponset Health Center, Harvard Street Neighborhood Health Center, Whittier Street Health Center

Supporting Partners: Boston Medical Center Injury Prevention Center, Health Resources in Action

Communities Served:
Roxbury and North Dorchester

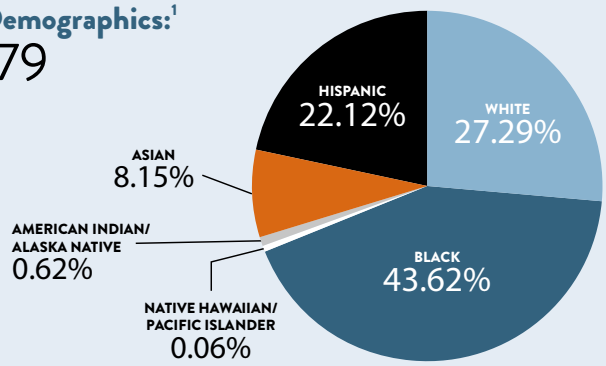


2015 Clinical Population with Priority Conditions:
13,406[2]

HEALTH CONDITIONS ADDRESSED:

- Pediatric Asthma
- Hypertension
- Older Adult Falls

Census Demographics:[1]
123,279



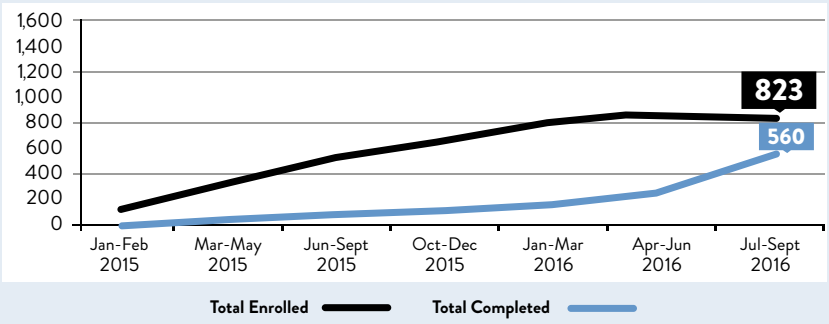
HEALTH DISPARITY: In these neighborhoods, **18.6%** of White residents have hypertension, compared to **36.7%** of Blacks and **26.2%** of Latinos.[3]



51
jobs supported by PWTF

JANUARY 2015 - SEPTEMBER 2016[4]

COMMUNITY INTERVENTION PARTICIPATION



80%
Between January 2015 - September 2016, the average rate of referral increased by 80% each quarter

1,704
total number of referrals

PARTNERSHIP HIGHLIGHT

USING PARTNERS TO ENHANCE FALLS PREVENTION

Many new partners came together to tackle falls in Boston including five clinical sites, four community organizations, and a subject matter expert. They initiated the development of a protocol and training for the CHW Assisted Home Safety Assessment intervention with the development of an evidence-based checklist that was subsequently used statewide for PWTF. Their subject matter expert has been instrumental in supporting not only the Boston CHWs conducting home assessments, but all of the PWTF CHWs across the state doing this work. With three Elder Service agencies as partners and several staff trained to conduct home assessments, Boston has built significant capacity to provide this to their at-risk older adult population.



19.2% of patients screening positive for falls risk received a Gait-Strength-Balance assessment in Boston clinics **compared to only 17%** as the PWTF average.[5]



From Jan. 2015 – Dec. 2016, Boston had the highest number of referrals for falls home assessments:

304

Almost twice as many as the PWTF average of 164.[6]



From Jan. 2015 - Sept. 2016, Boston had the highest completion rate for all enrollees in Matter of Balance

75% Boston vs 56% PWTF

and Tai Chi

48% Boston vs 10% PWTF.[7]

OLDER ADULT FALLS OUTCOMES – 7 PARTNERSHIPS:

Significant infrastructure was developed to address the growing public health concern of older adult falls and more than **900 falls were prevented** in one year of PWTF. The interventions are cost-effective.[8]

[1] American FactFinder, United States Census Bureau. 2010-2014. Prepared by the Massachusetts Dept. of Public Health.

[2] PWTF Clinical Data, Massachusetts Dept. of Public Health. 2015. Prepared by the Massachusetts Dept. of Public Health.

[3] Massachusetts Center for Health Information and Analysis, BPHC administered Boston Behavioral Risk Factor Survey (2013)

[4] PWTF Community Data, Massachusetts Dept. of Public Health. 2014-2016. Prepared by the Massachusetts Dept. of Public Health.

[5] PWTF Clinical Data, Massachusetts Dept. of Public Health. 2016. Prepared by the Massachusetts Dept. of Public Health.

[6] PWTF Community Data, Massachusetts Dept. of Public Health. 2014-2016. Prepared by the Massachusetts Dept. of Public Health.

[7] Ibid.

[8] Harvard Catalyst: The Harvard Clinical and Translational Science Center; The Massachusetts Prevention and Wellness Trust Fund Grantee Program, Final Evaluation Report, January 2017.

PREVENTION & WELLNESS TRUST FUND | HealthyHolyoke
Our Health. Our Community.

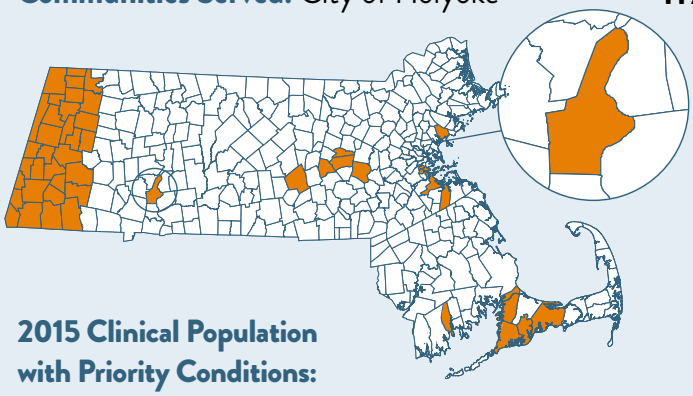
PARTNERS

Coordinating Partner:
Holyoke Health Center

Community Partners: City of Holyoke, River Valley Counseling Center, Greater Holyoke YMCA, Pioneer Valley Asthma Coalition, Holyoke Public Schools, Holyoke Housing Authority

Clinical Partners: Holyoke Medical Center, Western Mass Physician Associates, Holyoke Pediatric Associates

Communities Served: City of Holyoke



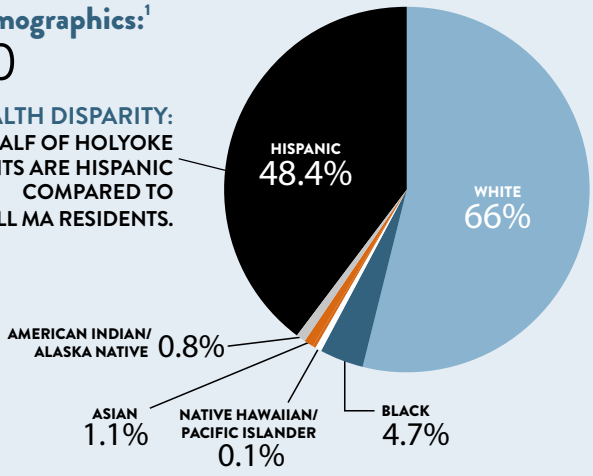
2015 Clinical Population with Priority Conditions:
20,013[2]

HEALTH CONDITIONS ADDRESSED:

- Pediatric Asthma
- Hypertension
- Tobacco Cessation
- Obesity

Census Demographics:[1]
39,880

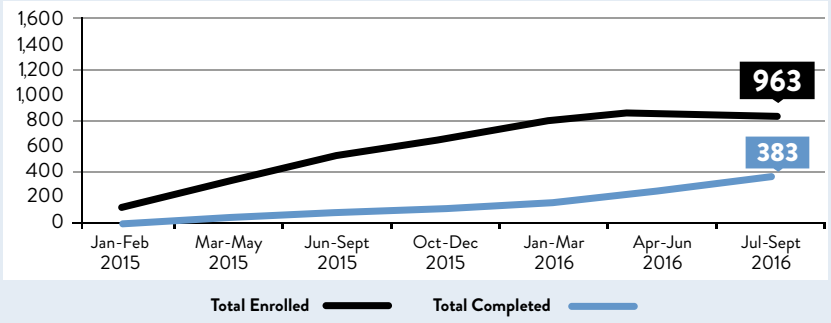
HEALTH DISPARITY:
ALMOST HALF OF HOLYOKE RESIDENTS ARE HISPANIC COMPARED TO **11%** OF ALL MA RESIDENTS.



28
jobs supported by PWTF

JANUARY 2015 - SEPTEMBER 2016[3]

COMMUNITY INTERVENTION PARTICIPATION



119%
Average rate of referral increase for each quarter

1,708
total number of referrals

PARTNERSHIP HIGHLIGHT

HYPERTENSION

In an effort to increase client engagement in measuring their own blood pressure (Self-Monitoring Blood Pressure Program), the Partnership decided to proactively conduct a quality improvement Plan-Do-Study-Act cycle with Dr. Naomi Fisher, a PWTF hypertension subject matter expert. As a result, the Holyoke Partnership made significant modifications to their Self-Monitoring Blood Pressure Program to better meet the needs of their clients and clinicians. Specifically, they changed the three-month blood pressure tracking format to seven-day tracking. Patients recorded two readings in the morning and evening and computed the average readings for the week. By simplifying the intervention, they were able to provide meaningful blood pressure data to providers. Also, they increased the motivation and confidence of the participants by celebrating smaller successes earlier on in the intervention. Completion rates for the program increased significantly as a result of these modifications. **Results: From April to June 2016, Holyoke had an 82% successful completion rate.**

HYPERTENSION PREVALENCE [4]

28.8% STATE AVERAGE vs. 37.6% HOLYOKE

JANUARY 2015 - SEPTEMBER 2016 [5]

71.2% of all Holyoke clinical patients with HTN have their BP taken at every visit, compared to only

67.8% of all PWTF patients with HTN

63.5% of all Holyoke clinical patients with HTN were in control at their last visit, compared to only

59% of all PWTF patients with HTN

HYPERTENSION OUTCOMES – 9 PARTNERSHIPS:

Improvement in blood pressure levels in PWTF communities were meaningful at the population level and can lead to reductions in heart disease events and strokes. If these changes persist, they could result in **500–1,000 fewer heart attacks** and stroke per million residents.[6]

[1] American FactFinder, United States Census Bureau. 2010-2014. Prepared by the Massachusetts Dept. of Public Health.

[2] PWTF Clinical Data, Massachusetts Dept. of Public Health. 2015. Prepared by the Massachusetts Dept. of Public Health.

[3] PWTF Community Data, Massachusetts Dept. of Public Health. 2014-2016. Prepared by the Massachusetts Dept. of Public Health.

[4] Behavioral Risk Factor Surveillance System, CDC and Massachusetts Dept. of Public Health. 2011-2013 for grantee small area estimate average, 2013 for state estimate. Prepared by the Massachusetts Dept. of Public Health.

[5] PWTF Clinical Data, Massachusetts Dept. of Public Health. 2016. Prepared by the Massachusetts Dept. of Public Health.

[6] Harvard Catalyst: The Harvard Clinical and Translational Science Center; The Massachusetts Prevention and Wellness Trust Fund Grantee Program, Final Evaluation Report, January 2017.

PREVENTION & WELLNESS TRUST FUND | LYNN PARTNERSHIP

PARTNERS

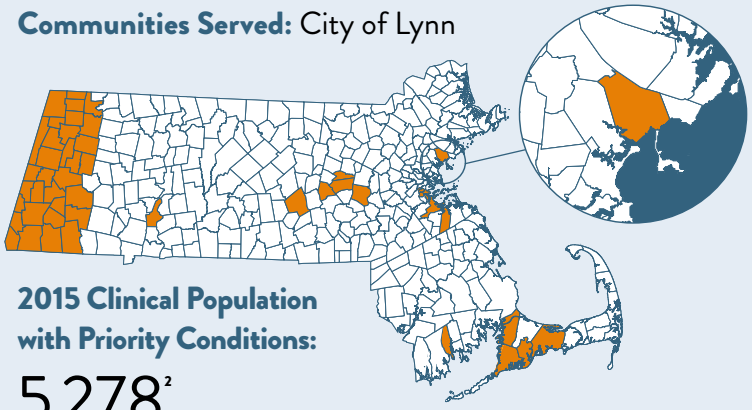
Coordinating Partner: City of Lynn

Community Partners: Greater Lynn Senior Services, Lynn Public Schools, Lynn Housing Authority and Neighborhood Development, Massachusetts Coalition for the Homeless, City of Lynn

Clinical Partner:
Lynn Community Health Center

Supporting Partner:
Metropolitan Area Planning Council

Communities Served: City of Lynn

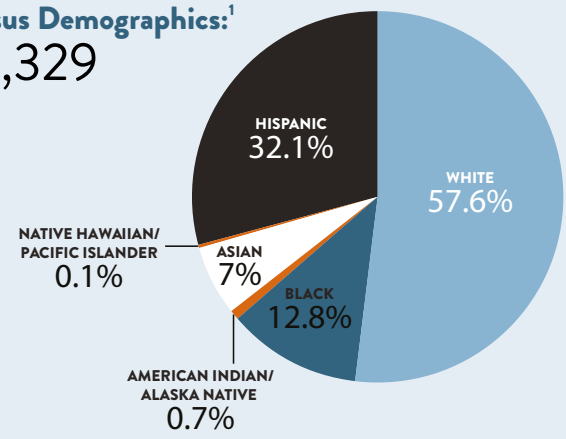


2015 Clinical Population with Priority Conditions:
5,278[2]

HEALTH CONDITIONS ADDRESSED:

- Pediatric Asthma
- Hypertension
- Older Adult Falls
- Tobacco Cessation

Census Demographics:[1]
90,329

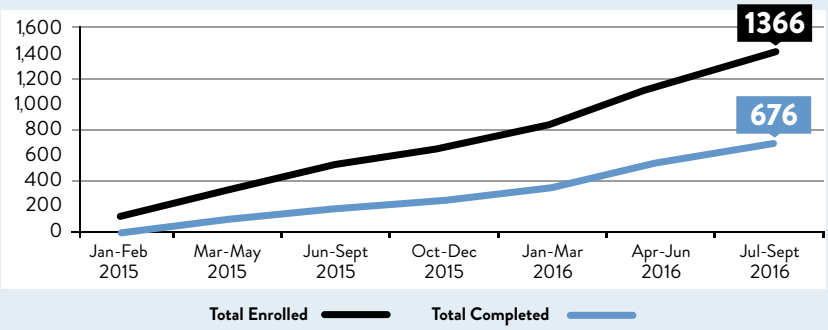




45 jobs supported by PWTF

JANUARY 2015 - SEPTEMBER 2016[3]

COMMUNITY INTERVENTION PARTICIPATION



94%
Average rate of referral increase for each quarter

1,641
total number of referrals

PARTNERSHIP HIGHLIGHT

PEDIATRIC ASTHMA

The Partnership has worked to make the asthma home visit process more efficient. The Lynn Community Health Center refers high-risk asthma patients to the Massachusetts Coalition for the Homeless' Room-to-Breathe program, which arranges patient home visits. Among other activities, the Coalition's community health workers (CHWs) identify environmental asthma triggers within the home. CHWs then refer those patients to the Lynn Housing Authority and Neighborhood Development (LHAND), which assist with home modifications. Initially, home modifications took an average of 5.3 months to complete. To compress the schedule, Room-to-Breathe and LHAND collaborated to implement innovative quality improvement measures. **Results: The time needed for home modifications decreased dramatically, from an average of 5.3 months to just 1 month.**

PEDIATRIC ASTHMA PREVALENCE[4]

13.7% vs. 15.6%

STATE AVERAGE | CITY OF LYNN

JANUARY 2015 - SEPTEMBER 2016[5]



Sent the most **referrals**– more asthma home visit referrals than the next closest partnership

49%



782

home visits completed



39%

of all asthma home visit referrals out of PWTF

HEALTH EQUITY HIGHLIGHT:

From April - June 2016, **48.8%** of African American and **56.7%** of Asian pediatric asthma patients had a flu vaccine in the past year, compared to **45.2%** of White Non-Hispanic pediatric asthma patients in Lynn.[6]

PEDIATRIC ASTHMA OUTCOMES – 6 PARTNERSHIPS:

The asthma interventions had promising results with decline in overall health care costs in PWTF communities when compared to comparison communities. Data suggests that asthma interventions may give very good value and may result in net costs savings.[7]

[1] American FactFinder, United States Census Bureau. 2010-2014. Prepared by the Massachusetts Dept. of Public Health.

[2] PWTF Clinical Data, Massachusetts Dept. of Public Health. 2015. Prepared by the Massachusetts Dept. of Public Health.

[3] PWTF Community Data, Massachusetts Dept. of Public Health. 2014-2016. Prepared by the Massachusetts Dept. of Public Health.

[4] Behavioral Risk Factor Surveillance System, CDC and Massachusetts Dept. of Public Health. 2012-2014 for grantee small area estimate average; 2014 for state estimate. Prepared by the Massachusetts Dept. of Public Health.

[5] PWTF Clinical Data, Massachusetts Dept. of Public Health. 2014-2016. Prepared by the Massachusetts Dept. of Public Health.

[6] PWTF Clinical Data, Massachusetts Dept. of Public Health. 2016. Prepared by the Massachusetts Dept. of Public Health.

[7] Harvard Catalyst: The Harvard Clinical and Translational Science Center; The Massachusetts Prevention and Wellness Trust Fund Grantee Program, Final Evaluation Report, January 2017.

PREVENTION & WELLNESS TRUST FUND

METROWEST PREVENTION AND WELLNESS PARTNERSHIP

PARTNERS

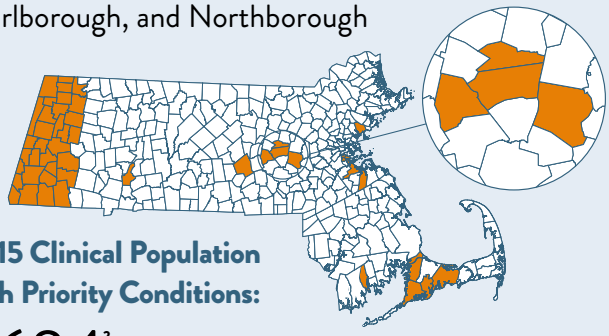
Coordinating Partner: Town of Hudson

Community Partners: Framingham Health Department, Hudson Health Department, Marlborough Board of Health, Northborough Board of Health, Latino Health Insurance Program, MetroWest YMCA, YMCA of Central Massachusetts-Boroughs Family Branch

Clinical Partners: Edward M. Kennedy Community Health Center-Framingham, MetroWest Medical Center, Charles River Medical Associates

Supporting Partners: Metropolitan Area Planning Council, Center for Health Impact

Communities Served: Framingham, Hudson, Marlborough, and Northborough



2015 Clinical Population with Priority Conditions:

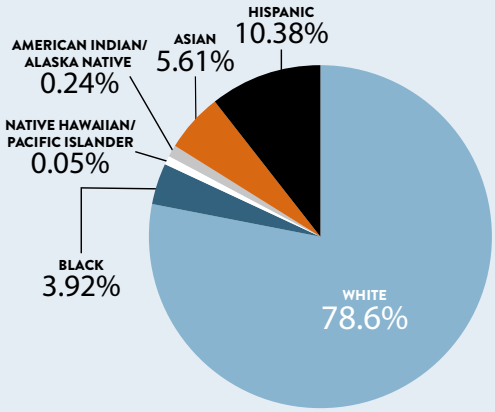
1,684[2]

HEALTH CONDITIONS ADDRESSED:

- Pediatric Asthma
- Hypertension
- Older Adult Falls
- Tobacco Cessation

Census Demographics:[1]

140,035

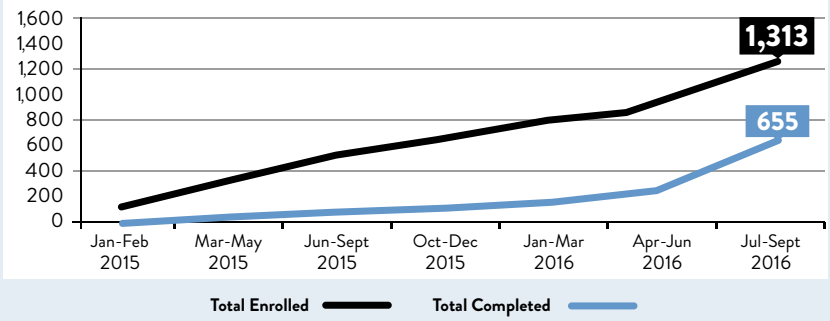




53 **jobs supported by PWTF**

JANUARY 2015 - SEPTEMBER 2016[3]

COMMUNITY INTERVENTION PARTICIPATION



109%
Average rate of referral increase for each quarter

1,208
total number of referrals

PARTNERSHIP HIGHLIGHT

HYPERTENSION

Clinical partners in the MetroWest Prevention and Wellness Partnership institutionalized ways to reinforce consistent blood pressure readings, accurate diagnosis of hypertension, and medication adherence. One clinical site conducted train-the-trainer sessions with staff members on the proper, evidence-based methodology for taking an accurate blood pressure reading. These trained staff then could mentor new staff over time. The provider also took advantage of pharmacy staff as a referral resource and used nurses to review medications during their patient visits. Similarly, the Director of Outpatient Services at another clinical site is a certified hypertension coach and supports staff in this area.

NEED FOR HYPERTENSION INTERVENTION[4]

25.9% STATE INSURANCE CLAIMS vs. **28.5%** METROWEST INSURANCE CLAIMS

JANUARY 2015 - SEPTEMBER 2016

From January 2015 - September 2016, MetroWest has had

80% of referred enrollees completing CDSMP–almost double the PWTF average of 44%.[5]

In April-June 2016,

76.2%

of all MetroWest patients with hypertension had their blood pressure taken at every visit, compared to the PWTF average of 67.8%.[6]

HEALTH EQUITY HIGHLIGHT

During the baseline period of 2014, **2.7%** of Hispanic clinical patients had potentially undiagnosed hypertension, but by 2016 only **1.75%** had potentially undiagnosed hypertension. The rate of undiagnosed in White Non-Hispanic clinical patients stayed roughly the same across this same time period.[7]

HYPERTENSION OUTCOMES – 9 PARTNERSHIPS:

Improvement in blood pressure levels in PWTF communities were meaningful at the population level and can lead to reductions in heart disease events and strokes. If these changes persist, they could result in **500–1,000 fewer heart attacks** and stroke per million residents.[8]

[1] American FactFinder, United States Census Bureau. 2010-2014. Prepared by the Massachusetts Dept. of Public Health.

[2] PWTF Clinical Data, Massachusetts Dept. of Public Health. 2015. Prepared by the Massachusetts Dept. of Public Health.

[3] PWTF Community Data, Massachusetts Dept. of Public Health. 2014-2016. Prepared by the Massachusetts Dept. of Public Health.

[4] All Payer Claims Database, Center for Health Information and Analysis. 2012. Prepared by the Massachusetts Dept. of Public Health.

[5] PWTF Community Data, Massachusetts Dept. of Public Health. 2014-2016. Prepared by the Massachusetts Dept. of Public Health.

[6] PWTF Clinical Data, Massachusetts Dept. of Public Health. 2016. Prepared by the Massachusetts Dept. of Public Health.

[7] PWTF Clinical Data, Massachusetts Dept. of Public Health. 2014-2016. Prepared by the Massachusetts Dept. of Public Health.

[8] Harvard Catalyst: The Harvard Clinical and Translational Science Center; The Massachusetts Prevention and Wellness Trust Fund Grantee Program, Final Evaluation Report, January 2017.

PREVENTION & WELLNESS TRUST FUND | WELLNESS INITIATIVE

PARTNERS

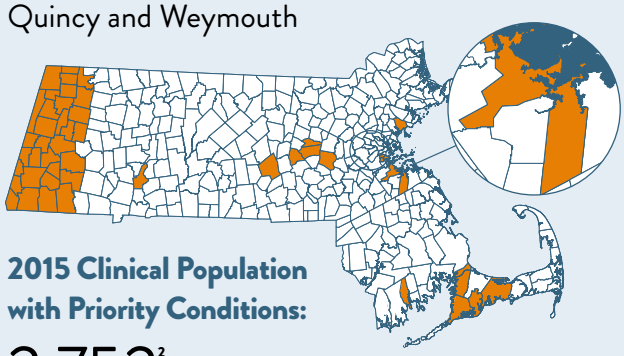
Coordinating Partner:
Manet Community Health Center

Community Partners: City of Quincy, Town of Weymouth, Bay State Community Services, South Shore Elder Services, South Shore YMCA, Enhanced Asian Community Health, Inc.

Clinical Partners: South Shore Hospital, Manet Community Health Center

Supporting Partner: South Shore Workforce Investment Board

Communities Served:
Quincy and Weymouth

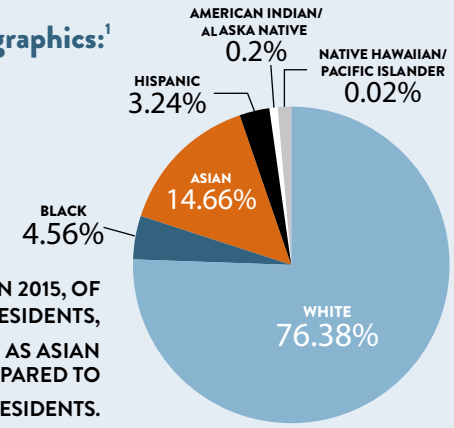


2015 Clinical Population with Priority Conditions:
2,752[2]

HEALTH CONDITIONS ADDRESSED:

- Hypertension
- Older Adult Falls
- Tobacco Cessation
- Diabetes
- Substance Abuse

Census Demographics:[1]
118,052

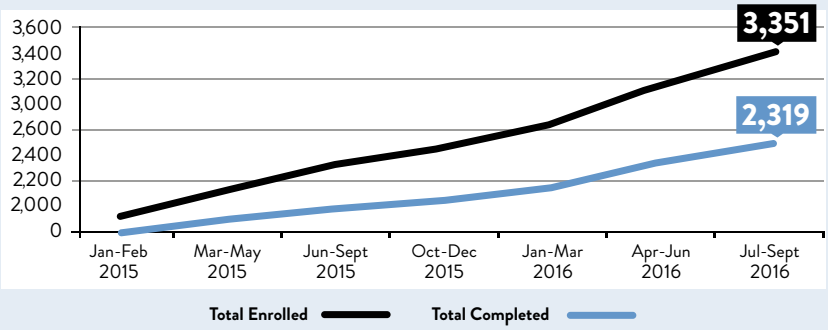


HEALTH DISPARITY: IN 2015, OF QWWI PARTNERSHIP RESIDENTS, **17%** IDENTIFIED AS ASIAN COMPARED TO **6%** OF ALL MA RESIDENTS.

26
jobs supported by PWTF

JANUARY 2015 - SEPTEMBER 2016[3]

COMMUNITY INTERVENTION PARTICIPATION



80%
Average rate of referral increase for each quarter

2,175
total number of referrals

PARTNERSHIP HIGHLIGHT

TOBACCO CESSATION & SMOKE-FREE HOUSING

The Quincy Weymouth Wellness Initiative (QWWI) conducts provider trainings to build knowledge, buy-in, and awareness of PWTF activities in the Quincy-Weymouth region. To increase tobacco quit rates, QWWI educates providers on the value of Quitworks and how to refer patients to the Massachusetts Smokers' Helpline (commonly known as the Quitline). For clients who want more personal support, the partnership provides referrals to smoking cessation counseling at the local YMCA.

HEALTH DISPARITY

From 2012-2014, Quincy-Weymouth had 613.5 inpatient hospitalizations related to tobacco usage per 100,000 people (MA had 466.3)[4]

The Partnership also successfully reached the PWTF charter goal of implementing smoke-free housing policies at all of its Quincy municipal housing authorities and reached the target of increasing the number of smoke-free units by 10%. QWWI is currently assisting Winter Gardens, a private 24-unit housing property, to go smoke-free.



In April-June 2016, **5.6%** of Quincy-Weymouth patients were referred to QuitWorks (compared to **3.4%** for PWTF overall)[5]



From January 2015-September 2016, **99%** of all Quincy-Weymouth clinical referrals for tobacco cessation counseling enrolled (compared to **38%** for PWTF overall)[6]

TOBACCO USE OUTCOMES – 5 PARTNERSHIPS:

There has been a substantial increase among MA community health centers in screening and recording smoking status; by October 2016, **88%** of adults had their smoking status recorded.[7]

[1] American FactFinder, United States Census Bureau. 2010-2014. Prepared by the Massachusetts Dept. of Public Health.

[2] PWTF Clinical Data, Massachusetts Dept. of Public Health. 2015. Prepared by the Massachusetts Dept. of Public Health.

[3] PWTF Community Data, Massachusetts Dept. of Public Health. 2014-2016. Prepared by the Massachusetts Dept. of Public Health.

[4] American FactFinder, United States Census Bureau. 2015. Prepared by the Massachusetts Dept. of Public Health.

[5] Massachusetts Smokers' Helpline Data, Massachusetts Dept. of Public Health. 2016. Prepared by the Massachusetts Dept. of Public Health.

[6] PWTF Community Data, Massachusetts Dept. of Public Health. 2014-2016. Prepared by the Massachusetts Dept. of Public Health.

[7] Harvard Catalyst: The Harvard Clinical and Translational Science Center; The Massachusetts Prevention and Wellness Trust Fund Grantee Program, Final Evaluation Report, January 2017.

PREVENTION & WELLNESS TRUST FUND | SHIFT Southeastern Health Initiative for Transformation — My Health Matters. Mi Salud es Importante. Minha Saúde é Importante.

PARTNERS

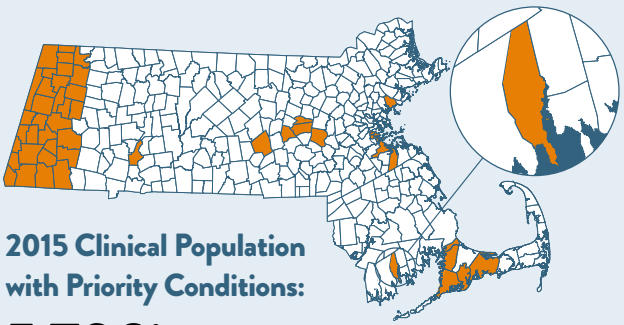
Coordinating Partner: City of New Bedford Health Department

Community Partners: Seven Hills Foundation, Community Nurse Home Care, New Bedford Health Department

Clinical Partner: Greater New Bedford Community Health Center

Communities Served: New Bedford

Supporting Partners: Immigrants' Assistance Center, New Bedford Housing Authority, New Bedford Parks Recreation & Beaches Department, YMCA Southcoast, Hawthorn Medical Associates



2015 Clinical Population with Priority Conditions:

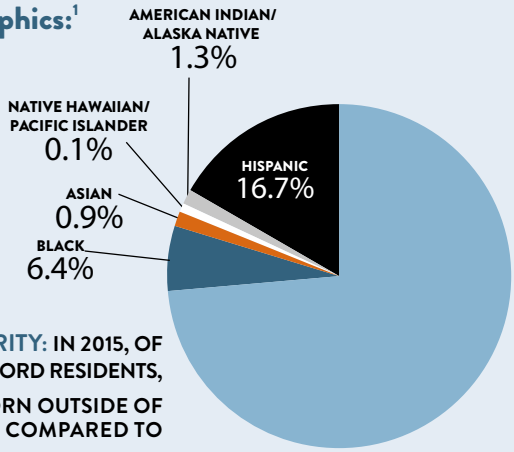
5,728[2]

HEALTH CONDITIONS ADDRESSED:

- Pediatric Asthma
- Hypertension
- Older Adult Falls
- Substance Abuse

Census Demographics:[1]

95,072

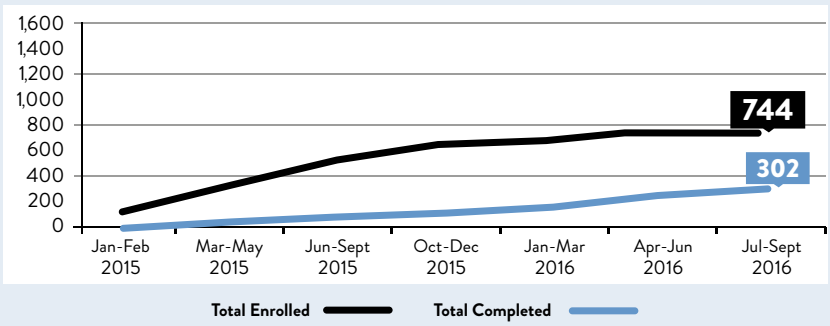


HEALTH DISPARITY: IN 2015, OF NEW BEDFORD RESIDENTS, **21%** WERE BORN OUTSIDE OF THE U.S. COMPARED TO **16%** OF ALL MA RESIDENTS.

18 jobs supported by PWTF

JANUARY 2015 - SEPTEMBER 2016[3]

COMMUNITY INTERVENTION PARTICIPATION



101%
Average rate of referral increase for each quarter

1,569
total number of referrals

PARTNERSHIP HIGHLIGHT

FALLS PREVENTION

Addressing older adult falls is a big focus for SHIFT. The Greater New Bedford Community Health Center screens and referrals patients at high-risk for falls to the Matter of Balance program that is offered through Community Nurse Home Care. Many supports and tools have been developed to encourage enrollment. The clinical team provides a flyer with photos and contact information for the CHWs from Community Nurse Home Care, who will reach out to the patient to enroll them. SHIFT also provides transportation for its clients to get to the Matter of Balance classes. Scripts, which include motivational interviewing techniques, were created to guide the CHW calls with referred patients that. Also, if clients decline Matter of Balance, they are sent an "open door" letter letting them know they are welcome in the future should their circumstances change.

REPORTED FALLS WITH INJURIES[4]

10.1% vs. 12.2%

STATE AVERAGE NEW BEDFORD

JANUARY 2015 - SEPTEMBER 2016[5]

From Jan 2015-Sept 2016, SHIFT has the leading total of Matter of Balance referrals (618) -

40% higher than the next closest partnership.

They comprise **23%** of all PWTF Matter of Balance referrals.

From Jan 2015-Sept 2016, SHIFT enrolled **168** clients into Matter of Balance ranking

4th out of 8 partnerships for Matter of Balance enrollment.

OLDER ADULT FALLS OUTCOMES – 7 PARTNERSHIPS:

Significant infrastructure was developed to address the growing public health concern of older adult falls and more than **900 falls were prevented** in one year of PWTF. The interventions are cost-effective.[6]

[1] American FactFinder, United States Census Bureau. 2010-2014. Prepared by the Massachusetts Dept. of Public Health.

[2] PWTF Clinical Data, Massachusetts Dept. of Public Health. 2015. Prepared by the Massachusetts Dept. of Public Health.

[3] PWTF Community Data, Massachusetts Dept. of Public Health. 2014-2016. Prepared by the Massachusetts Dept. of Public Health.

[4] Behavioral Risk Factor Surveillance System, CDC and Massachusetts Dept. of Public Health. 2012-2014 for grantee small area estimate average; 2014 for state estimate. Prepared by the Massachusetts Dept. of Public Health.

[5] PWTF Community Data, Massachusetts Dept. of Public Health. 2014-2016. Prepared by the Massachusetts Dept. of Public Health.

[6] Harvard Catalyst: The Harvard Clinical and Translational Science Center; The Massachusetts Prevention and Wellness Trust Fund Grantee Program, Final Evaluation Report, January 2017.

PREVENTION & WELLNESS TRUST FUND | WORCESTER PARTNERSHIP

PARTNERS

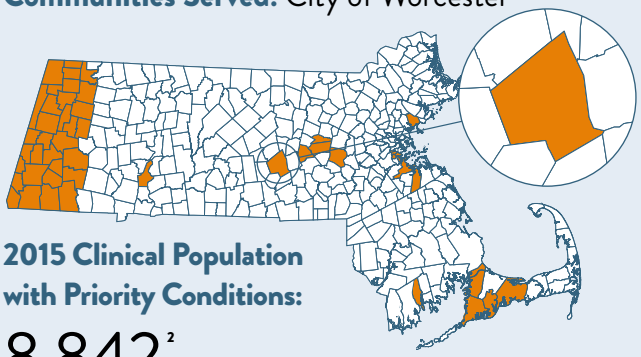
Coordinating Partner:
Worcester Division of Public Health

Community Partners: Worcester Senior Center, Head Start, Worcester Public Schools, Community Legal Aid, Massachusetts Audubon Society

Clinical Partners: Family Health Center of Worcester, Edward M. Kennedy Community Health Center - Worcester, UMass Memorial Medical Center

Supporting Partners: Fallon Health, Elder Services of Worcester Area

Communities Served: City of Worcester

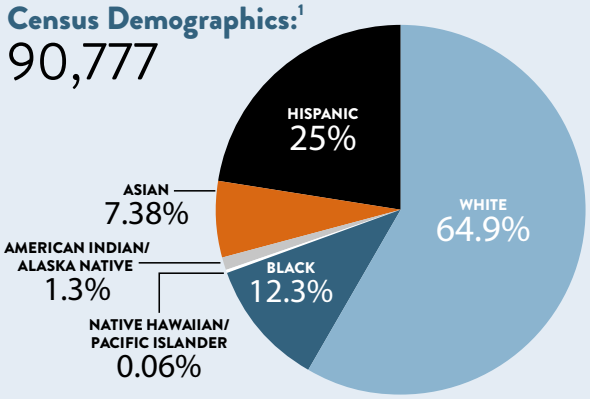


2015 Clinical Population with Priority Conditions:
8,842[2]

HEALTH CONDITIONS ADDRESSED:

- Pediatric Asthma
- Hypertension
- Older Adult Falls

Census Demographics:[1]
90,777

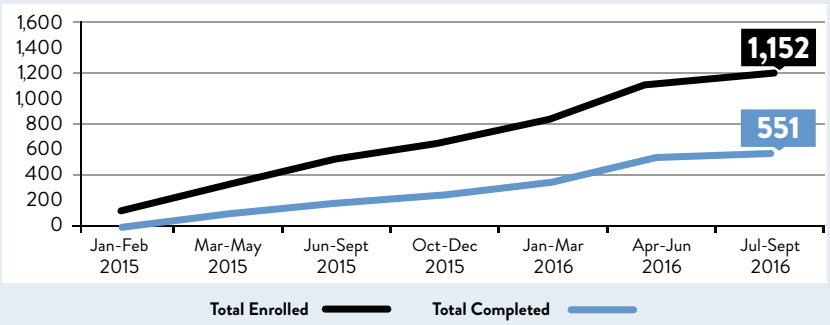




45
jobs supported by PWTF

JANUARY 2015 - SEPTEMBER 2016[3]

COMMUNITY INTERVENTION PARTICIPATION



63%
Average rate of referral increase for each quarter

1,436
total number of referrals

PARTNERSHIP HIGHLIGHT

PEDIATRIC ASTHMA

The Worcester Partnership has developed an innovative pediatric asthma model, which links to the public elementary schools to UMass Memorial Medical Center to reduce school absenteeism, hospitalizations, and emergency department use among children with poorly controlled asthma. The school nurses provide a monthly feedback report of student progress to the UMass Memorial and Pulmonary Associates. America's Essential Hospitals, a national group representing hospitals committed to high-quality care for all people, including the vulnerable, awarded UMass Memorial Health Care the association's 2016 Gage Award for Population Health for their work on pediatric asthma.

HEALTH DISPARITY

From 2011-2013, Worcester had 1,447.9 emergency room visits per 100,000 kids (MA had 737.6).[4]

— APRIL – JUNE 2016[5] —



74% of Worcester asthma patients had their asthma severity documented
(compared to **38.5%** for PWTF overall)

— JANUARY 2015 - SEPTEMBER 2016[6] —

Educated
2,807 students
in asthma management





Completed at least
739
home visits for asthma

89% of clinical referrals who enroll in asthma home visits complete in Worcester
(compared to 70% for the PWTF average)

HEALTH EQUITY HIGHLIGHT:

In April - June 2016, **82.4%** of African American pediatric asthma patients had their asthma severity documented compared to **73%** of White Non-Hispanic patients in Worcester.[7]

PEDIATRIC ASTHMA OUTCOMES – 6 PARTNERSHIPS:

The asthma interventions had promising results with decline in overall health care costs in PWTF communities when compared to comparison communities. Data suggests that asthma interventions may give very good value and may result in net costs savings.[8]

[1] American FactFinder, United States Census Bureau. 2010-2014. Prepared by the Massachusetts Dept. of Public Health.

[2] PWTF Clinical Data, Massachusetts Dept. of Public Health. 2015. Prepared by the Massachusetts Dept. of Public Health.

[3] PWTF Community Data, Massachusetts Dept. of Public Health. 2014-2016. Prepared by the Massachusetts Dept. of Public Health.

[4] Massachusetts Acute Hospital Case Mix Database, Center for Health Information and Analysis. FY2011-2013. Prepared by the Massachusetts Dept. of Public Health.

[5] PWTF Clinical Data, Massachusetts Dept. of Public Health. 2016. Prepared by the Massachusetts Dept. of Public Health.

[6] PWTF Community Data, Massachusetts Dept. of Public Health. 2014-2016. Prepared by the Massachusetts Dept. of Public Health.

[7] Ibid.

[8] Harvard Catalyst: The Harvard Clinical and Translational Science Center; The Massachusetts Prevention and Wellness Trust Fund Grantee Program, Final Evaluation Report, January 2017.

MASSACHUSETTS WORKING ON WELLNESS: MEETING PEOPLE WHERE THEY WORK

Chapter 224 allocates up to 10% of the Prevention and Wellness Trust Fund (PWTF) to support increased adoption of workplace wellness programs. Working on Wellness was created to help businesses implement comprehensive wellness initiatives that enable employees to engage in healthy behaviors and in the long-term help reduce healthcare costs.

Figure 1: Description of Program Model



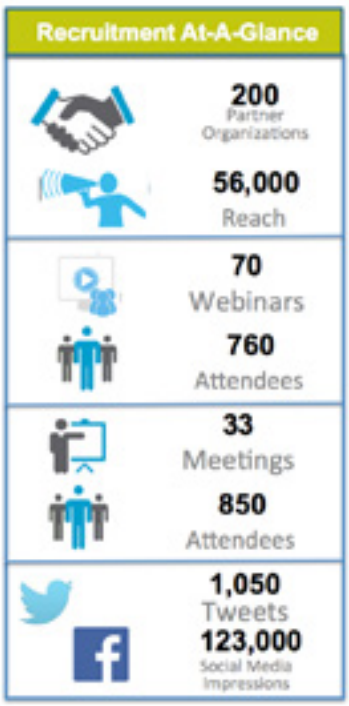


Figure 2: Recruitment efforts

Working on Wellness provides training, technical assistance and seed funding to Massachusetts employers to initiate health-promoting policies, environmental supports, and behavior change programs for employees, by teaching the skills to plan and implement a comprehensive wellness initiative. The educational content is based on worksite health promotion best practices and follows a six-step program development cycle (Figure 1).

Over the course of the ten-month program, participating organizations complete two online learning modules for each step of the program development cycle, and receive additional support through live technical assistance calls, blogs, expert series webinars, and other tools and worksheets for each step. Organizations receive between $5,000 and $10,000 in seed funding to support their wellness program; the amount varies based on the quality and scope of the planned interventions.

By implementing a comprehensive wellness initiative, 25 employers participating in Working on Wellness are now eligible to apply for the MA small business tax credit, which covers up to 25% of the costs of wellness program implementation (max of $10,000). In 2014 (before Working on Wellness launched), there were a total of 27 approved applications for the small business wellness tax credit.

Program Reach

Working on Wellness has achieved the goal of expanding the number of employers offering comprehensive worksite wellness initiatives. Extensive outreach was conducted using various marketing channels to recruit employers (Figure 2). Representing all regions of the state (Figure 3), 165 employers are actively participating in Working on Wellness, impacting nearly 72,000 employees, 21% of which are lower wage workers.[1] (Figure 4)

The majority of employers were from the non-profit sector and the most common industries included education, public administration, manufacturing, and healthcare and social assistance, which is fairly representative of the overall MA workforce.[2] DPH prioritized recruiting businesses with less than 200 employees, as these organizations are less likely to offer wellness initiatives. Half (51%) of the organizations in Working on Wellness have 200 employees or less.

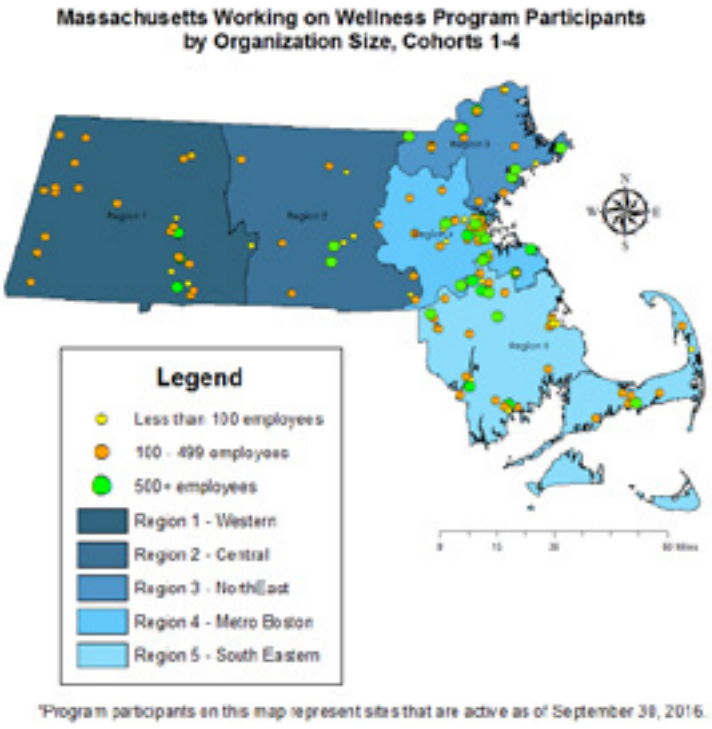


Figure 3: Working on Wellness Program Participants by Organization Size



Figure 4: Program Reach

Asian Task Force for Domestic Violence

Asian Task Force for Domestic Violence (ATASK) is an 11-person Boston-based non-profit organization that serves Asian families and individuals in Massachusetts and New England who suffer from or are at risk of suffering from domestic violence. Through Working on Wellness, ATASK learned that 19% of its staff are obese, 23% report not engaging in enough physical activity, and 90% have high levels of stress. To address this, ATASK developed a comprehensive program to support increased physical activity, team building, and community engagement. One example is creating a team to compete in the Dragon Boat Festival race. ATASK sponsored a team made up of community members and staff, and won a Silver Medal in their division. Participants have reported positive feedback about the team: "Because of the wellness program, our staff has become more active on a regular basis and there is more communication between the different sites, which promotes a collective feeling."



Program Impact

DPH worked with the University of Massachusetts Medical School and University of Massachusetts Lowell to conduct the evaluation of Working on Wellness. Please refer to Appendix B for their discussion. This section highlights key impacts of the program.

Working on Wellness has achieved the following:

- Increased by 165 the number of MA employers offering comprehensive worksite wellness initiatives, including the establishment of the internal infrastructure of executive sponsor, initiative leader, and employee wellness committee, and the development of strategic plans and budgets for their worksite wellness initiatives.
- Increased by 72,000 the number of MA employees with access to comprehensive worksite wellness initiatives.
- Increased the number of workplace policies and environmental supports that impact the health and well-being of employees, including flextime, paid time for physical activity or attending wellness programs, on-site gyms, tobacco-free grounds, stretch breaks in meetings, and healthy meetings policy.
- Leveraged existing community investments in 27 PWTF and/or Mass in Motion communities, with 86 employer organizations participating, touching over 33,000 employees, including 10 PWTF partner organizations.
- Expanded program reach beyond enrolled participants by developing tools and resources available to all employers, not just program participants, including the Healthy Workplace Toolbox and the Expert Webinar Series.

Limitations

Capacity Building: Effective infrastructure development is the foundation for successful implementation of comprehensive systems change, and this infrastructure development simply takes time. Recruitment began in August 2015, so there has only been one year of program implementation which limits the ability to demonstrate impact on health cost savings or improvements in health outcomes.

Recruitment: The target was 350 MA employers; 207 applied, 203 were accepted, and 165 are actively engaged. Organizations with a centralized human resources function were more likely to enroll; as such, certain industries (e.g., retail, food service, construction) are underrepresented. Additionally, lower wage workers make up 21% of employees in Working on Wellness, but represent 29% of the workforce in MA.[3]

Retention: Of the 207 organizations that applied, 203 were accepted into the program, and 38 dropped out. Reasons for attrition included failure to secure commitment from senior leadership, competing organizational priorities, or the program required too much time and effort. This attrition is consistent with published barriers related to insufficient staff resources and organizational instability.

"The work of the agency is client-centered, but the wellness program is adding a much needed perspective on staff health and wellness. As evaluation continues, we expect to see increases in interdepartmental staff communication and productivity, both of which will forward our overall agency mission and vision."

Harbor Health Services, Inc.

Harbor Health Services, Inc. (HHSI) provides comprehensive healthcare in Boston, the South Shore, and Cape Cod. It also participates in the PWTF Grantee Program. Through Working on Wellness, HHSI identified that only 18% of its 190 staff in the Dorchester and Mattapan locations consumed the recommended servings of fruits and vegetables per day, and 45% expressed interest in having a farmer's market on site. HHSI partnered with The Fresh Truck, a mobile fruit and vegetable market, to come to three HHSI locations every week. Employees received coupons for $5 off a $10 purchase to promote participation. Early success – 73% of employee shoppers report eating more fruits and vegetables because of the program – prompted HHSI to expand the initiative. HHSI is actively promoting The Fresh Truck with local businesses and public housing developments, thereby broadening fresh fruit and vegetable access in the community. "My family is eating more fruits and vegetable since I started shopping at The Fresh Truck. I look forward to trying something new each week. The quality is excellent and a good value for money. I hope the program continues. Thanks WoW team!"



Town of Fairhaven

The Town of Fairhaven employs 494 people across diverse job types, and the wellness committee includes representation from all Town departments. During Working on Wellness, the Town learned that 32% of employees were not meeting daily physical activity recommendations and 54% of employees were interested in getting more physically active.

The Wellness Committee developed a multi-phase approach to helping employees increase physical activity. The Committee organized an intermural kick ball tournament for town departments, which is being expanded to local businesses. A Health Fair provided employees with information about various wellness resources. The Town is developing a policy allowing a five-minute activity break during any organized meeting lasting over an hour. The Wellness Committee also made recommendations to the Town for enhancements to its bike paths with mile markers, exercise stations, and instructional signage. Bike path upgrades require collaboration across many Fairhaven Departments and will ultimately benefit the broader community.



Sustainability

Occupation is an important social determinant of health. Poor working conditions such as stress, low autonomy, and exposure to workplace hazards can lead to illness and injury. Conversely, safe and healthy working conditions lead to more productive employees, reduced absenteeism, reduced rates of injuries, and improved employee health. Certain populations, including lower-wage workers, are more likely to be exposed to unsafe working conditions. With this context, the Prevention and Wellness Advisory Board recommends a shift in the worksite wellness component of PWTF.

Overall Recommendations

Adopt a Total Worker Health (TWH) Model: TWH, launched by the National Institute of Occupational Safety and Health (NIOSH), integrates worksite health promotion activities with occupational safety and health. Increasing evidence shows that TWH efforts can improve program effectiveness and participation, with potential for greater health impacts and increased sustainability.

Integrate worksite wellness into PWTF grantee program: Ten grantee partners enrolled in Working on Wellness, and the partnerships themselves played an important role in recruitment of local businesses, but there has been limited opportunity for collaboration beyond that. Better integration of worksite wellness into the work of the grantees may improve program participation, effectiveness, and sustainability.

Move toward policy and systems-level changes: Intervention planning at the organizational level should continue to focus on policy changes for a more sustainable program that reaches more employees. Additionally, DPH should examine broad systems-level approaches to surveillance, needs assessment, and technical assistance that place less burden on the individual employer.

Focus efforts on lower wage workers: Providing a healthy and safe working environment for lower-wage workers and other vulnerable populations is an important step in eliminating work-related health disparities.

Recommendations for DPH

DPH should identify which industries employ the highest percentage of lower-wage workers by comparing multiple existing datasets. This information will:

- Inform the development of industry- or condition-specific interventions, which could be piloted by local employer organizations.
- Help employers tailor existing worksite wellness initiatives to meet the needs of their lower-wage employees, and those in racial and ethnic minority groups.

DPH should also develop an "Employment Profile" to help local organizations incorporate occupation and employment data into the local assessment of the health and needs of a specific community.

"The enthusiasm of the Wellness Committee has been our greatest success. Despite the fact that we are all strapped for time, people are excited about it, and it's contagious. Our entire staff talks about BeWell and seems to have a greater awareness about making healthy choices for lunch and getting walks or breaks in during the day, even if these behaviors aren't part of a formal intervention. Employees seem more comfortable talking about wellness, talking about how they are feeling, and taking initiative to make small changes that suit them. Our leadership is supportive of our work."

Recommendation for Local Organizations/ Community Partners

Surveillance

Local organizations should incorporate work/ employment into the assessment of local health needs using the "Employment Profile" developed by DPH. This will help identify at-risk workers and work-related health issues, and help set priorities for addressing the unique needs of the workforce in each community.

Worksite Wellness Program Models

- With support from DPH, local organizations should implement TWH interventions that align with PWTF priority conditions, e.g., a school-based intervention for pediatric asthma can be expanded to include integrated pest management practices and a ban on certain cleaners, which would improve outcomes for staff as well.
- Community partners should see themselves as employers who can provide a safe and healthy working environment for their employees. Future PWTF partners could go through the current Working on Wellness program, which has been shown to work well for similar types of organizations.
- CHWs should be trained to address occupational health and safety concerns, both as they arise with their clients and in their own place of employment.

Recommendation for Healthcare Providers and Payers

Healthcare providers and payers should capture occupation and/or industry in electronic health records (EHRs). This will improve surveillance and enhance our understanding of how work impacts health. It can also improve clinical care, giving providers a broader understanding of the association between occupation and disease/disease outcomes; it also presents an opportunity to pilot clinical decision support tools tailored for occupational considerations.

Recommendation for Employees

Employees, worker centers, and unions should be viewed as key partners in promoting healthy and safe worksites. These groups are the voice of the working population and bring different ideas and perspectives to the design and implementation of wellness programs. Their involvement is essential program for buy-in, impact, and sustainability.

REFERENCES

1. Lower wage workers are defined as those earning $13.50 or less per hour (150% of the Massachusetts minimum wage)
2. MA Department of Labor and Workforce Development, Employment and Job Statistics http://www.mass.gov/lwd/economic-data/employment-jobs/
3. htttp://www.massbudget.org/report_window.php?loc=State_and%20_Local_Impact_of_Raising_MW%20_to_$15_in_MA.html

SUSTAINING THE PREVENTION AND WELLNESS TRUST FUND

Chapter 224 charged the Prevention and Wellness Advisory Board to provide the legislature with "recommendations for whether the program should be discontinued, amended or expanded and a timetable for implementation of the recommendations; and...recommendations for whether the funding mechanism for the fund should be extended beyond 2016 or whether an alternative funding mechanism should be established." [1]

Below are the recommendations of the Prevention and Wellness Advisory Board to fulfill this obligation to the legislature.

RECOMMENDATIONS FOR SUSTAINING THE PREVENTION AND WELLNESS TRUST FUND

Approved by the Prevention and Wellness Advisory Board on September 22, 2016

A. INTRODUCTION

On September 22, 2016, the Prevention and Wellness Advisory Board (PWAB) unanimously voted (Note: DPH abstained given its role as administrator of the program) to approve the recommendations
developed by the PWAB Sustainability Committee, with two modifications. This document reflects the final approved recommendations as amended by the board.

1. Prevention and Wellness Advisory Board Sustainability Committee

In March 2015, the Prevention & Wellness Advisory Board (PWAB) created a committee with the charge of researching, developing, and making recommendations for the sustainability of the Prevention and Wellness Trust Fund. The Board determined that the subcommittee would be comprised of members of the Board; and board member delegates would be allowed to serve as members of the subcommittee. All Sustainability Committee meetings adhered to open meeting laws and guests in attendance were allowed and encouraged to participate in the discussions of the subcommittee.

2. Committee Membership

The Sustainability Committee consisted of the following members:

- Jean Zotter, PWTF Program Manager, Department of Public Health (co-chair)
- Maddie Ribble, Director of Public Policy, Massachusetts Public Health Association (co-chair)

- Jeff Stone, Director of Programs, Massachusetts Health Council
- Samantha Pskowski, Research Analyst, Office of Representative Kate Hogan
- Sarah Sabshon, Chief of Staff, Office of Representative Jeffrey Sánchez
- Erika Scibelli, Legislative Director, and Elizabeth Toner, Chief of Staff, Office of Senator James Welch[2]
- Zack Crowley, Chief of Staff, Office of Senator Jason Lewis
- Michael Powell, Senior Health Policy Analyst, MassHealth

3. Activities and Meetings

The committee met eight times. In 2015 it met in August, September, October and December; and in 2016, it met in February, March, April and May. The first six meetings focused on gathering background information and fact-finding. The last two were devoted to developing the recommendations. Below is a summary of the meetings:

- The August meeting focused on developing a schedule for fact-finding to inform the recommendations of the committee.
- The September meeting's objective was to develop a common understanding of the PWTF Grantee Program and the legislative intent of the law.
- In October, the Health Policy Commission presented its work under Chapter 224 and the committee discussed alignment with on-going healthcare policy reform.
- December's meeting had presentations from Harvard Catalyst on the independent evaluation and from MassHealth on their movement to an Accountable Care Organizations (ACO) model.
- The February 2016 meeting had a panel of health policy experts: Meredith Rosenthal of Harvard School of Public Health and Public Health Council member, Brian Rosman of Health Care for All, and Pat Edraos of Massachusetts League of Community Health Centers to discuss PWTF sustainability.
- March was the last fact-finding meeting and it had presentations from Terry Mason, consultant, and Gail Hirsch of Massachusetts Department of Public Health on efforts to have insurers cover community health workers (CHWs) and a presentation from the MetroWest Partnership on their efforts to sustain PWTF locally.
- The April and May meetings focused on developing recommendations.

The Sustainability Committee focused on the PWTF Grantee Program, which represents 75% of the total funds, along with the ensuing administrative costs. The Sustainability Committee did not examine the workplace wellness component of the program but believes activities to explore sustainability for this component should be undertaken.

4. Process of Developing Recommendations

The committee co-chairs created the first draft of the recommendations based on the discussions and presentations made to the committee. The Sustainability Committee then provided input and feedback into the first draft at the April meeting. Committee members and audience could submit comments to Jean Zotter or Liz Moniz of DPH by e-mail. One set of comments was received. The final draft was voted on and approved with changes at the May meeting.

B. OVERVIEW

1. The Committee has considered three elements of sustainability for the Grantee Program — the interventions, the model, and the program. Each of these elements could be sustained through different mechanisms and are not dependent on one another.

1.1. The partnerships deliver evidence-based **INTERVENTIONS** in clinics and communities to address four priority conditions: pediatric asthma, hypertension, older adult falls, and tobacco use, along with several optional conditions. The interventions include an asthma home visiting program in New Bedford and a chronic disease self-management program in Quincy and Weymouth, for example. The interventions in the community are not currently covered by health insurance.

1.2. The **MODEL** refers to the bi-directional community-clinical linkage model that is central to PWTF, where patients at high risk for poor health outcomes are identified in a clinical setting and referred with a warm handoff to community-based programs to address their health needs and provide feedback to the clinician. This model has several components that includes many of the PWTF interventions, but is not limited to those specific interventions. Other components include: a central coordinating partner responsible for building, monitoring, and maintaining a robust infrastructure of working relationships across numerous partners; engaged clinical and community partners; a bi-directional referral system including the use of e-Referral; and CHWs who help patients navigate systems.

1.3. The **PROGRAM** refers to PWTF as a statewide initiative with dedicated funding to address a broad set of goals, as laid out in Chapter 224. The goals of Chapter 224 are broader than the model and interventions that have been put in place as part of implementation.

2. PWTF as a statewide program is unique in several respects:

2.1. It is the first large-scale effort in the nation to link clinical treatment and screening to community disease prevention programs. The PWTF Partnerships cover approximately 15% of the state's population and has made over 8,800 clinic-to-community referrals in the first year and a half of full implementation.

2.2. PWTF implements evidence-based prevention approaches at a systemic level, in a manner that complement existing healthcare services and ongoing healthcare transformation efforts. As such, PWTF is transforming the ability of healthcare and other social service organizations to coordinate services to address the needs of the whole person.

2.3. PWTF is reaching some of the most vulnerable populations in the state. This large-scale effort is reaching some of the highest-risk communities that have significant disparities in health outcomes and high healthcare utilization.

2.4. PWTF supports a partnership effort that shares leadership between clinical, municipal, and community organizations to make health improvements in their community. A Coordinating Partner leads an effort with six to 18 partners to create community health improvements.

2.5. DPH has provided significant guidance and technical assistance to enable the nine partnerships to meet their goals and objectives.

2.6. The future of PWTF as a statewide program should incorporate the most effective interventions and the most effective aspects of the current model, and should adapt based on evaluation data and lessons learned, with the goal of pursuing greater impact.

3. The Sustainability Committee sees an important role for PWTF as a statewide program in the future:

3.1. PWTF is an essential complement to healthcare transformation that extends care into the community and has the potential to impact community health factors. PWTF can mutually reinforce the efforts in Massachusetts to improve the health of Massachusetts residents while containing healthcare spending by seeking to coordinate clinical and community health efforts and address the social determinants of health.

3.2. Without a large-scale systemic effort like PWTF, the current efforts in Massachusetts to rein in costs and improve outcomes will fall short because no similar statewide prevention effort in Massachusetts exists. Investment in a model like PWTF ensures healthcare transformation efforts in Massachusetts are successful because they are focused on prevention and based on best practices.

3.3. Patients' ability to follow through on care is limited when social and economic factors are unmet, an issue that applies to many residents who qualify for public health insurance. PWTF can address the social, economic and environmental factors that influence health. This work will reduce health disparities by addressing underlying health inequities. With social needs addressed, patients are more able to engage in their healthcare.

3.4. PWTF is part of a coordinated approach to improving the health of Massachusetts residents, in coordination with:

3.4.1. MassHealth redesign and other healthcare delivery system transformation efforts;

3.4.2. Efforts to improve our system of community-based care (through the CHART program and other efforts);

3.4.3. Other community-based change efforts to address social determinants of health; and

3.4.4. Efforts to create data linkages in order to provide a more complete picture of healthcare outcomes in Massachusetts.

4. Among these efforts, PWTF is unique in addressing prevention and community health and is uniquely suited to address inequities in health outcomes across racial and income groups:

4.1. Though Massachusetts ranks near the top of states in many measures of health, these high marks mask troubling disparities in many measures of health across race and income.

4.2. We know that clinical healthcare services only account for about 10% of health outcomes, but we invest the vast majority of our healthcare dollars in clinical care.[3]

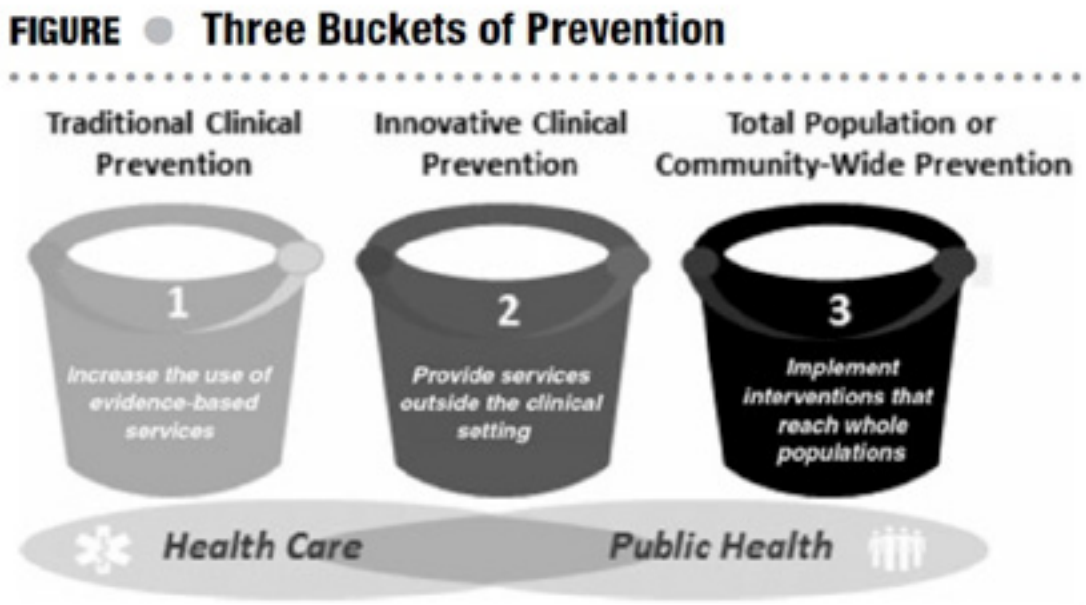
4.3. Systemic investment in evidence-informed approaches to combat the underlying causes of poor health and health inequities is the best way to prevent poor health outcomes and, in the long term, reduce the cost of treating preventable conditions.

4.4. In order to accomplish this, we need to invest in all three "buckets of prevention" identified by the United States Centers for Disease Control and Prevention (CDC) (see figure below).

4.4.1. The clinical healthcare system primarily focuses on the "traditional clinical prevention" bucket – comprised of evidence-based services provided in clinical settings (e.g., vaccinations). The clinical care system is beginning to pay greater attention to the "innovative clinical prevention" bucket by connecting patients with community-based services.

4.4.2. PWTF is filling in gaps in the system that allows patients to be connected from clinical settings to effective community-based care. PWTF pays for services and infrastructure that is not covered by current payment models in order to accomplish this.

4.4.3. PWTF is the only large-scale program addressing community-wide prevention, though in its current form, the ability of PWTF to addresses community-wide issues is limited. The impact of PWTF could be even greater if more attention were paid to this "bucket."



C. LOCAL APPROACHES

1. These recommendations seek to support local partnerships to secure funding or partnerships to continue some or all of their current interventions.

2. All PWTF community interventions are currently not covered by health insurance. All have an evidence base for their efficacy and cost effectiveness. The final evaluation from Harvard Catalyst will provide more data on their effectiveness.

3. PWTF has created strong infrastructure in nine partnership regions. Local approaches to sustainability must include support for program infrastructure in order to be successful. This is one of the central lessons of PWTF. PWTF infrastructure includes the coordinating partner role to manage relationships, communications, responsibilities, and workflow across multiple organizations, as well as the time and effort needed to establish new working relationships between organizations with different organizational cultures, methods of operating, and technology, such as management of the DPH e-Referral Program.

4. Sustainability through local approaches could include:

   4.1. Local partnership with health system or ACO to incorporate some or all PWTF interventions into their model of care;

   4.2. Support from local philanthropy to continue some or all interventions; and

   4.3. Fundraising by local partnerships to sustain current interventions, including from other private or governmental grants at the state or national level.

RECOMMENDATIONS: LOCAL APPROACHES

STATE AGENCIES

- **DPH should** develop informational materials including an overview of available data on PWTF interventions and information on the work of each partnership.
- **DPH should** provide opportunities for partnerships to collaborate on local funding strategies where interests align, e.g., sharing strategies for approaches to local health systems, trainings/coaching on working with health systems/ACOs, etc.
- **DPH should** provide geographic-based data for risk stratification and other forms of support to local partnerships and other stakeholders to develop and target effective population-based prevention strategies.
- **DPH should** encourage hospitals to align Determination of Need (DON) investments and community benefits with local PWTF partnership and priorities.
- **MassHealth should** encourage ACOs to support evidence-based prevention programs such as those funded by PWTF as part of its redesign process and federal waiver. This encouragement could include technical assistance to ACOs.

LOCAL ORGANIZATIONS/AGENCIES

- **PWTF Partnerships should** identify, educate, and share best practices with local hospitals, ACOs, and philanthropic organizations about the impact of their interventions and discuss opportunities for partnership and funding.

HEALTHCARE PROVIDERS AND PAYERS

- **ACOs should** support evidence-based prevention programs such as those utilized by PWTF, recognizing that prevention programs can help contain costs and improve outcomes for their patient population and meet quality measures.
  - ACOs should invest in the existing community programs to deliver these interventions – buy not build these services.
- **Hospitals should** consider aligning community investments such as DON and community benefits with local PWTF partnership and priorities.
- **Individual ACOs should** support the model of community-clinical linkages. In order to support this care model, several elements need to be in place:
  - Effective data collection and risk stratification in order to understand the characteristics, health needs, and barriers to good health among a patient population. This includes the collection of sociodemographic data on members and screening tools to identify social determinants of health that impact members.
  - Recognition that community-clinical linkages take time to develop and allow for a staggered approach to creating these relationships.
  - Investment in community-based programs and partnerships to address defined risk factors for members.
  - Inclusion of community expertise and consumers on ACO boards in order to address the needs of the community served and the risk factors prevalent in the patient population. This should include both individual consumers and partners with expertise in community needs and resources.
  - Utilize CHWs for linking patients to community services and, as appropriate or as requested by members, including CHWs in integrated care teams. CHWs possess a unique ability to work with low-income, underserved patients with the goal of bridging communication, cultural, and other barriers to accessing care. Additionally, CHWs can serve as a link to resources that address the non-clinical challenges affecting health status.

D. HEALTH SYSTEMS APPROACHES

1. Healthcare is undergoing a transformation, with the goal of paying for value rather than volume. This creates opportunities to align healthcare and public health around wellness and prevention. For instance:

   1.1. MassHealth is undergoing a redesign with the goals of developing integrated, accountable models of care that integrate community-based partners and linkages to social services.[4]

   1.2. The Health Policy Commission is in the process of finalizing ACO standards with the goals of delivering well-coordinated, patient-centered care that addresses population health management and social determinants of health.[5]

2. These new models could provide flexibility for people to receive services and care in non-traditional settings and from non-traditional providers.

3. However, ACO models are in the early stage of development, and the degree to which community-based services will be incorporated into new delivery models is unclear. There is significant uncertainty about the ability of ACO to sufficiently accomplish these goals in the near term.

4. These recommendations address ways to bring the PWTF community-clinical linkage model to greater scale through integration in emerging healthcare financing and delivery systems.

RECOMMENDATIONS: INSURER/ACO APPROACHES

STATE AGENCIES

- **MassHealth and the Health Policy Commission should** create ACO frameworks that support the model of community-clinical linkages. In order to support this care model, several elements need to be in place:
  - Effective data collection and risk stratification in order to understand the characteristics, health needs, and barriers to good health among a patient population. This includes the collection of sociodemographic data on members and screening tools to identify social determinants of health that impact members.
  - Meaningful risk adjustment methodologies that ensure sufficient resources are available to serve the highest-risk members and to eliminate incentives to limit needed care for these members.
  - Recognition that community-clinical linkages take time to develop and allow for a staggered approach to creating these relationships.
  - Investment in community-based programs and partnerships to address defined risk factors for members.

  - Inclusion of community expertise and consumers on ACO boards order to address the needs of the community served and the risk factors prevalent in the patient population. This should include both individual consumers and partners with expertise in community needs and resources.
  - Inclusion of CHWs in the ACO infrastructure to support linking patients to community resources and, as appropriate or when requested by a patient, in integrated care teams. CHWs possess a unique ability to work with low-income, underserved patients with the goal of bridging communication, cultural, and other barriers to accessing care. Additionally, CHWs can serve as a link to resources that address the non-clinical challenges affecting health status.
- **DPH and MassHealth should** collaborate to provide upfront technical assistance and support to ACOs to ensure that the data systems, work flows, staff training, and connection to community prevention programs occurs and that it builds on the knowledge and best practices built in PWTF and other programs.
- **DPH should** work with insurers and MassHealth to promote coverage for selected PWTF interventions where the research literature and PWTF outcomes show a compelling case for coverage.
- **DPH should** provide geographic-based data for risk stratification and other forms of support to MassHealth and other health systems to develop and target effective population-based prevention strategies.

LEGISLATURE

- **The Legislature should** monitor and periodically revisit goals and outcomes related to Chapter 224.

STATEWIDE ORGANIZATIONS

- **Statewide organizations should** continue advocacy to embed the community-clinical linkage model into healthcare policy and engage interested PWTF partnerships in this effort.

LOCAL ORGANIZATIONS/AGENCIES

- **PWTF partnerships should** share their expertise and experience with healthcare policymakers, including MassHealth and the Health Policy Commission, as new care and financing models are developed.

E. PROGRAM REAUTHORIZATION

1. PWTF was established by the Legislature and Governor with a one-time assessment on health insurers and certain large hospital systems. Funding for PWTF and its existence as a statewide program will cease in mid-2017.

2. Further action from the Legislature and Governor is necessary to continue PWTF as a statewide program investing in the health of local communities.

RECOMMENDATIONS: LEGISLATIVE REAUTHORIZATION

STATE AGENCIES

- **DPH should** provide geographic-based data for risk stratification to strategically target future PWTF funds to address communities and risk factors that contribute to statewide health inequities.

LEGISLATURE AND GOVERNOR

- **The Legislature and Governor should** commit to reauthorization of PWTF in 2017, recognizing the importance and unique role of PWTF in advancing the Commonwealth's health goals and reducing health inequities. In doing so, the Legislature and Governor should embed key principles into the authorization:
  - Bolster Evaluation of PWTF and Create Bridge to Next Phase. In order to provide a robust evaluation of current PWTF interventions, current grantees should be granted an extension of one year. Due the timing of data availability, this will provide an additional two years of claims data for the evaluation. (Infrastructure took up to 18 months to build in many cases, the final report from the independent evaluator is due 6 months before program completion, and a lag in claims data will mean no 2016 data will be available for the evaluation. This means that only one year of claims data is likely to be available in many cases.) This will also provide a bridge during the year it will take DPH to design and evaluate proposals for the next phase of PWTF, which should be competitively bid.
  - For Greater Impact, Define Metrics of Success, Focus on Underlying Causes. In order to have the greatest impact in the future, the next phase of PWTF should focus less on short term ROI as the main evaluation criteria. Instead, PWTF should be designed to advance a set of metrics that can be evaluated in the short term and that align with long-term change. This approach will allow a focus on social determinants of health, which are key to addressing health inequities and leveraging long-term impact. Metrics could include:
    - Increased capacity to collaborate, share data, and align services for greater impact, including workforce development
    - Changes in access to community-based services for individuals or families

  - Change in community-wide conditions that alleviate targeted risk factors and/or increase targeted protective factors
  - Change in health behaviors or health outcomes
  - Cost effectiveness
  - Reduction in disparities on all metrics
- Coordinate Individual and Community-Wide Interventions to Address Causes of Inequities. For the next phase of PWTF, build upon the strongest aspects of the community-clinical linkage model and the infrastructure built to enable this model, while seeking greater long-term impact. To achieve this, establish a coordinated set of interventions that address both individual-level risk factors and community-wide risk factors.
- Ensure Financial Sustainability. Provide a regular and ongoing source of funding.

STATEWIDE ORGANIZATIONS, LOCAL ORGANIZATIONS/AGENCIES, HEALTHCARE, PROVIDERS AND PAYERS

- **PWTF partnerships, statewide organizations, legislators, and other parties should** agree on a set of criteria for future funding of PWTF and engage in further analysis and discussion to consider all options that could sustain PWTF, including:
  - Financing sources that are sustainable and unlikely to be diverted to other uses;
  - Financing sources that are stable and can generate sufficient funds to impact population health outcomes for the Commonwealth as a whole (e.g., not mini-grants). Financing sources should be able to sustain or increase the depth (within regions) and breadth (across the state) of the current PWTF model;
  - Financing sources that provide a logical link between funding source and long-term cost savings; and
  - Financing sources that are simple to administer.

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TRACKING THE FUNDING

Over the four-year life of the program, PWTF will receive $57 million. The PWTF budget for the four years allocates no more than $8,550,000 (15%) for the Department of Public Health's (DPH) administrative, technical assistance and evaluation costs. An additional $42,750,000 goes to the PWTF Grantee Program (75%) and up to $5,700,000 to the Massachusetts Working on Wellness Program (10%).

As of January 12, 2017, DPH has credited $56,957,601.97 in revenue to PWTF. Overall, the total expenditures of PWTF equal $42,657,244.09.

These expenses breakdown into the following categories spanning the timeframe of July 2013 – January 12, 2017:

- DPH Administrative Costs: $6,235,500.79
- PWTF Grantee Partnerships $34,435,720.73
  - County of Barnstable (Barnstable Prevention Partnership): $3,208,769.17
  - Berkshire Medical Center Inc. (Berkshire Partnership for Health): $3,619,991.25
  - Boston Public Health Commission (Boston Partnership): $4,385,207.55
  - Holyoke Health Center (Healthy Holyoke Partnership): $3,452,128.96
  - City of Lynn (Lynn Partnership): $4,395,186.47
  - Town of Hudson (MetroWest Prevention and Wellness Partnership): $3,696,271.86
  - Manet Community Health Center Inc. (Quincy Weymouth Wellness Initiative): $4,395,186.47
  - City of New Bedford (Southeastern Health Initiative for Transformation): $2,927,201.65
  - City of Worcester (Worcester Partnership): $4,355,777.35
- Massachusetts Working on Wellness Program: $1,986,022.57

The funds expended to date are 74.9% of the total received. The Department has allocated a total of $19,921,711.48 for the fiscal year 2017 budget. $7.8 million is projected to be unexpended at the end of the 2017 fiscal year for on-going use for PWTF activities in Fiscal Year 2018.

Department of Public Health Expenditures

The Department expenditures from May 2013 to June 30, 2016 are summarized below. The Department's expenditures fall into three main categories: administration, technical assistance, and evaluation.

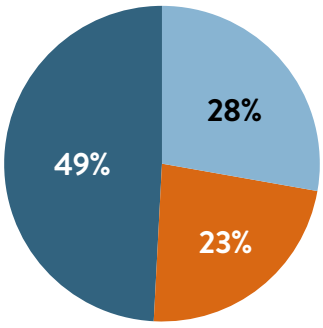
On the next page, the graph represents how DPH divided up its funding between the three categories between the fiscal years of 2014 through 2016. Administration expenses include all costs necessary for the management of PWTF funds – both for the Grantee Program and for Massachusetts Working on Wellness. These items include: management, administrative, legal, communications, and fiscal staffing plus fringe, utilities, supplies, travel, and indirect.

Technical assistance expenses focus solely on the support provided to the PWTF Grantee Program. Working on Wellness technical assistance came from the 10% allocated for worksite wellness. For technical assistance, DPH focuses on ensuring grantees: 1) understand and can deliver the model, 2) have program oversight and management, 3) have sufficient information to deliver the interventions in the priority conditions, 4) have grounding in quality improvement methods and shared learning via learning collaboratives, and 5) can collect and process data

for evaluation purposes. Expense items for technical assistance include: technical assistance staffing plus fringe, consultants, training (in-person and webinars), subject matter experts, learning collaborative meetings, communications support, and CHW network meetings and support.

Funds for evaluation cover the work of the Department to support quality improvement of the Grantee Program by providing timely data feedback to grantees. It also includes the Department's contract with Harvard for managing the PWTF Grantee independent evaluation. The majority of the independent evaluation costs come from the PWTF Grantees. The Department funds for evaluation cover: staffing plus fringe, consultants, hardware and software, programming licenses, and management of the PWTF Grantee independent evaluation.

DPH Spending by Category
Fiscal Years 2014 - 2016



Administration: $2,092,061.47

Evaluation: $1,743,855.85

Technical Assistance: $3,692,637.37

PWTF Grantee Expenditures

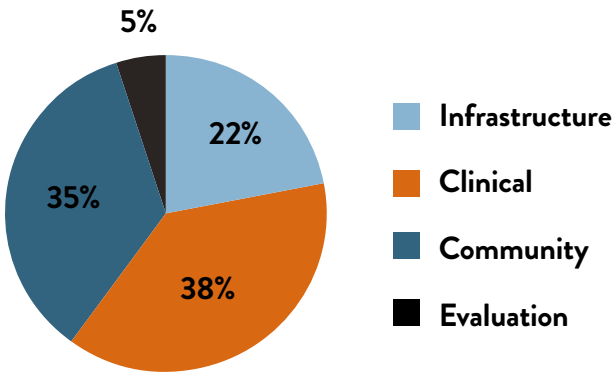
Nine partnerships received funding based on their proposed interventions and conditions, number of partners, and estimated reach. The chart below provides information on award amounts and population size.

Partnership	Funding Allocation (in millions)	Census Population
Barnstable	$3.9	110,484
Boston	$5.3	123,279
Holyoke	$4.1	39,880
Lynn	$5.3	90,329
MetroWest	$4.5	140,035
New Bedford	$4.7	95,072
Quincy Weymouth	$5.3	118,052
Worcester	$5.2	90,777
Berkshire	$4.4	131,219
Total		**939,127**

Partnerships divide their expenses between three main categories of infrastructure, clinical, and community. DPH estimated the amounts allocated to these three categories by reviewing the partnerships' expenditure reports. Infrastructure costs include all the work of the Coordinating Partner as the backbone agency. This includes staffing (coordinator, principal investigator, financial and budget staff, and administrative), meetings, information technology, quality improvement support, communications, Harvard evaluation, and other expenses that benefit the whole partnership. Clinical expenses are any expenses incurred by a clinical partner. Community expenses are any expenses incurred by a community partner.

A breakdown of partnership budgets by conditions addressed is available in the Harvard independent evaluation report. Harvard worked with the partnerships to understand estimated allocations by conditions for the independent evaluation and those estimations can be found in the Harvard report.

Partnership Spending by Category
March 2014 - June 2016



Worksite Wellness Expenditures

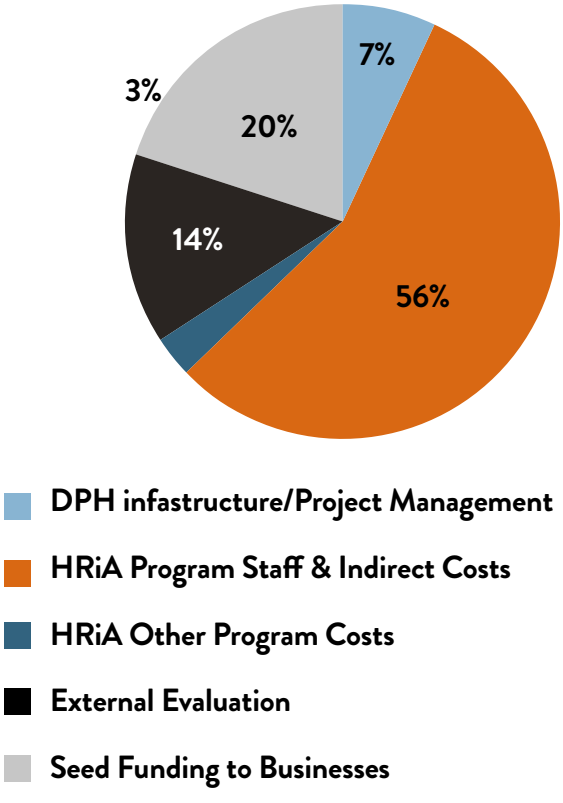
Expenditures to Date

Chapter 224 allocated up to 10% of PWTF dollars for workplace wellness. Of the $5,700,000 available, DPH budgeted $3,237,500 for seed funding to support 350 businesses in their worksite wellness efforts. Because enrollment in Working on Wellness was lower than projected, seed funding expenses will be lower than the original budgeted amount.

As of September 2016, total expenses for Working on Wellness were $1,841,144.72 (32% of program budget). Businesses have received $359,000 in seed funding. Expenses are broken down into five major categories.

- DPH project management (includes 1.0 FTE)
- Program Vendor: Health Resources in Action (includes 4.38 FTEs)
- Other program costs (e.g., marketing and recruitment)
- Evaluation contractor: UMass Medical and UMass Lowell
- Seed funding to businesses

Working on Wellness Expenses
June 2015-September 2016



PUTTING IT ALL TOGETHER

The Prevention and Wellness Trust Fund serves as a model for health systems as they move from a fee-for-service approach to a value-based payment model that includes community partners. It is a model for community organizations that embark on a partnership with a health system in order to improve community health. Few tools exist to assist clinical providers and community organization partners on improving patient and community health – as this intensive collaboration has not been tried often. Yet, this partnership will be necessary in the coming years to meet the goals of Chapter 224. Clinical providers and community programs come from different backgrounds and experiences – both offering value to healthcare transformation. They speak different languages and have different cultures. Creating common ground and a common approach is necessary for the collaboration to work. PWTF offers a roadmap to successful clinical and community partnerships. It has demonstrated strong success in its early years, and is an important part of Massachusetts' effort to control cost while improving care.

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APPENDIX A:

HARVARD CATALYST INDEPENDENT EVALUATION OF PWTF GRANTEE PROGRAM

The Massachusetts Prevention and Wellness Trust Fund (PWTF) Grantee Program

Final Evaluation Report

Harvard Catalyst:
The Harvard Clinical and Translational Science Center

January 13, 2017

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Section One: Executive Summary

Introduction

The PWTF evaluation showed findings suggestive of its positive impact on outcomes, costs, and systems innovations in spite of the brief intervention period and shortcomings of data sources available for this report. PWTF partnerships have made important strides in linking clinical and community strategies, for all four priority conditions, in nine distinct communities. The interventions themselves, and our evaluation of them, are ongoing through June 2017.

The Harvard Catalyst evaluation has three components: outcomes (including prevalence of conditions and intermediate outcomes such as screening practices and blood pressure measures); cost-effectiveness and return on investment (CE/ROI); and process evaluation studying how PWTF was implemented in the nine grantee partnerships, including lessons learned in infrastructure and systems-building, particularly as it applies to addressing health equity. In all three components, the evaluation found promising results. The following table summarizes the key findings of this evaluation across each condition.

Condition	PWTF Results: September 1, 2014 – June 30, 2016	Projected Impact: 5-Year	Projected Impact: Lifetime
Hypertension	0.515 to 0.945 mmHg drop in Blood Pressure. Increase in hypertension screening from 58% to 62%. Increase in controlled and treated hypertension in several PWTF communities.	↓ 21-28 IHD hospitalizations ↓ 96-145 stroke hospitalizations ↓ 28-48 CVD deaths $2 million to $3 million healthcare costs averted	↓ 81-140 IHD hospitalizations ↓ 444-784 stroke hospitalizations ↓ 127-251 CVD deaths $9 million to $16 million healthcare costs averted
Pediatric Asthma	Declining prevalence in several PWTF communities. Almost 6,000 school-based education and care management completions. Interventions appear to be highly cost-effective at current rates.	Additional claims data are needed to accurately measure potential changes in utilization (emergency department visits and inpatient admissions) and associated cost outcomes.	
Falls Among Older Adults	↓ 901 falls and 220 injuries ↓ 7 hospitalizations and 41 other cases requiring medical care $181,000 healthcare costs averted	↓ 3,000 falls and 730 injuries ↓ 25 hospitalizations and 135 other cases requiring medical care $635,000 healthcare costs averted	Estimates are made on a per-year basis, not the lifetime of the individual.
Tobacco Use	Substantial increase in recorded smoking status among community health center patients. Data may not fully capture full effect of cessation counseling. Interventions could be cost-effective/cost-saving with higher completion rates.	More time is required to produce changes in health and cost outcomes. Please refer to the "Lifetime" projections box to the right.	↓ 0, 7, 115 IHD hospitalizations ↓ 0, 28, 165 stroke hospitalizations ↓ 1, 8, 98 CVD deaths $622,000 to $5.6 million healthcare costs averted *Figures above are based on quit rates of 1 per 10,000, 1 per 1,000, and 1 per 100.*
IHD: Ischemic Heart Disease CVD: Cardiovascular Disease			

Summary of Health and Cost Outcomes

Hypertension

- **The number and percentage of people screened for hypertension increased**.
- **Improvement in blood pressure levels** were meaningful at the population level and can lead to reductions in heart disease events and strokes. If these changes persist, they could result in 500–1,000 fewer heart attacks and strokes per million residents.
- **The hypertension interventions appear to be highly cost-effective**, in line with other highly effective interventions and more cost effective than other interventions approved for care by Medicare and Medicaid, including certain types of cancer screening (e.g., mammographic), management of antidepressant medication, and cholesterol management.

Hypertension prevalence in Massachusetts remained steady between 2010 and 2015. Prevalence among, and disparities between, racial and ethnic groups also remained steady, with African Americans, Whites and Native Americans showing higher prevalence than Hispanics and Asians. Mild to modest decreases in prevalence were found in three PWTF communities compared with comparison sites. The fraction of people whose hypertension was under control increased in five of the nine PWTF sites.

Six of the nine PWTF communities showed mild decreases in total hypertension costs from 2010–2015, and four showed drops in average costs per person while comparison communities and the state as a whole remained flat or showed increases. The increase in the number and percentage of people screened for hypertension (58% vs. 62%) between 2014 and 2016, if sustained, is an important predictor of better outcomes and lower costs, and is suggestive of equity-driven systems change. Final analysis of MassHealth data may reveal even better outcomes and cost savings.

Pediatric Asthma

- **Prevalence of pediatric asthma (among 0-9 year olds) dropped** in PWTF communities at higher rates than the state average. Prevalence among adolescents and teens was stable.
- **Almost 6,000 youngsters completed school-based asthma education and care management interventions.**
- **All PWTF communities addressing asthma show declines in total costs** per year compared to comparison communities. Although available data is incomplete, data suggests **that asthma interventions may give very good value and perhaps result in net costs savings.**

While the statewide prevalence of asthma in 0–9 year olds decreased from 13% to 10% between 2012 and mid-2016, there were larger drops in rates in four PWTF communities, while their comparison communities had milder or no decreases. Further analysis, particularly of 2015 emergency department data, may reveal additional effects of the intervention on severity and costs.

Falls Among Older Adults

- **From April 2016 through June 2016, 7,725 patients received a STEADI screening in PWTF clinics,** of which 2,191 (28.3%) screened positive, 521 received a "gait, strength, balance" assessment, 832 received a plan of care (POC) and a multifactorial risk assessment, and 507 were referred to PWTF community interventions. In the following quarter, 8,643 screenings were documented. According to MDPH, this represents **a significant increase in screening, potentially exceeding national standards.** Care at the clinic level generates health benefits, both for those referred and those not referred, beyond those derived from the community level programs.
- **Falls prevention was probably the most pronounced systems innovation**. About half of falls partners had never collaborated before. From April–June 2016, half of enrollments in community-based programs originated from clinical referrals, and half from community outreach, illustrating the synergy of the PWTF strategy.
- **Falls interventions are likely to prove cost effective as the interventions mature,** particularly when data on quality of life improvements due to reduced fear of falling are taken into consideration.

APCD data indicate that between 1–6% of older adults (65+) had a fall-related injury between 2010 and 2015. There were no clear trends in prevalence among PWTF communities compared with matched comparators. While additional data are needed, it does appear that PWTF interventions may have prevented more than 900 falls during a relatively brief window, which includes 200 fall-related injuries and seven hospitalizations. Important progress has been made in simplifying screening and embedding it in the clinical workflow, increasing referrals and the consequent uptake of interventions. As the newest of the PWTF clinical-community collaborations among the four priority conditions, delivery of PWTF falls intervention programs may well become more efficient and cost effective as programs mature, as suggested by the increases in screening and referrals in the two most recent quarters.

Tobacco Use

- There has been a **substantial increase among MA community health centers in recording smoking status**; by October 2016, 88% of adults had their smoking status recorded.
- PWTF tobacco interventions generally do not show significant changes compared to comparison communities in this time frame.

The increase in recorded status may help to explain rising rates of current smoking in 2012; rates have been stable since, with a prevalence of 16%. Prevalence of smoking by race/ethnicity was also steady over the last two years statewide and we found no difference in these trends in PWTF communities. Data did not support significant evidence of increased referrals for smoking cessation programs or counseling and we are not able to assess the overall effectiveness of tobacco interventions. It is possible that more smoking cessation counseling occurred than was recorded; the data fields available do not allow for its detection and many providers do not code for this in their billing.

Process Evaluation: Lessons Learned

- Systems innovations resulted in increased capacity and coordination among clinical and community organizations, including innovative strategies to ensure that **new screening and referral processes became integrated within clinical workflow.**
- Social network analysis showed improvements in the capacity of PWTF partner organizations to connect community members to services, share best practices, provide technical assistance, provide training and capacity building, and share staff.
- PWTF implementers reported that **community health workers (CHWs) helped engage hard to reach populations and were essential in efforts to improve health equity.** CHWs built and maintained trustful relationships with both clinical and community settings, particularly multilingual populations, those needing interpretation, refugee and immigrant communities, and the uninsured.
- **Including community-based organizations outside of the health sector** was reported to add value in promoting health equity, including the ability to reach immigrant populations, migrant farm workers, and patients living in substandard housing.
- Mechanisms to facilitate community-generated referrals, and sustaining an efficient centralized system for processing referrals and connecting clinical screening with follow up interventions, are seen as essential to the PWTF vision.

Data Limitations

- The PWTF will have had a much shorter intervention period than would normally be expected to impact the four priority conditions.
- **Much of the evaluation period was consumed by start-up activities; many communities are only beginning to reach optimal scale and efficiency of service delivery.** The "startup" cost may therefore appear high when allocated over the health benefits that have accrued to date and may appear more reasonable over time as more benefits accrue.
- Additional MassHealth, Medicare, and Case Mix Emergency Department data are needed particularly to supplement asthma and falls data and draw clearer conclusions.

Conclusion

The results of the interventions so far, in terms of outcomes, cost effectiveness and ROI potential, and potentially sustainable systems change, have been highly encouraging. Extending data analysis to capture the 2016 intervention year will improve our ability to project outcomes and cost savings both across time and applying PWTF strategies across the Commonwealth. While it is impossible to say with certainty that these outcomes are directly attributable to PWTF, the results are attractive enough to warrant continued investment.

Section Two: Acknowledgments

Grantee Partnerships

The nine PWTF grantee partnerships were extraordinarily helpful and insightful as participants in our evaluation efforts. The Coordinating Partners spent considerable time reviewing our proposed evaluation design, overseeing contracts management, participating in interviews, and helping us identify, reach, survey, and interview members of their partnerships. Further, we were consistently impressed by the many PWTF participating partners we met at Learning Collaboratives and during our site visits, and we especially want to attest to the level of expertise we found in the Coordinating Partners in all nine communities. They are:

Barnstable	Vaira Harik
Berkshire	Kim Kelly
Boston	Nicole Rioles
Holyoke	Vicki Van Zee
MetroWest (Hudson)	Alex Depalo
Lynn	Karin Carroll
SHIFT (New Bedford)	Janet DeLeo Wade & Brenda Weiss
Quincy-Weymouth	Janice Sullivan
Worcester	Tracy Kennedy

Massachusetts Department of Public Health (MDPH)

As planned, our independent evaluation also required extensive collaboration with MDPH, from whom we received timely guidance and assistance in all stages and aspects of the evaluation, including feedback on the design and implementation of the evaluation, contracts management, IRB application, help with databases, interviews, and regular consultations. We especially want to thank Tom Land, Laura Nasuti, Jean Zotter, Carlene Pavlos, Laura Coe, and Elizabeth Scurria Morgan, and especially Amy Bettano for the collection and analysis of extensive Community Intervention data submitted by the partnerships.

The Center for Health Information and Analysis (CHIA)

Our evaluation also required essential data from the Massachusetts All Payer Claims Database (APCD). Sylvia Hobbes, Kathy Hines, and Scott Curley of CHIA were responsive and helpful in providing APCD as well as Case Mix, MassHealth, and Medicare data, while also helping to solve the inevitable challenges of working with these complex data sets.

Prevention and Wellness Advisory Board (PWAB) and the PWAB Evaluation Committee

The PWAB provided welcome advice and feedback during the course of the evaluation, including an emphasis on the stories behind the PWTF interventions and those accomplishments that cannot be documented solely through numbers. The Evaluation Committee provided additional feedback and support, in part, by recognizing the challenges of this evaluation. The Committee's members were Stephenie Lemon of the University of Massachusetts Medical School, Marilyn Schlein Kramer, formerly of CHIA and currently Vice President and General Manager of Health Data and Management Solutions, Inc., Michael Powell of MassHealth, Zi Zhang from CHIA, and Laura Nasuti of MDPH.

Subcontractors

We had three subcontractors who were essential to completing this evaluation with the rigor and timeliness it required. Grateful for the suggestion by Marilyn Kramer of the PWAB Evaluation Committee, we contracted with JEN Associates of Cambridge to prepare the APCD, Case Mix, MassHealth, and Medicare data for analysis, and to help us develop at Harvard the capacity to prepare future claims data going forward. We would like to recognize JEN's president, Dan Gilden, Darlene "Dee" O'Connor, JEN's Vice President for Strategic Planning, and Project Management Officer Ilene Rosin and her expert team: Joanna Kubisiak, Angelina Lee, Kevin Neipp, and William Degan-Rinaldi.

Michael Klompas' team at Harvard Pilgrim Health Care Institute (HPHCI) contributed the richness of MDPHnet to our evaluation. The team, spearheaded by Noelle Cocoros and including John T. Menchaca and Susan Gruber, brought data through September 2016 into our analysis, and also helped us match PWTF communities to their best comparison sites. We also subcontracted with Commonwealth Informatics, the group that has been used by HPHCI to program for MDPHnet. Special thanks to Project Manager Catherine Rocchio for her assistance.

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Section Three: Introduction

PWTF Origin

Section 60 of Chapter 224 of the Acts of 2012 established the Prevention and Wellness Trust Fund (PWTF), a first-in-the-nation initiative designed to reduce healthcare costs, decrease preventable risk factors, reduce the prevalence of preventable health conditions, and improve the management of existing chronic disease through evidence-based interventions planned and delivered by community-clinical partnerships. The PWTF was funded by a one-time, $57 million assessment on acute hospitals and payers, of which $42 million was provided to the PWTF Grantee Program. Administered by the Massachusetts Department of Public Health (MDPH) and overseen by the Prevention and Wellness Advisory Board (PWAB), the PWTF focused on four priority chronic conditions chosen for implementation and evaluation. These conditions were selected as there are multiple evidence-based interventions available to address them and they are more likely than others to show changes in outcomes, costs, and a positive return on investment in a period of three to five years. These conditions are:

1. Hypertension ("Hypertension")
2. Pediatric Asthma ("Asthma")
3. Falls Among Older Adults ("Falls")
4. Tobacco Use ("Tobacco")

In January 2014, following a competitive application process, MDPH selected nine community partnerships to participate in the PWTF. These grantees were selected based on a number of factors, including the prevalence in participating communities of the key conditions noted above; community and clinical readiness and capacity to address the priority conditions; and the overall demographic makeup of each community. The funded partnerships varied in size and configuration–some were single municipalities or parts of municipalities, others included multiple cities and towns, and one constituted an entire county. Together they comprised about 15% of the Massachusetts population. Partnerships ranged from six to fifteen participating organizations, with each including, at a minimum, a municipality/regional planning agency, a community-based organization, and a clinical health provider.

The grantees had to propose and then develop a partnership among clinical providers and community-based organizations that would address at least two of the four priority conditions through linking and coordinating clinical and community-based strategies. Some PWTF grantees were seen as more "shovel ready" to implement the interventions, and as such, two different groups (Cohort 1 and Cohort 2) were created as part of the capacity-building phase. This process took place over the course of six to nine months beginning in March 2014 and concluding in either September 2014 or December 2014. The MDPH request for response (RFR) had specified that for each health condition selected, partnerships would be responsible for implementing at least one intervention in each of three domains: community, clinical, and community-clinical linkages. The RFR further specified that at least one clinical partner must implement a bi-directional referral system per the MA State Innovation Model Award e-Referral program (hereafter simply referred to as "e-Referral") with at least one community-based organization. For example, a clinical site might develop a system with a community organization in which patients who are screened as hypertensive or at risk for falls are electronically referred to an evidence-based program in the community; the community organization, in turn, would then be able to update the medical provider on the status of the referral.

PWTF Partnerships and Interventions

For most of the grantee partnerships, 2014 was devoted to capacity-building and strengthening of the partnerships themselves; implementation of the interventions primarily began early in 2015 (though a small number began prior to that point). In consultation with MDPH, the CDC, academic experts, and Social Finance US, a non-profit expert in analysis on return on investment (ROI), evidence-based interventions for each of the four priority health conditions were divided by MDPH into three tiers based on three criteria:

1) Access to data to demonstrate outcomes;
2) Evidence base for clinical impact; and
3) Likelihood of producing ROI.

Tier 1 interventions were those for which there was straightforward access to data, a strong evidence base for clinical impact, and a higher likelihood of a positive ROI. Grantees were required to select at least one Tier 1 intervention for each priority health condition they addressed and MDPH focused the majority of its grantee support (technical assistance, joint learning sessions, and quality improvement evaluation) on these interventions. **Table 1** shows each of the nine partnerships with its evidence-based interventions for each priority health condition. Of the PWTF partnerships, all nine selected hypertension, eight selected falls among older adults, six chose pediatric asthma, and five selected tobacco use. The total PWTF dollars allocated to each community for the full grant period is also shown.

Table 1: PWTF Partnerships, Interventions, and Funding

	PRIORITY CONDITIONS	TIER	Barnstable	Berkshire	Boston	Holyoke	MetroWest (Hudson)	Lynn	SHIFT (New Bedford)	Quincy-Weymouth	Worcester
	TOBACCO										
CLIN	***USPSTF Screening Guidelines***	1		X		X	X	X		X	
COMM	***Promoting Smoke-Free Environments***	2		X		X	X	X		X	
	Tobacco Cessation Counseling	1		X		X	X	X		X	
	HYPERTENSION										
CLIN	***Evidence-Based Guidelines for HTN screening***	1	X	X	X	X	X	X	X	X	X
COMM	***Chronic Disease Self-Management Program***	1	X		X	X	X	X	X	X	X
	YDPP or NDPP (for patients with HTN and pre-diabetes)	2				X				X	
	Self-Measured Blood Pressure Monitoring w/ Additional Support	2	X	X	X	X		X			X
	PEDIATRIC ASTHMA										
CLIN	***Care Management for High-Risk Asthma Patients***	1			X	X	X	X	X		X
	Asthma Self-Management in Primary Care	2				X		X	X		X
COMM	***Home-Based Multi-Trigger, Multi-Component Intervention***	1				X	X	X	X		X
	Comprehensive Head Start-Based Asthma Programs	2			X						X
	Comprehensive School-Based Asthma Programs	2			X	X		X			X
	FALLS AMONG OLDER ADULTS										
CLIN	***STEADI Clinical Risk Assessment***	1	X	X	X		X	X	X	X	X
COMM	***Tai Chi***	2	X		X		X	X		X	X
	Matter of Balance	2	X	X	X		X	X	X	X	X
	Assisted Home Safety Assessment	2	X	X	X		X	X		X	X
	OPTIONAL CONDITIONS										
	Substance Use								X	X	
	Obesity					X					
	Diabetes/Pre-Diabetes		X	X						X	
	Amounts Awarded		$3,939,561	$4,448,438	$5,255,950	$4,126,273	$4,543,492	$5,267,872	$ 4,672,535	$5,267,872	$5,228,000

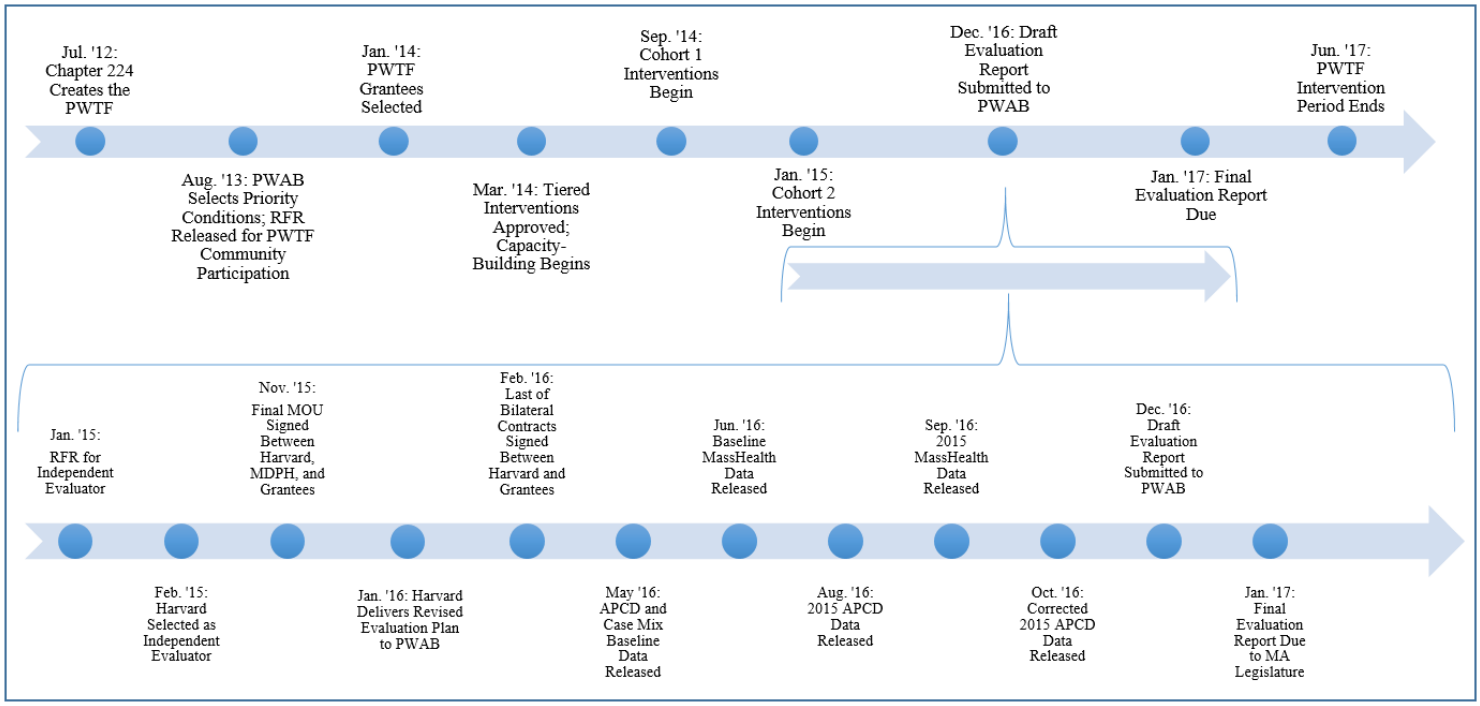
PWTF Evaluation

The Massachusetts Legislature established evaluation criteria to gauge the effectiveness of the PWTF via Section 250 of Chapter 165 of the Acts of 2014. This measure articulated the following objectives for the evaluation with respect to the overall effectiveness and return on investment of the PWTF program: the extent to which the program impacted the prevalence of preventable health conditions; the extent to which the program reduced health care costs or the growth in health care cost trends; and whether health care costs were reduced and who benefited from the reduction. From their allocations, the PWTF grantees were required to jointly fund a rigorous independent evaluation of the PWTF to determine the extent to which it met its legislative objectives.

In February 2015, Harvard Catalyst, the Harvard Clinical and Translation Science Center (HCAT), was selected by MDPH and the grantees to conduct the independent evaluation of the PWTF. At a meeting in June 2015 between Harvard Catalyst, MDPH, and the grantees, the grantees requested, and Harvard and MDPH agreed, that the data presented in the final report not identify communities individually. The contractual process required the execution of a Memorandum of Understanding (MOU) between MDPH, Harvard, and the nine partnerships, as well as individual, bilateral contracts between Harvard and the ten other parties. This process was necessarily extensive, and as a result, contracts were not finalized, and the evaluation was not officially launched, until November 2015. In accordance with the specifications of the evaluation RFR and contract, Harvard submitted and received approval for a revised evaluation plan from MDPH and the grantees in January 2016.

A timeline for the entire PWTF process, from its legislative origins to the completion of this report to the Legislature, appears in **Figure 1** below.

Figure 1: PWTF Development and Evaluation Timelines



Role of the Prevention and Wellness Advisory Board (PWAB)

The PWAB and its Evaluation Committee were integral throughout the evaluation process, providing Harvard with recommendations and feedback with respect to the design of the evaluation plan and its implementation. The PWAB also played a key role in both recognizing and understanding the complicated nature of the evaluation, including some of the challenges that arose along the way, and providing suggestions for how to address such complications. Particularly, the PWAB provided valuable feedback on the draft evaluation report that Harvard submitted on December 1, 2016.

Section Four: Description of Data Sources

Introduction

In conducting our analysis, we reviewed a number of data sources, each with its own strengths and limitations. Each source is described in detail below, including the type of data provided, the period covered, and a description of each component's utility and limitations.

Source: The All Payer Claims Database (APCD), MassHealth, and Medicare
Provided By: The Center for Health Information and Analysis (CHIA)
Type of Data: Claims-Based
Period Covered: January 1, 2010—December 31, 2015

Claims data for the state of Massachusetts were available through one of three data files, depending on the nature of the insurance program to which the claim was submitted: APCD, which covers all commercial insurance programs; MassHealth, which constitutes Medicaid and the Children's Health Insurance Program (CHIP); and Medicare. Our original intent was to incorporate data from all three files, but unfortunately, a number of technical challenges and limitations with the data sets made this impossible.

- Medicare data, which are not part of the APCD but accessible via CHIA, were only available from 2010 through 2013 and a portion of 2014. Without any post-intervention period data (i.e., 2015), and with limited pre-intervention period data, the Medicare data sets were not useful for the purposes of this evaluation and were excluded from analysis.
- Results from the prevalence analyses indicated that the MassHealth file had substantial data quality issues: prevalence for all four priority conditions dropped significantly between 2011/2012 and 2013. After examining trends in the raw data, we found a large increase in the number of claims missing a certain identification marker beginning in 2013. Without this identification marker, the diagnosis flags used to calculate disease prevalence could not be properly applied. While this discovery explained the large observed drops in prevalence, since the missing identification markers could not be corrected, the quality of the MassHealth file remained compromised.[1]
- With respect to the APCD commercial data, the race and ethnicity fields had substantial missing data: approximately 75% of individuals had missing race information while 77% had missing ethnicity data. As a result, our ability to investigate variation in the impact of the interventions by race/ethnicity (i.e., disparities) was severely limited.

For the reasons outlined above, in the present analysis, the MassHealth and Medicare files were therefore excluded from the prevalence calculations, and only claims from the APCD file (i.e., commercial payer sources) were used. However, as more data become available and as we continue to explore potential fixes to the MassHealth data, we hope to revisit these sources in the future. While estimates of prevalence using APCD data are age- and sex-standardized (specifically to the Massachusetts 2014 population), given the incompleteness of the data with respect to race and ethnicity, we have chosen not to report prevalence estimates by race/ethnicity group from this data set. Further, while there are clear and valid diagnostic codes used for asthma, fall-related injuries, and hypertension, the only such code with clear application to tobacco/smoking is chronic obstructive pulmonary disease (COPD), and this makes APCD data inadequate to estimate the prevalence of tobacco use.

[1] Harvard will continue to work with JEN Associates, MDPH, and CHIA to identify and execute possible solutions to the issues in MassHealth data that currently preclude the calculation of reliable prevalence estimates.

Lastly, one constraint of only being able to use claims from commercial sources is that the prevalence estimates do not account for significant segments of the population being examined. For example, the exclusion of MassHealth data meant the loss of data from the Children's Health Insurance Program; the pediatric asthma prevalence is therefore underestimated using this source. Similarly, since the Medicare files contain substantial records for the population over age 65, restricting our analysis of APCD to commercial claims likely makes the estimates for hypertension and falls among older adults artificially low. However, given that these errors in prevalence estimates are not conditional on the interventions, we submit that change in prevalence estimates are sufficient for estimating effects of the interventions.

As noted earlier, the majority of PWTF interventions did not begin until early 2015 and beyond. However, the interventions implemented were designed to show a return on investment within three to five years. As such, given both the limited window during which data were available and the relatively short time during which interventions have actually been taking place (i.e., less than one year), we did not expect to see measurable changes in either the prevalence estimates or the costs/cost trends associated with each condition. However, these data gave us important information with respect to overall prevalence trends leading into the intervention period as well as cost information for claims associated with specific conditions.

Source: Case Mix
Provided By: The Center for Health Information and Analysis (CHIA)
Type of Data: Hospital Discharge Data
Period Covered: October 1, 2009—September 30, 2015 (Fiscal Years 2010—2015)

Case Mix consists of three sets of hospital discharge data: the Hospital Inpatient Discharge Database (HIDD), the Outpatient Observation Database (OOD), and the Emergency Department Database (ED). We had intended to use all three of these components in our analysis, but full data for Fiscal Year (FY) 2015 was not available in time to be included in this evaluation; only the final HIDD set was provided by CHIA, though a preliminary ED file was also provided in mid-November. Our preference was to review both the HIDD and ED sets together as they are very much related in terms of falls and asthma-related episodes (i.e., ED visits can lead to inpatient admissions), but in the interest of reporting on the data that we did have available, we have included a preliminary analysis of the HIDD component, understanding that these data only cover claims through September 30, 2015. It is our intention to revisit the final ED and OOD components of the Case Mix data in the follow-up period through June 30, 2017.

Source: The Massachusetts Department of Public Health Network (MDPHnet)
Provided By: Harvard Pilgrim Health Care Institute (HPHCI)
Type of Data: Electronic Health Record (EHR) Data from Atrius Health, the Cambridge Health Alliance, and the Massachusetts League of Community Health Centers
Period Covered: January 1, 2012—October 1, 2016

MDPHnet is able to query electronic health record data from three large practice groups in Massachusetts to provide timely surveillance data on approximately 20% of the state population. Estimates of disease prevalence derived from MDPHnet align well with the Behavioral Risk Factor Surveillance System (BRFSS). MDPHnet provides a real-time view of health-related trends across the state, within PWTF communities, and within comparison communities from the beginning of 2012 through the first three-quarters of 2016, thus providing roughly 21 months of PWTF

intervention period data. MDPHnet also generates details with respect to blood pressure screenings, blood pressure measures, and tobacco cessation. However, MDPHnet does not include fields for falls among older adults; therefore it can only report on three of the four PWTF priority conditions. We used MDPHnet data to characterize the health profile of eight of the nine PWTF communities and combined these data with census data to find the best-matching comparison communities. Because MDPHnet coverage in Berkshire County is low (<10% of the population), it is not included in any of the MDPHnet analyses, nor were we able to calculate a control group specific to Berkshire. We instead used the average of other comparison communities when analyzing Berkshire data for comparative purposes. Lastly, and of significant note, MDPHnet was able to fill the race/ethnicity data gap created by the APCD data, thus providing us with macro-level information about health trends within specific populations. (It might be noted that researchers using data collection instruments of all kinds are finding it increasingly difficult to gather and interpret race and ethnicity data, a challenge that could be addressed by policymakers.)

Source: Electronic Health Records (EHR)
Provided By: PWTF Clinical Sites via MassLeague/Azara Data Reporting and Visualization System (DRVS) and Data Extracts from Other PWTF Clinical Partners
Type of Data: Encounter-Level Electronic Health Record (EHR) Data
Period Covered: September 1, 2013–September 30, 2016

Some of the most useful data came by way of more than two dozen clinical sites engaged in intervention activities within the PWTF communities. This electronic health record data allowed us to look more closely at specific clinical sites based on interventions they undertook, as opposed to the more macro view of APCD and MDPHnet, and to track the health status of individual patients from pre-intervention through almost two years of the intervention period. (It should be noted that all patient information was de-identified, thus maintaining the confidentiality and privacy of the population.) The majority of these data come from the Azara Data Reporting and Visualization System (DRVS) data network in partnership with the Massachusetts League of Community Health Centers. However, there were additional extracts from other PWTF clinical sites not on DRVS. As a result, the data are heterogeneous across different clinics and their respective data systems; there is considerable variation in data availability and quality from site to site. Further, there are no data on falls because no template for data collection, entry, and analysis had been created prior to the PWTF, and there is no EHR data from comparison communities. This is a longitudinal data set looking at pre-post comparisons for individuals.

Source: PWTF Community Intervention Data
Provided By: PWTF Community and Clinical Sites via MDPH
Type of Data: Site-Level Information with respect to Intervention Referrals, Enrollments, and Completions
Period Covered: September 1, 2014–September 30, 2016

The MDPH-provided Community Intervention data included perhaps the most granular level of detail with respect to community and clinical organizations engaged in intervention activities, including the number of individuals referred to programs and how many enrolled and completed them. While initially designed and collected for quality improvement purposes, these data, reported in greater detail in the MDPH final PWTF report, were extremely valuable in terms of our ability to estimate per-person intervention costs, measure relative intervention effect in the absence of available claims data, and project possible intervention cost-effectiveness and return on investment going forward.

Source: Process Evaluation Data
Provided by: Implementers in the Nine PWTF Communities
Type of Data: Interviews, Surveys, and Focus Groups
Period Covered: January 2014—September 2016

Harvard's mixed methods research team collected primary data in three phases between March and September 2016. This process sought to gather data from all aspects of the PWTF implementation from January 2014 through September 2016. Phase 1 of this process consisted of 1.5-hour telephone interviews with two leaders from each partnership: the project manager from the Coordinating Partner agency and one other senior person in the partnership designated by MDPH. These interviews used a protocol adapted from the Consolidated Framework for Implementation Research (CFIR).[2] From these interviews, Phase 2 consisted of an Implementation Survey administered online to two to three people with diverse job descriptions in each of the partner organizations participating in the PWTF; and a Social Network Survey administered online to one key informant in each PWTF participating organization. Phase 3 began with deriving a "deeper dive" interview protocol from the analysis of these Phase 1 and 2 products and selecting four partnerships that scored highest on implementation measures on the Implementation Survey. A total of 24 clinical and community-based practitioners from these four partnerships participated in 1.5-hour interviews. Additional interviews and focus groups were conducted with approximately 40 personnel from four of the remaining partnerships, though these were not included in the CFIR analysis.

[2] Damschroder LJ, Aron DC, Keith RE, et al.: Fostering implementation of health services research findings into practice: a consolidated framework for advancing implementation science. Implement Sci. 2009.

Section Five: Evaluation Methodology

Overview of Proposed Evaluation Plan

In accordance with the PWTF's legislative mandate, and in conjunction with our agreement with MDPH, PWTF grantees, and the PWAB, our outcome evaluation plan proposed to assess the extent to which the program impacted the prevalence of preventable health conditions, the extent to which the program reduced health care costs or the growth in health care cost trends, and whether health care costs were reduced and who benefited from the reduction.

Components of the Evaluation Plan

To address the evaluation objectives, we distinguished three inter-related components of the PWTF evaluation:

1. **Outcomes Evaluation:** Did the PWTF produce changes in intermediate (or impact) measures such as screening and participation in interventions and in outcome measures such as overall prevalence, condition-related episode preventions (i.e., preventing falls and associated injuries), and healthcare utilization; and did any changes benefit populations disproportionately affected by these conditions (i.e., racial and ethnic disparities)?
2. **Assessment of Cost Effectiveness (CE) and Return on Investment (ROI):** Did the PWTF actually or potentially contribute to a present or future reduction in health care costs and cost trends?
3. **Process Evaluation:** How were the PWTF activities implemented, what changes did they contribute to in participating communities and organizations, and what lessons might have implications for changes in health systems?

Evaluation Methodology: Part One: Outcomes Evaluation

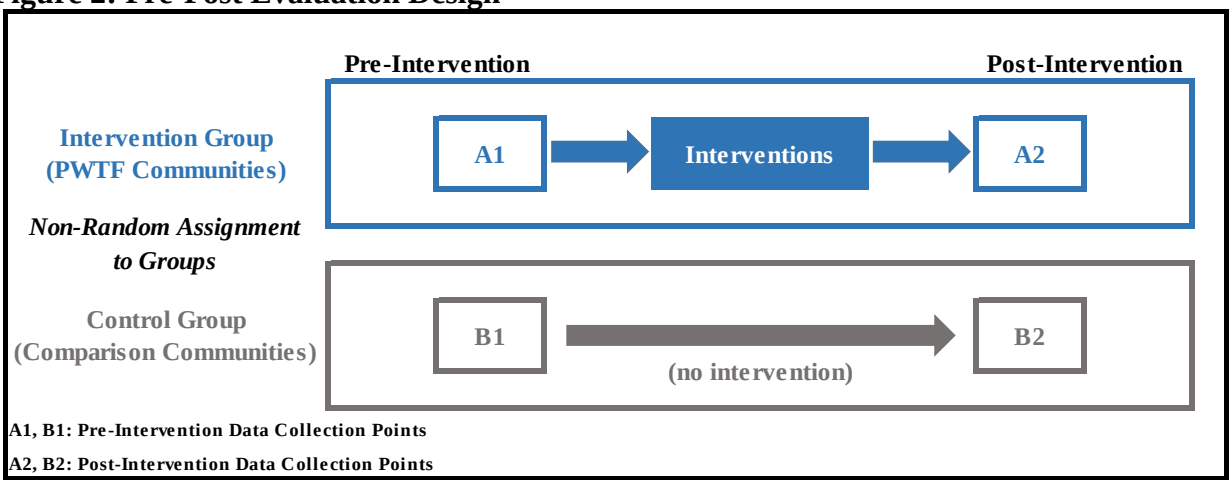
Introduction

The outcomes evaluation followed a quasi-experimental design. For the purposes of our evaluation, we viewed the PWTF program as a "natural experiment" in which communities were assigned to receive a PWTF intervention or not, albeit non-randomly. We used data collected before interventions began (the baseline or "pre" period) and data collected after interventions began (the "post" period) to perform two complementary types of comparisons, the combination of which enabled us to assess whether changes in condition prevalence might be a result of intervention effect or simply in line with overall temporal trends or external events.

- **Comparison 1:** Internal pre-intervention vs. post-intervention comparisons within PWTF communities.
- **Comparison 2:** Comparisons between the individual and aggregated PWTF intervention communities and matched individual and aggregated control communities.

As illustrated in **Figure 2**, the "intervention group" represents those PWTF communities delivering at least one Tier 1 intervention for a specific condition, while the "control group" represents comparison communities matched by criteria described below to each PWTF community. In addition to this one-to-one comparison, we also reviewed how trends in PWTF communities with condition-specific interventions compared to the overall state trends across all of Massachusetts.

Figure 2: Pre-Post Evaluation Design



Pre-Post Analysis: APCD and MDPHnet

One approach used to investigate the impact of the interventions implemented in the PWTF communities was to examine annual prevalence rates for each of the four priority health conditions (asthma, falls, hypertension, and tobacco use) during the baseline before interventions began (the "pre" period) and the time after which interventions began (the "post" period). As shown in **Table 2,** with a few exceptions, the majority of interventions began after January 1, 2015, and we therefore viewed 2010–2014 as our pre-intervention period and 2015–2016 as our post-intervention period.

Table 2: Timing of Intervention Launches

	Barnstable	Berkshire	Boston	Holyoke	MetroWest (Hudson)	Lynn	SHIFT (New Bedford)	Quincy-Weymouth	Worcester
2014									
Sep				A: CL, A: CO, H: CL, T: CL		A: CO, H: CO		T: CL	
Oct						A: CL, A: CO, T: CL		T: CL, F: CO	A: CL, A: CO, H: CL, F: CL
Nov				T: CO		H: CL, T: CO, F: CL, F: CO	F: CO	T: CO	
Dec			H: CL						A: CO
2015									
Jan	H: CL, H: CO, F: CL, F: CO	H: CL, T: CL	H: CL			F: CO		H: CL, H: CO, T: CO, F: CL	
Feb					T: CO			F: CO	A: CO
Mar			A: CL, H: CO, F: CL	T: CO			A: CL, H: CL, F: CL	F: CO	
Apr			H: CO, F: CL		F: CL, F: CO		H: CO	H: CO, F: CO	
May			H: CO	H: CO	F: CO			T: CO	
Jun			H: CL, H: CO	H: CO	H: CL, H: CO, T: CO, F: CO				F: CO
Jul	F: CL	H: CO, T: CO, F: CO	A: CL, A:CO, H: CL, F: CL		H: CO, F: CO			T: CO, F: CO	
Aug			H: CO, F: CO	H: CO				F: CO	
Sep			A: CO, F: CL, F: CO	H: CO	F: CL			H: CO	F: CO
Oct					T: CL			H: CO	
Nov		T: CL, H: CL, F: CL	F: CL			A: CO			
Dec	H: CO, F: CO	T: CL, H: CL, F: CL, F: CO	F: CL		A: CL, H: CL, T: CL, T: CO	T: CO			
2016									
Jan					T: CO	A: CO, H: CO	A: CL, H: CL		
Feb				A: CL			A: CO	H: CL, T: CL, T: CO, F: CL	F: CL, F: CO
Mar			H: CL		A: CO, H: CL, T: CL	T: CO			
Apr		T: CL, H: CL, F: CL							
May								F: CL	
Jun									
Jul		T: CL, F: CL						T: CO	
Aug									
Sep									

A: Asthma F: Falls H: Hypertension T: Tobacco CL: Clinical CO: Community

In principle, if an intervention truly had an effect, one might expect the annual prevalence estimate to be lower during the post-intervention period than during the pre-intervention period. Examining prevalence estimates for the several years before interventions were implemented provides an indication of typical variation within each community, crucial for placing into context any shifts that occur during the post-intervention period. It is very important to note, however, that a strict analysis of only condition prevalence does not fully capture potential positive impacts of the

PWTF interventions. For example, increases in hypertension screening rates may actually increase the observed prevalence of the condition by identifying previously-undiagnosed patients, which is the first step in treating and controlling the condition, thus leading to positive health outcomes. However, as the legislative language that created the evaluation component of the PWTF does specifically call for an assessment of potential changes in prevalence, we have included those calculations across all four primary conditions in our analysis.

Selection of Comparison Communities

One potential pitfall of the standard pre-post approach is that changes between the two periods may be attributable to factors other than PWTF that confound the association and thus lead to misleading conclusions. For example, if the overall health of the PWTF communities is improving, then one might naturally see a decline in prevalence rates. To mitigate this problem, we performed parallel pre-post analyses based on data from matched comparison communities. To identify these control communities, we used MDPHnet data to conduct a rigorous analysis utilizing criteria that characterized the constituent populations in terms of size, geography, socio-demographic characteristics, and disease prevalence. Specific factors utilized in our identification of comparison communities included population size, median income, distribution of age and race, proportion of community members under the poverty line, receiving food stamps, and/or unemployed, and proportion of community members with the following conditions: hypertension, asthma, smoking, overweight/obese, or who have been diagnosed with Type 2 Diabetes.

Eligible controls were restricted to communities having no geographic overlap with PWTF communities (i.e., are not geographically close to one another) and with at least 10% coverage in MDPHnet. Matches were established using a metric known as Mahalanobis Distance (MD), which accounts for correlations in the data when computing the "distance" between communities. While our evaluation focused on the priority conditions of pediatric asthma, hypertension, falls among older adults, and tobacco use, when selecting comparison communities, we chose to also utilize other condition-specific factors associated with obesity and diabetes as several of the PWTF grantees chose to address one or more of these secondary conditions as well.

Calculating Prevalence: APCD

Using the All Payer Claims Database (APCD), estimates of prevalence for the four priority conditions were calculated for each PWTF and comparison community, as well as statewide, for each year from 2010–2015. (APCD data were only available through December 31, 2015.) For each prevalence calculation, the denominator was taken to be the number of unique Massachusetts residents who satisfied an age-restriction specific to the condition being analyzed and who had at least one record/claim in the APCD within the given year. For hypertension, the age range was 18–85 years; for pediatric asthma, the age range was 2–18 years; for falls among older adults, the age range was 65 years or older; and for tobacco use, the age range was 18 years or older. Furthermore, since the prevalence estimates are specific to each year, we note that an individual may contribute to one or multiple years.

To calculate the numerator for the prevalence estimates, we identified all individuals who met the criteria for the denominator (i.e., based on age and year restrictions) who also had at least one record of a diagnosis flag for the health condition in the APCD. These flags were based on ICD-9-CM diagnosis codes indicating the presence of a certain condition. A full listing of the ICD-9-CM codes used to flag each condition is found in **Appendix 1.** It is important to note that, since

no ICD-9-CM code exists to directly indicate a fall, a variety of E-Codes and ICD-9-CM codes indicative of fall-related injuries were used as proxy measures.

Finally, each prevalence estimate was calculated standardizing to the age and sex distribution of the Massachusetts 2014 population. Intuitively, the process of standardizing to a single population provides a means to control for the impact of changes in the age and sex distribution of patients across the 2010–2015 study period.

Calculating Costs: APCD

Using the APCD, two sets of analyses were conducted to measure costs and cost trends: total costs per condition in PWTF intervention communities and the associated cost per individual. Costs were stratified by condition, year, community, and the corresponding age range consistent with prevalence calculations as previously described. The communities analyzed included those within the PWTF grantee partnerships participating in a given intervention, their comparison communities, and (for costs per person) the Massachusetts state average. The "total payments" variable utilized claims associated with the condition-specific E-Codes and included all costs associated with a given claim. Depending on the condition, this could include payments associated with emergency department visits, inpatient visits, pharmacy, dental-related claims, and other institutional and professional claims. A very small percentage of payment values were listed as negative (0.01387% in the 2010–2014 data and 0.00715% in the 2015 data). At the advice of JEN Associates, in order to avoid such values disrupting the cost averages, negative cost values were set to zero. Total payments were then compiled for each year from 2010–2015 for all residents within a given community for whom a claim was submitted during that year. To calculate costs per person, total payment values were divided by the number of individuals for whom a claim was submitted.

Calculating Prevalence: Case Mix

Hospital Inpatient Discharge Data (HIDD) was used to analyze the rate of inpatient admissions with respect to asthma and fall-related episodes in PWTF intervention communities. As the Case Mix databases are based on hospital Fiscal Year terms (i.e., October–September), Fiscal Year 2015 Case Mix data only include claims through September 30, 2015, and thus only include 75% of the intervention period covered by the APCD data. The same methodology used to calculate APCD prevalence was applied to this component of the Case Mix data to determine the prevalence of these two conditions with respect to inpatient hospital admissions.

Calculating Prevalence: MDPHnet

For the PWTF communities, estimated MDPHnet coverage of their census populations ranges from 12% to 50%, excluding Berkshire, where coverage was too low in the system to allow for analyses. The data queried by MDPHnet are updated daily, and for the purposes of this evaluation, HPHCI estimated the quarterly prevalence of pediatric asthma, smoking, and hypertension statewide, in eight of the PWTF communities, and in the eight comparison communities between January 1, 2012 and September 30, 2016. The three conditions were defined using algorithms based upon vital signs, diagnosis codes, laboratory measures, prescriptions, and self-reported smoking status. Patients included in the analyses were those with at least one encounter at one of the MDPHnet participating practices within the two years preceding the start of each quarter. Patients were identified as residing in one of the PWTF communities based on their residential zip code in MDPHnet.

Prevalence estimates were adjusted to reflect the distributions of age, race, and sex in each population of interest according to the U.S. Census Bureau 2010 Census. To make this adjustment, MDPHnet results were stratified by age, sex, and race-ethnicity. A weight was then applied to each strata based on the difference between the census estimate of the number of people in each of these strata versus the MDPHnet measure of total number of people in each strata. This weighting was applied for the state as a whole as well as for each PWTF community. The sum of the projected count of people in each strata was then divided by the census population for the target location to get an adjusted prevalence estimate for the state and each community. This method ensures that the final estimated prevalence reflects the size of each stratification in the census population in that community (or the whole state) rather than the size of each stratification in the MDPHnet population for that community (or the state). For additional details with respect to MDPHnet methodology, please refer to **Appendix 2.**

Analytic Methods Using EHR Data: Overview

Data from available electronic health record (EHR) sources were utilized to conduct further analysis around hypertension and tobacco, including a merged data set containing more than 2.4 million individual clinical encounters and 444,337 unique patients across more than two dozen clinical sites.[3] Interventions delivered at these sites were tiered based on the available evidence-base for clinical efficacy and the likelihood of return on investment. As noted earlier, interventions were allocated to both clinical and community settings, but for the purposes of our CE/ROI analysis and developing projections using our model, we focused on the 34 months of patient-level EHR data provided by clinical sites.

The Tier 1 clinical intervention for hypertension included primarily the adoption of either JNC-7 or JNC-8 (Joint National Committee on Hypertension) guidelines, which encourage screening and then improved management of those identified with hypertension, and the referral of patients with hypertension to community-based or home-based self-monitoring. Individual patients were to be screened routinely for hypertension and individual clinics were to establish registries in order to assist clinicians in identifying hypertensive patients and to help manage the condition. Once screened, patients were referred to community-based interventions, of which there were two: the Chronic Disease Self-Management Program (CDSMP, Tier 1), a six-week skills-based course meant to educate patients about their condition, and the Self-Measured Blood Pressure Monitoring with Additional Support intervention (SMBP, Tier 2), a community-based program with blood pressure measurement at home and follow up by community-level providers.

The Tier 1 clinical intervention for tobacco use was implementation of the U.S. Preventive Services Task Force (USPSTF) recommendations to ask all patients about tobacco use, advising

[3] MDPH provided Harvard with an initial data set containing more than 3.5 million encounter-level records. On October 26, 2016, following an inquiry from the Harvard science team, MDPH informed Harvard that two clinical sites had been instructed to stop sending EHR data to MDPH as they "were not technically clinical sites" participating in the PWTF. We therefore removed data from these sites from the master data set. The data set was further refined by limiting records to individuals with valid patient identification numbers, gender, age, and recorded SBP and/or DBP. Lastly, the initial MPDH data set included records of individual "encounters" with patients, which were described by MDPH as being any interaction with a patient by separate providers (e.g., nurse, nutritionist, etc.). A single patient on a specific day could have more than a single encounter recorded in the EHR and there was no way to determine if they were part of the same office visit. We thus assumed that multiple encounters on the same visit date and at the same clinic for each unique patient ID made up an individual office visit. The information for each individual encounter would capture whatever the given provider thought important enough to note in the record while information captured by individual providers in the same visit were not populated across all encounters for a given visit. For example, if there were three encounters during a single visit, blood pressure may only appear in the single encounter when it was measured. As such, the final data set utilized for the analysis included approximately 2.4 million individual clinical encounters.

those who use tobacco to quit, and providing behavioral and pharmacotherapy as indicated. Two additional community-based interventions were employed: referral to tobacco cessation counseling, either via individual counseling or a phone-based quit line, and smoke-free environments promoted through encouraging smoking restrictions (i.e., smoke-free policies) implemented by housing authorities in several PWTF communities. Lastly, analyses conducted using data from the EHR were limited to assessments in the intervention communities only, as data for comparison communities were not included.

Analytic Methods Using EHR Data: Changes in Prevalence in Hypertension

Our methodological approach used for analyzing hypertension is as follows:

1. **Data Set for Analyses:** To address hypertension in the PWTF communities, we limited records in the EHR data set to persons with a valid patient identification number, gender, age, and a recorded systolic blood pressure (SBP) or diastolic blood pressure (DBP).
2. **Blood Pressure Measurements:** We assessed the frequency of blood pressure measurements by determining the number of times blood pressure was measured at least once during each unique visit among the total number of individual visits per month at each participating clinic.
3. **Prevalence of Hypertension:** The prevalence of hypertension was defined as the number of persons with SBP > 140 mmHg, or DBP > 90 mmHg, or listed use of anti-hypertension medications, or listed diagnosis of hypertension using either ICD-9/10 or SNOMED CT (Systematized Nomenclature of Medicine–Clinical Terms) codes, among the number of visits for unique individuals per month at each participating clinic. ICD-9/10 and SNOMED CT codes used are listed in **Appendix 3.**

For individuals with multiple readings in a given visit, we used the last reading for that visit. If an individual had multiple visits in any given month, we used the last visit date with measured blood pressure readings. We also limited the data for analysis to include only persons with clinically feasible ranges of blood pressure readings as follows: SBP between 70 & 300 mmHg and DBP between 40 & 200 mmHg. To assess the changes in prevalence of hypertension by PWTF community over time, we divided the data into two time periods: a baseline period from September 2013–August 2014 and an intervention period from September 2014–June 2016. Prevalence was adjusted for age and gender and reported in monthly intervals.

Analytic Methods Using EHR Data: Changes in Blood Pressure

In order to calculate any changes in blood pressure between the baseline and intervention periods, we used two different definitions. For Definition 1 we calculated the mean change in blood pressure between the last recorded visit in the baseline period and the last recorded visit in the intervention period (**Figure 3)**, and for Definition 2, we calculated the mean change in blood pressure between the average blood pressure for all visits in the baseline period and the last recorded visit in the intervention period (**Figure 4)**.

Figure 3: Change in Blood Pressure: Definition 1

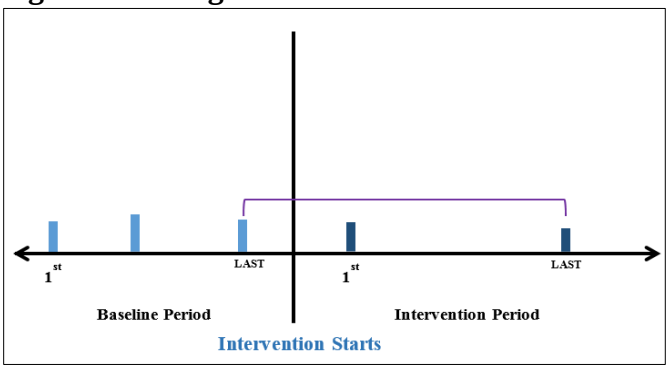
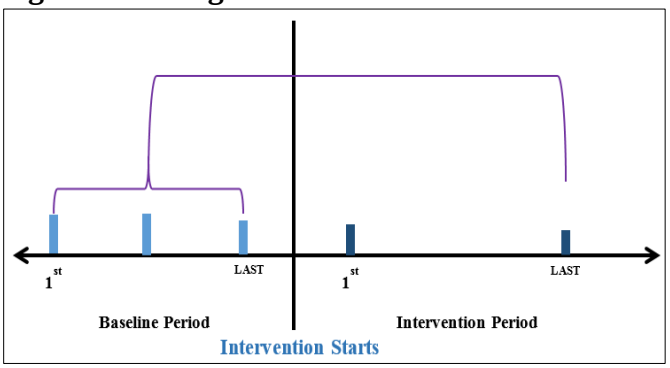


Figure 4: Change in Blood Pressure: Definition 2



Both of these approaches excluded individuals who had visits exclusively in the baseline period (but none in the intervention period) and retained individuals who had no visits in the baseline period but had at least two visits occurring in different months during the intervention period.

Analytic Methods Using EHR Data: Changes in Prevalence in Smoking Cessation

To assess tobacco use in the PWTF communities, we restricted the EHR data set to persons aged 18-years or older with a valid patient identification number. We then used the following methodology:

1. **Screening for Smoking Status:** To determine how often patients were screened for smoking status, we determined the number of persons who reported current smoking, not currently smoking, being a former smoker, or had a response of "other" noted in the record, among the total number of individual visits per month at each participating clinic.
2. **Prevalence:** The prevalence of tobacco use was defined by identifying the number of persons who reported current daily smoking, those with a CPT (Current Procedural Terminology) visit code of 99406 or 99407 (see definitions below), those listed as having received provider counseling, or those having a smoking cessation referral order on file, as a proportion of the total number of individual visits per month at each participating clinic.
    - **Code 99406:** Tobacco Use Cessation Intermediate (3-10 minutes): Smoking and tobacco use cessation counseling visit; intermediate, greater than 3 minutes up to 10 minutes.
    - **Code 99407:** Tobacco Use Cessation Intensive (> 10 minutes): Smoking and tobacco use cessation counseling visit; intensive, greater than 10 minutes.

Analytic Methods Using Community Intervention Data: Introduction

There are a number of different approaches to measuring the health benefit for PWTF conditions. Ideally, relevant health outcomes would be tracked at the individual level among those exposed to the PWTF intervention and a comparable group of unexposed individuals, though given the design and intent of the PWTF, outcome tracking did not occur in this manner. Alternatively, PWTF intervention effect might be observed at the population level by examining trends in key outcomes for populations exposed to the PWTF intervention relative to trends in comparable unexposed populations, as was the intent using APCD and Case Mix Data. However, this approach requires that a large enough portion of the target population is exposed to the PWTF intervention, and for an amount of time necessary for the interventions to take root and demonstrate their full potential, or the real effects for a relatively small number of individuals may not be detectable.

In the absence of a large target population, studied over time, with exposure to an intervention, a more speculative model-based approach can be taken, relying on evidence of effectiveness from literature in combination with actual data provided by clinical and community sites engaged in intervention delivery. The Community Intervention data were collected by sites conducting intervention work and reported to MDPH on a quarterly basis. MDPH then consolidated, standardized, and "cleaned" the data into summary reports as part of a feedback loop with PWTF communities. While these data collection methods were primarily designed for quality control and improvement purposes, we were able to use them to get a sense of the reach of each intervention (i.e., the number of individuals referred to programs, enrolled in programs, and completing programs), which in turn allowed us to calculate the approximate cost-effectiveness and return on investment of certain interventions, specifically in terms of falls and asthma.

Analytic Methods Using Community Intervention Data: Reach of Falls Interventions

In estimating the PWTF's impact on falls, no discernable trend was observed in population-level data observed in the APCD and Case Mix data sets, and both MDPHnet and EHR data sources are not suitable to track fall-related data. We therefore turned to the DPH-provided Community Intervention data and STEADI clinical data, together with established literature around the specific falls interventions undertaken by PWTF communities, to conduct our analysis.

All PWTF communities provided quarterly reports of the number of clients referred to, enrolled in, and completing intervention programs (i.e., classes, screenings, home assessments, etc.). Community-based intervention providers delivered services to those referred through PWTF clinical sites as well as those who participated without having been referred by another PWTF site. Since all of these services were supported by the PWTF, we included all of the individuals in our measure of reach, both those referred by PWTF clinical sites and those not referred. As shown in **Table 3** there were 3,295 enrollments in community-level falls interventions and 1,403 completed as of June 30, 2016. While less than half of enrolled clients had completed the intervention, we expect this is partly due to the relatively recent start of PWTF enrollment and the long duration of the intervention, such as attending a Tai Chi class for several months. Therefore, for the purposes of this evaluation, in an effort to best capture the potential reach of these interventions, we counted all enrollments (rather than completions) as individuals receiving a PWTF-related benefit.

Table 3: Client Encounters for Community-Based Falls Interventions Reported to MDPH through June 2016

FALLS INTERVENTIONS	Sum of # PWTF Referred	Sum of # PWTF Enrolled	Sum of # PWTF Completed	Sum of Total # Enrolled	Sum of Total # Completed
Grantee/Partnership	410	369	184	1,211	506
Grantee/Partnership	274	127	83	162	89
Grantee/Partnership	573	147	48	286	132
Grantee/Partnership	567	69	36	93	37
Grantee/Partnership	183	99	0	94	0
Grantee/Partnership	177	98	58	254	156
Grantee/Partnership	643	262	74	342	133
Grantee/Partnership	850	493	210	853	350
Total	**3,677**	**1,664**	**693**	**3,295**	**1,403**
Cost-effectiveness and return on investment calculations are based on the Total # Enrolled (3,295)					

The evidence of effectiveness in the literature is quite strong for the falls interventions employed by the PWTF. As such, we were able to calculate the expected number of prevented fall-related episodes resulting from the total number of individuals reached via the PWTF falls interventions.

Analytic Methods Using Community Intervention Data: Reach of Asthma Interventions

Similar to our review of Community Intervention data with respect to falls, we also analyzed reports from PWTF communities to MDPH with respect to asthma interventions, including referrals, enrollments, and completions. Six PWTF communities delivered interventions to address pediatric asthma, all of which provided quarterly reports of the number of clients who were referred to, enrolled in, and completed specific intervention activities (i.e., home visits, self-management education, etc.).

While the number of clients referred is large (47,309), these numbers may simply reflect the number of target population in schools in some communities rather than indicate substantive service delivery; therefore, we focused on the number of clients reported as enrolled. Of the 6,432 clients enrolled by June 2016, two communities together accounted for 89% of all enrollments with 5,723 between them (2,574 and 3,149, respectively). **Table 4** displays these data in their entirety.

Table 4: Client Encounters for Community-Based Pediatric Asthma Interventions Reported to MDPH through June 2016

ASTHMA	Sum of # PWTF referred	Sum of # PWTF enrolled	Sum of # PWTF completed
Grantee/Partnership	15,831	3,149	3,088
Grantee/Partnership	25	9	0
Grantee/Partnership	11,632	625	394
Grantee/Partnership	19,259	2,574	2,542
Grantee/Partnership	75	47	0
Grantee/Partnership	487	28	0
Total	**47,309**	**6,432**	**6,024**
Cost-effectiveness and return on investment calculations are based on the Total # Enrolled (6,432)			

Evaluation Methodology: Part Two: Cost Effectiveness and Return on Investment

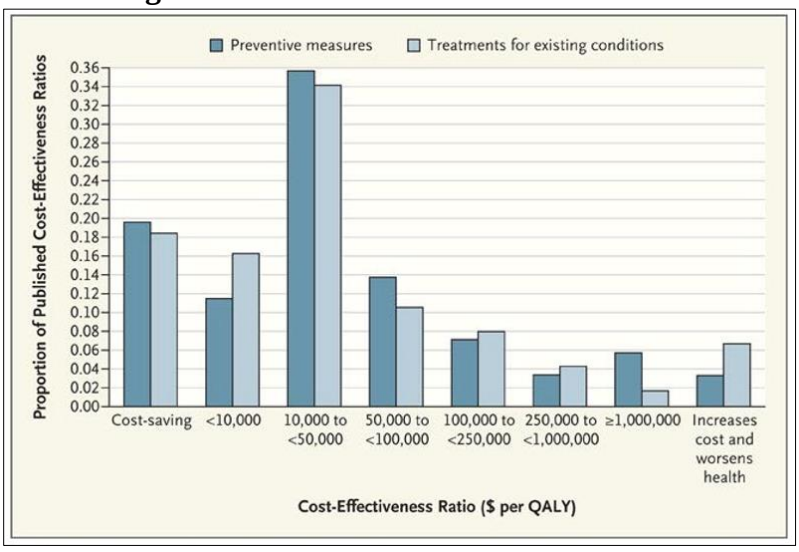
Introduction

The second component of our evaluation was an attempt to estimate, to the extent possible, the cost-effectiveness (CE) and return on investment (ROI) of the PWTF, for which there are two main types of economic evaluation that can be performed: a cost-effectiveness analysis, in which the incremental cost per unit of health benefit produced is the main outcome, or a return-on-investment analysis, which focuses on the question of whether spending on PWTF ultimately leads to downstream (health care) cost savings. ROI analysis is only concerned with financial impact; it tries to answer the question: Does the money spent on a particular intervention result in savings in the long term? For this reason, we also estimated the cost-effectiveness (CE) of the Tier 1 PWTF interventions as implemented, using the same models used to calculate ROI.

In the cost-effectiveness analysis (CEA), we estimated incremental cost-effectiveness ratios (ICERs) for interventions or packages of interventions. The ICER is a measure of the extent to which the intervention yielded both cost-savings to the health care system and life year gains to the patient, relative to money spent on the intervention. It helps to answer the question: How much does it cost to produce one quality-adjusted life year (QALY) using the intervention? In economic analyses, a QALY is a reflection of disease burden and quality of life with a gain of one QALY being equivalent to one year of perfect health. The key difference between ROI analysis and CEA analysis is that ROI analysis is primarily concerned with long-run cost-savings while the CEA is concerned with the following question: Was the health benefit generated for the target population worth the cost?

Figure 5 provides data with respect to the overall proportion of published cost-effectiveness ratios as reported by the New England Journal of Medicine in 2008. As illustrated in this graphic, fewer than 20% of preventive measures and treatments for existing conditions are actually found to be cost-saving, a point we would like to note given that the PWTF-specific interventions, and more to the point, their implementation, are relatively new.

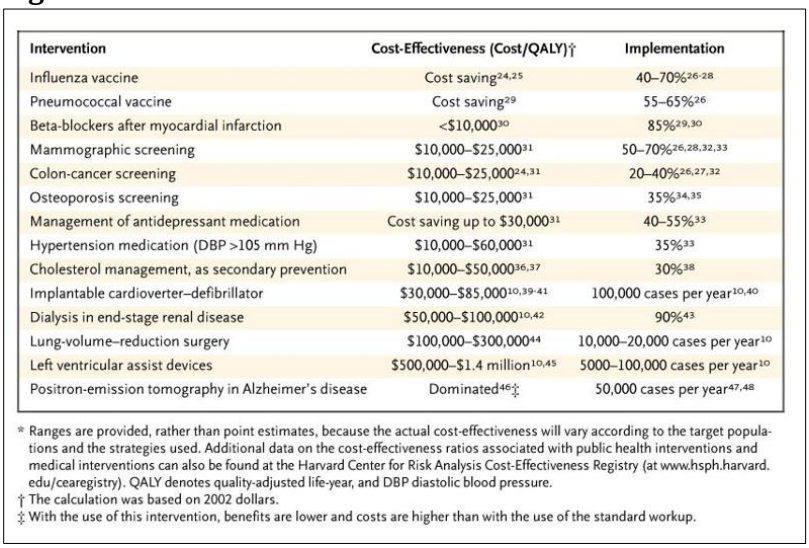
Figure 5: Distribution of Cost-Effectiveness Ratios for Preventive Measures and Treatments for Existing Conditions



Source: Cohen JT et al. N Engl J Med 2008;358:661-663.

Figure 6 provides some additional information with respect to selected interventions in the Medicare population. Once again, it is important to note that very few interventions are actually cost-saving; what is of equal, if not greater relevance, is the spread of costs associated with Quality-Adjusted Life Years (QALY), which is essentially the cost associated with generating an additional year of "good health" for an individual by addressing and treating certain chronic conditions.

Figure 6: Cost-Effectiveness and Use of Selected Interventions in the Medicare Population



Intervention	Cost-Effectiveness (Cost/QALY)†	Implementation
Influenza vaccine	Cost saving[24,25]	40–70%[26-28]
Pneumococcal vaccine	Cost saving[29]	55–65%[26]
Beta-blockers after myocardial infarction	<$10,000[30]	85%[29,30]
Mammographic screening	$10,000–$25,000[31]	50–70%[26,28,32,33]
Colon-cancer screening	$10,000–$25,000[24,31]	20–40%[26,27,32]
Osteoporosis screening	$10,000–$25,000[31]	35%[34,35]
Management of antidepressant medication	Cost saving up to $30,000[31]	40–55%[33]
Hypertension medication (DBP >105 mm Hg)	$10,000–$60,000[31]	35%[33]
Cholesterol management, as secondary prevention	$10,000–$50,000[36,37]	30%[38]
Implantable cardioverter–defibrillator	$30,000–$85,000[10,39-41]	100,000 cases per year[10,40]
Dialysis in end-stage renal disease	$50,000–$100,000[10,42]	90%[43]
Lung-volume–reduction surgery	$100,000–$300,000[44]	10,000–20,000 cases per year[10]
Left ventricular assist devices	$500,000–$1.4 million[10,45]	5000–100,000 cases per year[10]
Positron-emission tomography in Alzheimer's disease	Dominated[46]‡	50,000 cases per year[47,48]

* Ranges are provided, rather than point estimates, because the actual cost-effectiveness will vary according to the target populations and the strategies used. Additional data on the cost-effectiveness ratios associated with public health interventions and medical interventions can also be found at the Harvard Center for Risk Analysis Cost-Effectiveness Registry (at www.hsph.harvard.edu/cearegistry). QALY denotes quality-adjusted life-year, and DBP diastolic blood pressure.
† The calculation was based on 2002 dollars.
‡ With the use of this intervention, benefits are lower and costs are higher than with the use of the standard workup.

Source: Neumann PJ et al. N Engl J Med 2005;353:1516-1522.

As articulated earlier in this section, a cost-effectiveness analysis is concerned with the following question: Was the health benefit generated for the target population worth the cost? To answer this question, both the benefits and the costs of the intervention must be estimated.

Several considerations regarding PWTF costs arose when reviewing data sources available for a cost-effectiveness or return on investment analysis. In theory, benefits and costs could be measured for each PWTF community. Benefits are most naturally measured (or estimated) separately for each condition (i.e., asthma, falls, hypertension, and tobacco, as well as the secondary conditions addressed by select communities). If a summary health outcome measure such as quality-adjusted life years (QALYs) can be computed for each condition's interventions, these could be summed across conditions to determine the total health benefit of PWTF in a common unit that is widely comparable. If one could also measure the resource use (i.e., cost) by condition, then the return on investment could be estimated by condition as well as by community. Indeed, if benefits and costs were measured for each intervention within condition categories, an even more refined picture of PWTF performance could be obtained, resulting in lessons that could be learned and used to refine the program and improve efficiency going forward.

Unfortunately, resource use among PWTF communities was not tracked systematically for external evaluation beyond that which was required for quarterly financial reporting to MDPH. These reports were submitted regularly from each PWTF community but did not allocate spending by specific condition(s). One reason was that PWTF recognized that services and staffing are not intended to be neatly fragmented by condition; many programs and providers work on multiple conditions, and of course, many patients/clients have multiple risks and morbidities. Nevertheless,

if we could aggregate all the benefits across conditions, we could calculate an overall cost-effectiveness ratio and return on investment for the PWTF as a whole. However, a complete tally of benefits proved difficult because a significant portion of PWTF funds were spent on the secondary conditions of diabetes, substance use, and obesity, which were not conditions for which we developed impact models. Additionally, translating health benefits for all conditions into QALYs was difficult given the wide variety of interventions undertaken. We therefore pursued an alternative condition-specific approach focusing especially on the four core conditions and sought additional information from three communities that served as a basis for allocating PWTF spending to conditions.

Non-Recurring "Start-Up" Costs

Another important consideration when estimating the value of PWTF is the portion of PWTF spending considered a non-recurring "start-up" cost necessary to establish the infrastructure and capacity to deliver the PWTF health interventions. This mid-term evaluation of the PWTF covered program experience through June 2016, and as such, much of the evaluation period has been consumed by start-up activities, meaning that many communities may not yet have reached optimal scale and efficiency of service delivery. The "start-up" cost may therefore appear high when allocated over the health benefits that have accrued to date, but may appear more reasonable over time as more benefits accrue.

Contribution of Non-PWTF Resources

The health benefits generated by PWTF interventions may have relied in part on non-PWTF resources such as other grants or locally-contributed resources. How such resources are viewed is a matter of perspective. PWTF funders may be content to ignore non-PWTF resources, assuming they are part of the context in which the PWTF occurred. They might even see the PWTF as "catalyzing" funds from other sources or amplifying their impact. When evaluating interventions, a more conventional societal perspective would consider all resources consumed to produce some health benefit regardless of financing source.

Source of Healthcare Costs Associated with PWTF Conditions

In the absence of PWTF interventions, the disease burden associated with each condition will lead to health care spending. For example, when an individual's hypertension is not controlled, they are more likely to experience cardiac events that result in hospitalizations. Directly measuring health care utilization and expenditures associated with health events or conditions is technically feasible, but doing so in this evaluation using the APCD was of limited value given that its scope is limited to a subset of commercial insurers and did not include useable MassHealth and Medicare data.

Estimated PWTF Intervention Costs: Approach and Methodology

To understand how PWTF funds were allocated across conditions, what share of PWTF spending to date was consumed by non-recurring "start-up" activities, and whether the health benefits generated required additional resources from non-PWTF sources, we developed a data collection form and conducted telephone interviews with program managers in three PWTF communities. Following these telephone interviews, each manager completed the data collection form and submitted information addressing the key questions about resource use.

The data collection form asked managers, to the extent possible, to allocate each quarter's spending to particular conditions. Respondents were permitted to allocate funds to a "general" category for non-condition specific activities such as coordination, management, training, and evaluation. The organizational structure of the PWTF program within a community involved a partnership of several community organizations. A record of PWTF funds expended by each organization within a partnership was available to the program manager who used knowledge of the activities and focus of each community organization as the primary basis for allocating funds to conditions.

In a second part of the data collection form, the manager was asked to indicate what portion of funds were spent on non-recurring start-up activities. The instructions, and guidance during the interviews, coached managers to consider a continuation phase of the PWTF in which funding is provided to cover the recurring cost of established programs. They were then asked to identify which of the activities occurring to date would not need additional funding in such established programs. For example, one community made an investment in modifying the user interface and back-end database of an electronic health record system to help clinicians identify patients eligible for PWTF interventions and to provide referrals. This was a one-time investment; an established PWTF program would not need to spend additional financial resources on EHR modifications. Likewise, all three communities described a considerable number of meetings and staff-hours spent establishing the network of PWTF partner organizations within their community and working out the protocols for collaboration. Again, the up-front cost of setting up the partnerships may be quite large relative to the ongoing cost of maintaining them, especially given that this evaluation is taking place while the intervention period is still very much ongoing.

Finally, we asked managers to report any non-PWTF resources that were consumed in delivering the PWTF interventions. During our interviews, some managers noted that there were, in some instances, funds from other sources that the PWTF partnerships used to establish their programs, such as a grant for an EHR development project that also helped enable the EHR modifications needed by the PWTF. However, overall, it proved difficult to quantify non-PWTF contributions to PWTF programs as they were generally coincidental synergies rather than formal co-financing. Therefore, our analysis is restricted exclusively to PWTF resources.

Estimated PWTF Intervention Costs: Results

The total amount of PWTF funds budgeted through June 2016 was $27.9 million and the amount communities had available per capita varied widely from about $20 in MetroWest/Hudson to almost $70 in Holyoke as illustrated in **Table 5**.

Table 5: PWTF Grantee Funding Levels and Allocations through June 2016

Grantee/Partnership	Total Population (Census 2010)	Total Budgeted Through Q2 2016 (MDPH)	PWTF Funds per Capita
Barnstable	110,484	$2,477,976	$22.43
Berkshire	131,272	$2,791,544	$21.27
Boston	123,279	$3,514,464	$28.51
Holyoke	39,880	$2,777,984	$69.66
MetroWest/Hudson	140,140	$2,849,051	$20.33
Lynn	90,329	$3,522,500	$39.00
Quincy-Weymouth	118,052	$3,522,500	$29.84
SHIFT/New Bedford	95,072	$2,927,202	$30.79
Worcester	90,777	$3,483,554	$38.37
Total	**939,285**	**$27,866,776**	**$29.67**

Overall, in the three communities surveyed, $7.6 million in PWTF funds have been spent through June 2016, which was 83% of the originally budgeted amounts for that period. Of the amount spent, $1.6 million (21%) was considered non-recurring startup costs. The three interviewed communities directly allocated 55%, 74%, and 100% respectively of their total recurring (i.e., non-startup) spending to specific conditions. We allocated any remaining non-condition specific recurring funds to conditions in proportion to the directly-allocated amounts. Start-up costs were not allocated to specific conditions.

Estimated PWTF Intervention Costs: Extrapolation

We used the information collected from the three interviewed communities to impute the condition-specific allocations for the other six communities where we only knew the total PWTF spending budgeted through June 2016. We assumed all six remaining communities spent 83% of their budgeted funds through June 2016.

Not all communities focused on all PWTF conditions. Therefore, to allocate funds to conditions, we first calculated the expected spending per condition based on the assumption of equal spending across conditions within a community. Then, we calculated the ratio of actual spending to this expected amount for the three surveyed communities, and computed the unweighted average ratio. For example, spending on hypertension was higher (actual:expected = 1.35) in one community than anticipated based on equal distribution across three interventions, and lower than anticipated in the other two communities (0.74 and 0.78). As illustrated in **Table 6,** on average, the hypertension spending ratio was 0.96.

Table 6: PWTF Grantee Spending on Conditions (Relative to Expected) Based on Equal Distribution Across Conditions

	Asthma	Falls	Hypertension	Tobacco	Diabetes	Substance Use	Obesity
Actual:Expected Ratio	0.22	1.39	0.96	1.05	0.64	1.35	1.00 *
Number of Data Points	1	3	3	2	2	1	0
*Assumed							

These spending ratios were then used to compute the allocation to each condition for each of the six non-surveyed communities. Specifically, the spending ratios were used to adjust the expected spending amount based on equal distribution over a community's focus conditions. Finally, for each of the six communities, all the condition-allocated values were scaled up or down proportionally, to ensure that the total matched actual spending as reported. (Results are shown in **Table 7**.)

It is important to note that asthma spending is based on responses from just one community where the actual:expected spending ratio was 0.22 (i.e., spending on asthma was much lower than expected based on equal allocation across conditions). Moreover, this community only accounted for about 1% of the total asthma clients enrolled across participating PWTF communities. Therefore, we have little data to leverage in our calculation of asthma-specific PWTF spending. Also, there was no information to inform the estimate of allocation for obesity in the community that addressed it, so we assumed spending was based on an equal share (i.e., one-quarter) of total spending.

Table 7: PWTF Grantee Spending by Condition (in $1,000s) through June 2016

Grantee/Partnership	Asthma[1]	Falls	HTN	Tobacco	Diabetes	Substance Use	Obesity[2]	Recurring Total	Non-Recurring (Startup)[3]	TOTAL
Grantee/Partnership		**$398**	**$811**		**$594**			$1,803	**$458**	**$2,260**
Grantee/Partnership		$638	$438	$481	$291			$1,823	$494	$2,317
Grantee/Partnership	$196	$1,244	$855					$2,295	$622	$2,917
Grantee/Partnership	$124		$538	$591			$562	$1,814	$492	$2,306
Grantee/Partnership	**$101**	**$1,094**	**$357**	**$271**				$1,824	**$498**	**$2,322**
Grantee/Partnership	$140	$885	$608	$668				$2,300	$624	$2,924
Grantee/Partnership		**$531**	**$351**	**$715**	**$135**	**$638**		$2,371	**$671**	**$3,042**
Grantee/Partnership	$107	$680	$467			$657		$1,911	$518	$2,430
Grantee/Partnership	$195	$1,233	$847					$2,275	$617	$2,891
Total	**$863**	**$6,702**	**$5,273**	**$2,726**	**$1,020**	**$1,295**	**$562**	**$18,415**	**$4,994**	**$23,409**
Overall	**4%**	**29%**	**23%**	**12%**	**4%**	**6%**	**2%**	**79%**	**21%**	**-**

(1) Asthma spending is based on data provided only by one site and their spending level was notably lower than what would be expected if funds were distributed evenly across conditions.
(2) We based obesity spending on an assumption that the community spent ~1/4th of their funds on obesity, since we had no direct observation of the allocation to obesity.
(3) Non-recurring startup funds includes capacity-building grants as well as other spending that program managers judged to be non-recurring investments necessary to develop infrastructure to deliver the PWTF programs.
Shaded items indicate the three partnerships that took part in the cost-estimate survey.

The condition-allocated recurring PWTF spending can be expressed on a per capita basis using the target age group for each intervention. As shown in **Table 8**, the spending per individual in the target age group varies substantially across PWTF communities. These figures were used as the input for our calculations with respect to CE/ROI analysis across all four conditions.

Table 8: PWTF Grantee Spending Per Target Population through June 2016

Grantee/Partnership	Asthma	Falls	Hypertension*		Tobacco	Diabetes
Population Base (U.S. Census 2010)	**<18**	**65+**	**18+**	**35+**	**18+**	**35+**
Grantee/Partnership		**$16.11**	**$8.97**	**$10.79**		**$7.91**
Grantee/Partnership		$26.12	$4.15	$5.45	$4.55	3.62
Grantee/Partnership	$5.59	$112.37	$9.69	$15.95		
Grantee/Partnership	$11.74		$18.33	$26.95	$20.12	
Grantee/Partnership	**$2.97**	**$58.48**	**$3.37**	**$4.58**	**$2.56**	
Grantee/Partnership	$6.21	$85.91	$8.96	$13.58	$9.84	
Grantee/Partnership		**$29.66**	**$3.73**	**$5.23**	**$7.58**	**$2.00**
Grantee/Partnership	$4.87	$48.99	$6.40	$9.43		
Grantee/Partnership	$7.77	$134.33	$12.89	$20.29		
Overall (Population weighted)	$5.78	$51.49	$7.32	$10.33	$6.76	$4.58

*The hypertension intervention per capita spending is calculated based on two population bases: 18+ and 35+.
Shaded items indicate the three partnerships that took part in the cost-estimate survey.

Calculating Cost-Effectiveness: Models and Projections

Given the somewhat limited availability of intervention-period data, we sought to generate a series of possible future outcomes utilizing models and simulations populated with actual data that were available, in combination with accepted intervention success rates in published literature and our own calculations with respect to the costs associated with intervention delivery. We take the estimated intervention costs together with the changes suggested in the outcomes/behavioral data and estimate the CE/ROI for those changes in different time periods.

As described above, to estimate the costs associated with delivering specific PWTF interventions, we conducted interviews with several partnerships and reviewed financial statements and quarterly expense reports provided by MDPH. We estimated the monetary value of the resources (e.g., labor,

equipment, medicines, etc.) consumed in the process of delivering interventions (recurrent costs) as well as the costs associated with developing the infrastructure, systems, and other capacity required to actually launch the interventions in question (one-time/capital costs). These estimates are based only on funding specific to the PWTF and do not include any additional direct or in-kind contributions from organizations engaged in intervention delivery. Using population census data for the PWTF communities, we generated a spread of per capita costs for each intervention in each community. Using these cost estimates in synergy with condition-specific cost data derived from the APCD (i.e., costs related to falls hospitalizations, hypertension episodes, etc.), we were able to run a number of simulations to project the expected CE/ROI for these interventions.

Generally, we did not expect to observe large healthcare utilization changes and cost savings in the limited time horizon of the study. However, if improvements in pediatric asthma control, falls risk reduction, hypertension control, and tobacco cessation did occur in the short term, then over the lifetime of target populations, there is a likelihood of reduced expensive hospitalizations and emergency room visits (e.g., asthma attacks, fall-related fractures, strokes, heart attacks) that often require high-cost health care. For this reason, we estimate possible returns over both short and long time horizons.

Hypertension and Tobacco: CVD PREDICT Model

For both hypertension and tobacco, we used the Harvard Cardiovascular Disease Policy Model for Risk, Events, Detection, Interventions, Costs, and Trends (CVD PREDICT) to evaluate the cost-effectiveness of the interventions focused on these conditions. This model is populated with a database of individual patients with accompanying risk factor data. The CVD risk factors necessary to run the model are: sex, age, systolic blood pressure, total cholesterol, HDL cholesterol, smoking status, and diabetes status. The model also considers a patient's prior history of having a CVD event and populates these individuals in their respective CVD health states at the start of a model run. The model then projects yearly and life-time likelihood of CVD events, fatalities, and costs for a given population.

The CVD PREDICT model has been used to evaluate the cost-effectiveness of national guidelines for cholesterol management, the cost-effectiveness of screening and treatment strategies for those with hypertension and high overall CVD risk, and for tobacco interventions. The model updates cardiovascular risk factors (age, total and HDL cholesterol, systolic blood pressure, diabetes status) in yearly cycles. These risk factors were used to estimate the annual risks of cardiovascular disease (coronary heart disease [cardiac arrest, myocardial infarction, and angina] and stroke) events. These events had acute (i.e., one-year) and post-acute (i.e., all other years) mortality, morbidity, and healthcare costs. All individuals were simulated until age 100 years or death. We used conventional incremental cost-effectiveness analysis methods to evaluate the strategies included in our study. Lifetime costs and QALYs were discounted at 3%.[4]

Incremental cost-effectiveness ratios (ICERs) were calculated for strategies that were not eliminated due to strong dominance (higher incremental costs and lower incremental QALYs) or weak dominance (lower QALYs but larger ICER than a more expensive option). We used cost-

[4] Sanders, G. D., P. J. Neumann, A. Basu and et al. (2016). "Recommendations for conduct, methodological practices, and reporting of cost-effectiveness analyses: Second panel on cost-effectiveness in health and medicine." JAMA 316(10): 1093-1103.

effectiveness thresholds of $50,000/QALY, $100,000/QALY, and $150,000/QALY to determine the optimal strategy in base-case and sensitivity analyses.[5]

Modeling Hypertension: Additional Factors

In running our simulations with respect to the effect of the PWTF interventions, we compared two different model scenarios:

1. Increase in screening levels for hypertension leading to decreases in major adverse cardiac events (MACE). (See **Figure 7**.)
2. Two different levels of absolute systolic blood pressure reductions: a 0.515 mmHg decrease and a 0.945 mmHg decrease. (See **Figure 8**.)

Factored into these simulations were a number of methodological assumptions. First, reductions in blood pressure (BP) lead to reductions in MACEs, thus improving quality and quantity of life and reducing health expenditures. Second, we assumed that BP reduction persists between the intervention group and the non-intervention group over time. Third, we assumed that the costs of the intervention(s) are needed to maintain associated benefits over time. Fourth, secular trends in BP, smoking, and cholesterol underlie the model, and our BP effects are in addition to those secular trends. Lastly, we ran sensitivity analyses on both the cost and the effect size of the intervention.

Figure 7: Blood Pressure Intervention Model 1



Figure 8: Blood Pressure Intervention Model 2



Modeling Tobacco: Additional Factors

With respect to tobacco, we modeled one overall scenario based on decreased smoking prevalence that leads to decreased cardiovascular disease (CVD) risk and, ultimately, decreased MACEs. (See **Figure 9**.) We evaluated three different reductions in smoking compared to the baseline reductions due to secular trends.

1. 1 in 100 additional smokers quit
2. 1 in 1,000 additional smokers quit
3. 1 in 10,000 additional smokers quit

Figure 9: Smoking Cessation Interventions



[5] Neumann, P. J., J. T. Cohen and M. C. Weinstein (2014). "Updating cost-effectiveness—the curious resilience of the $50,000-per-QALY threshold." New England Journal of Medicine 371(9): 796-797.

Inputs for the PREDICT-CVD Model

To run the simulations for hypertension and tobacco using the CVD-PREDICT model, we simulated a population of 1,000,000 adults (ages 35–85 years) using epidemiological data related to cardiovascular disease (CVD) and based on National Health and Nutrition Examination Survey (NHANES) data from cycles 2003–2012. We previously calibrated our model using Framingham-based risk scores for coronary heart disease and stroke using NHANES data, with baseline values collected in 1999–2000 and cause-specific mortality follow-up through 2011.

To calculate the effect size for the hypertension intervention we used the change in mean systolic blood pressure (SBP) using definitions 1 and 2, as outlined in **Figure 3** and **Figure 4** earlier in this report. SBP changes of 0.515 mmHg and 0.945 mmHg, respectively, were used as inputs in the model. With respect to tobacco inputs, we assumed a smoking prevalence of 16.92% based on NHANES data.

Intervention costs for hypertension and smoking cessation were calculated using mean costs tracked by three PWTF communities: hypertension only in one community and both hypertension and tobacco in the other two communities. The per capita spending utilized in the model was $3.86 for hypertension interventions and $5.46 for smoking cessation. The calculation of the per capita costs were weighted to match the distribution of adults aged 18 and older in these individual communities and excluded PWTF one-time startup costs for implementation of the interventions.

The costs of care for hypertension and CVD events were calculated using data from the 2015 All Payer Claims Database (APCD), which covers commercial payer claims data and excludes claims for Medicare or Medicaid subscribers. As APCD data did not provide costs for individual events by CVD condition, we calculated the mean, per capita cost per inpatient admission for primary CVD events for all ischemic heart disease (IHD) events (acute MI, acute MI CABG procedures, Angina, and acute Angina CABG procedures), all stroke events (acute first stroke and repeat stroke), all peripheral vascular disease (PVD), and heart failure (HF). Our model only utilized mean costs for IHD events ($26,462.91), stroke events ($15,603.66), and US commercial payee costs for both CABG ($76,889) and PTCA ($36,222) procedures. (Please see **Appendix 4** for a summary of these costs.) Chronic care costs for CVD in the model are based on average costs for the US population.[6,7]

Projected Hypertension and Tobacco Trends in Prevalence, Cost, and Disparities Combining Available Data with Available Literature and Models

Community-based interventions were evaluated for referrals, enrollments, and completion rates for programs addressing each of the priority conditions. Assuming the whole of the population in a given PWTF community had access to PWTF-funded clinics, previously described prevalence rates for Massachusetts were applied to community populations to estimate the number of individuals with prevalent priority conditions potentially affected by these interventions. The number of patients exposed to these interventions was then used to estimate changes in prevalence, outcomes, and costs of priority conditions based on the effect size of the interventions. Notably, in determining the number of individuals enrolling in community-based interventions, all members of the community enrolled were counted, rather than strictly those referred by PWTF-funded

[6] Lee KK, Cipriano LE, Owens DK, Go AS, Hlatky MA. Cost-effectiveness of using high-sensitivity C-reactive protein to identify intermediate- and low-cardiovascular-risk individuals for statin therapy. *Circulation.* Oct 12 2010;122(15):1478-1487.
[7] Pignone M, Earnshaw S, Tice JA, Pletcher MJ. Aspirin, statins, or both drugs for the primary prevention of coronary heart disease events in men: a cost-utility analysis. *Annals of internal medicine.* Mar 7 2006;144(5):326-336.

clinics. For instance, assuming a smoking rate of 15% in the general population, a baseline quit rate of 7%, and improvement in quit rates by 33% when referred to cessation counseling or telephone quit line and 76% when counseled by a clinician, we could determine the potential number of additional smokers who quit, and then using published literature, determine the likely number of future deaths and costly morbid CVD events attributable to smoking would be averted.

Using the Behavioral Risk Factor Surveillance System (BRFSS) self-report survey data, the Centers for Disease Control and Prevention (CDC) reports that 14.0% of all Massachusetts adults (18+) were current smokers in 2015, and more than half (53.1%) of every-day smokers had attempted to quit for one or more days in the prior year.[8] Further, MassHealth claims data showed that between July 1, 2006 and December 31, 2008, approximately 37% of all Massachusetts Medicaid smokers (70,140) utilized a state law-mandated benefit covering tobacco cessation treatment (behavioral counseling and FDA-approved medications).[9] Using BRFSS survey data, significant differences were found in the rate of current smoking (38.3% pre-benefit vs. 28.8% post-benefit) as well as in recent quit success (6.6% pre-benefit vs. 19.1% post-benefit) while there was no significant difference in the percentage of smokers who made quit attempts. These findings suggest that when tobacco cessation treatments are promoted and covered by insurance, quit success rates improve. These findings are consistent with 2001–2010 national data analyzed from the National Health Interview Surveys (NHIS) by the CDC in 2011, which found that 52.4% of adult smokers had made a quit attempt in the prior year, while 6.2% had recently quit.[10]

Data Sources and Challenges: Electronic Health Records (EHR), DRVS

The master file of EHR data received from the Massachusetts Department of Public Health (MDPH) contained 2,402,308 records for distinct clinical encounters in more than two dozen clinics across the nine PWTF communities. These records represented 444,337 unique patients based on unique patient ID numbers. Records in the data set cover the period of September 2013 to June 2016. MDPH noted that the official start date for the intervention period was September 1, 2014, and EHR data uploads included records for the year prior to this date. Visits were subsequently considered to be baseline (i.e., pre-intervention) if they occurred between September 1, 2013 and August 30, 2014. All visits occurring from September 1, 2014 onward were considered to be intervention visits. Our analysis utilized a subset of the 137 variables available in the EHR data set, including age, gender, systolic blood pressure, diastolic blood pressure, prescribed medications, diagnoses (ICD-9/10 and SNOMED CT codes), current smoking status, visit type (including smoking cessation counseling sessions), the provision of tobacco cessation counseling by providers, and having a smoking cessation order referral on file.

Interventions and data collection did not commence at the same time in all communities. For example, in one partnership, hypertension interventions at the community level were initiated in some sites as early as September 2014 and as late as January 2016 in others. In general, follow-up periods were relatively short, limiting our ability to conduct longitudinal analyses. As a result, some analyses with this data set were cross-sectional and are subject to the associated limitations of inference with this type of data, including an inability to make direct causal inferences about exposure to the interventions and associated outcomes.

[8] State Tobacco Activities Tracking and Evaluation (STATE) System. https://nccd.cdc.gov/STATESystem/rdPage.aspx?rdReport=OSH_STATE.Highlights&rdRequestForwarding=Form. Date Accessed: November 21, 2016.
[9] Land T WD, Paskowsky M, Cammaerts A, Wetherell L, Kaufmann R, et al. Medicaid Coverage for Tobacco Dependence Treatments in Massachusetts and Associated Decreases in Smoking Prevalence. *PLoS ONE*. 2010;5(3):e9770.
[10] Centers for Disease Control and Prevention. Morbidity and Mortality Weekly Report (MMWR). Quitting Smoking Among Adults --- United States, 2001—2010. November 11, 2011. 60(40);1513-1519.

We were able to conduct other analyses of a longitudinal nature, particularly individual blood pressure measurements when patients had one or more values in both the baseline period and the interventional period. While data were sparse for some of the interventions (tobacco cessation), they were quite robust for others (hypertension), possibly due to the availability of fewer variables related to tobacco and the relatively light population of these variables by providers, as opposed to variables related to hypertension (i.e., blood pressure), which were much more complete and consistent. Lastly, information related to an individual's participation in specific interventions was not available in the EHR data set, precluding assignment of specific, proportional gains realized from any single intervention for a given condition. For key variables of interest such as medication use and disease diagnoses, the format of the data did not allow us to distinguish between incident (new) and recurring (chronic) diagnoses.

Lessons Learned from EHR Data Analysis

Future work using EHR data would be greatly enhanced by the development of a basic, standardized data-capturing tool as part of the design of the intervention which, in turn, can be easily integrated into existing systems and is easy to use. If the state anticipates establishing new contracts, or switching software vendors at participating clinics over the period of the intervention, incorporating planning for such events (i.e., integrating time to learn and adapt to new data collection formats and tools, or retraining staff as needed) will greatly reduce the potential for losing valuable data or obtaining unreliable data required for evaluation efforts.

Modeling Asthma

The information provided to MDPH in quarterly reports is not adequate to estimate the health impact of the interventions on the target population. Moreover, the scale of the interventions and the relatively brief amount of time they have been in place are not sufficient to detect a difference in ED visits or hospitalizations at a population level. For example, an analysis of APCD data found that two PWTF communities showed a slightly lower prevalence of asthma in 2015 compared to 2014, mirroring statewide trends. An analysis of Case Mix hospitalization inpatient data found that one of these communities also showed a slight increase in the number of asthma-related hospitalizations from 2014 to 2015 (as did a second**)**. However, the bulk of PWTF asthma-related client enrollments have occurred since the fall of 2015 and thus the impact of these interventions is likely not captured in the APCD and Case Mix data analyzed. As such, we cannot confidently model the projected future impact of these interventions based solely on the claims data available to date, and more data are needed to reliably measure potential changes in utilization. However, using established literature and Community Intervention data, we were able to estimate the approximate ROI of the PWTF interventions in comparison to other asthma-related interventions that have more available data around CE/ROI.

Modeling Falls

As of July 2016, the PWTF community-based programs reported 3,295 enrollments in evidence-based falls interventions. Since clients were routinely referred to multiple PWTF falls interventions, such as both a home safety assessment and a Tai Chi class for the same individual, it is likely that fewer than 3,295 individuals have been reached. Taken together with the assumption that all enrolled clients receive one year of falls risk reduction benefit regardless of completion status, our estimates of the PWTF impact on falls are undoubtedly on the upper bound.

We developed a model to estimate the number of falls, injuries, and medical care avoided due to the target population's participation in PWTF falls interventions. We first estimated the number of falls, injuries, and medical care episodes that would occur in the population in the absence of the PWTF, based on the age-specific probability of falling, probability of injury given a fall, and probability of medical care episode given an injury.

According to Bergen et al. 2016, analysis of the 2014 BRFSS indicates that in the United States, in a 12-month period, 28.7% of persons 65+ will report at least one fall. Because many individuals experience multiple falls, 672 falls are reported per 1,000 persons. About one-third of persons reporting at least one fall report at least one fall-related injury, and about one-quarter of all falls cause injury, resulting in 164 injuries per 1,000 persons age 65+. Fall-related injuries can range from mild scrapes and bruises to very serious hip fractures. In fact, two-thirds of all fall-related injuries are mild cuts scrapes and bruises not requiring care. About 5–10% of fall-related injuries are fractures, and about 3% of fall-related injuries require inpatient hospitalization.

Table 9: Risk of Falls and Related Injuries in the United States

Characteristic	% Reporting a Fall	Rate: Number of Falls per 1,000 Adults Aged ≥65 years	Percent Reporting a Fall Injury	Rate: Number of Fall Injuries per 1,000 Adults aged ≥65 years
Overall	28.7	672	10.7	164
Men	26.5	657	8.3	127
Women	30.3	683	12.6	192
65–74	26.7	650	9.9	154
75–84	29.8	669	11.4	170
≥85	36.5	820	13.5	199
Source: Bergen, G., Stevens, M. and Burns, E. (2016). Falls and Fall Injuries Among Adults Aged ≥65 Years — United States, 2014. MMWR. Morbidity and Mortality Weekly Report 65(37), 993–998.				

The risk of fall and injury increase with age[11,12] and the risk of having at least one fall is somewhat higher in women, possibly due to the older average age of the population. The probability of injury given a fall is 45% higher (0.281 vs 0.193) for women, which has been attributed, in part, to higher rates of osteoporosis in women.[13]

Falls Interventions: Effectiveness Evidence

The evidence base for PWTF falls interventions is quite strong. On average, we assumed exposure to a PWTF intervention reduced fall risk for one year by 20% to 40%.[14,15] **Table 10** provides a summary of evidence regarding the effectiveness of falls interventions deployed by PWTF communities.

[11] Bergen, G., Stevens, M. and Burns, E. (2016). Falls and Fall Injuries Among Adults Aged ≥65 Years — United States, 2014. MMWR. Morbidity and Mortality Weekly Report 65(37), 993–998.
[12] Deandrea, S., Lucenteforte, E., Bravi, F., Foschi, R., La Vecchia, C., Negri, E. Risk factors for falls in community-dwelling older people: a systematic review and meta-analysis. Epidemiology. 2010 Sep;21(5):658-68.
[13] Deandrea, S., Lucenteforte, E., Bravi, F., Foschi, R., La Vecchia, C., Negri, E. Risk factors for falls in community-dwelling older people: a systematic review and meta-analysis. Epidemiology. 2010 Sep;21(5):658-68.
[14] http://www.csp.org.uk/documents/falls-prevention-economic-model
[15] Gillespie LD, Robertson MC, Gillespie WJ, Sherrington C, Gates S, Clemson LM, Lamb SE. Interventions for preventing falls in older people living in the community. Cochrane Database of Systematic Reviews 2012, Issue 9. Art. No.: CD007146. DOI: 10.1002/14651858.CD007146.pub3.

Table 10: Evidence of Effect Size for Falls Interventions Utilized by PWTF Grantees

Intervention	Study	Effect Description	Magnitude of Effect	Duration of Effect	Persistence Assumptions
Tai Chi	Li 2005	Number of falls	38 falls in TC group vs. 73 in control group (p=.007)	Intervention period: 6 months. Follow-up period: 6 months	Persistence estimate: 12 months post-intervention. Even though Li 2005 only followed up to 6 months post-intervention, Clemson 2004 found effects 12 months post-intervention, and the MOB and Tai Chi interventions are fairly similar in content (exercise-based interventions)
		Length of time to first fall (log-rank)	log-rank = 7.34, p=.007		
		Hazard ratio	Hazard ratio for TC group compared w/ control = 0.46 (95% CI, 0.26 to 0.80, p=.006)		
	Logghe 2010	Incidence Rate Ratio	0.51 (95% CI, 0.38–0.68)	Multiple studies but most had intervention period of 6 months and follow-up period of 12 months.	
Matter of Balance	Clemson 2004, in Carande-Kulis 2015	Fall rate (relative risk)	Relative risk = 0.69, 95% CI 0.50–0.96	Intervention period: 7 weeks. Follow-up period: 14 months	Persistence estimate: 12 months post-intervention. Based on findings from Clemson 2004
Screening Assessments and Education	Ryan 1996	Proportion of subjects who fell	0.2 in the control group vs. 0.1 in the experimental group	--	Persistence estimate: 12 months post-intervention. Based on findings from Hill-Westmoreland 2002
	Hill-Westmoreland 2002	Mean weighted effect size (MWES) – across multiple studies	.1231 (Z = 3.97, p < .001)	8/12 studies measured falls for a 12-month period	
Home Safety Assessment / Modification	Campbell 2005	Percent fewer falls (incidence rate ratio)	Incidence rate ratio 0.59 (95% CI, 0.42 to 0.83)	Intervention period: 6 months. Follow-up period: 12 months	Persistence estimate: 5 years post-intervention. None of the studies followed up for this long of a period, but we assume that home modifications like ramps, bars, etc. would last for this amount of time.
	Nikolaus 2003	Percent fewer falls (incidence rate ratio)	Incidence rate ratio 0.69 (95% CI, 0.51-0.97)	Intervention period: 3 months. Follow-up period: 12 months	
	Guo 2014	Odds ratio	OR=0.751 (95% CI, 0.565–0.998, p=0.048)	--	

Asthma Interventions: Effectiveness Evidence

The asthma interventions implemented in PWTF communities are similar to those that have been well-studied and reported in the literature as having significant positive health, education, and economic impacts.[16] Two randomized controlled trials (RCTs) and two pre-post studies of patient education studies targeting pediatric asthma reduced ED visits and hospitalizations by more than 50%.[17] These interventions were all cost-saving with return on investment benefit:cost ratios between 7 and 13.

One RCT found smaller effects on healthcare utilization, but a significant gain of 26 symptom-free days (SFD) at a cost of $9.20 per SFD.[18] Likewise, evidence from RCTs for home-based interventions shows effectiveness at increasing SFD and reducing healthcare utilization. These programs did not produce net savings, but generated SFD at a reasonable cost between $2 and $28, which compares favorably to a number of other asthma control pharmaceuticals.

The Community Asthma Initiative (CAI) at Boston Children's Hospital has also recently been shown to be cost-saving, with an ROI benefit cost ratio of 1.4, a 50% or more reduction in emergency department visits resulting in hospitalizations, and a reduction in the number of missed school days.[19] The average cost of this program was $2,529 per child, which was the most expensive per client of all the programs described above.

[16] Hoppin P, Jacobs M. Investing in Best Practice for Asthma: A business case for education and environmental interventions. Asthma Regional Council of New England. 2010.
[17] Clark NM, Feldman CH, Evans D, Levison MJ, Wasilewski Y, Mellins RB. The impact of health education on frequency and cost of health care use by low income children with asthma. J Allergy Clin Immunol. 1986 Jul;78(1 Pt 1):108-15; Greineder DK, Loane KC, Parks P. A randomized controlled trial of a pediatric asthma outreach program. J Allergy Clin Immunol. 1999 Mar;103(3 Pt 1):436-40; Shelledy DC, McCormick SR, LeGrand TS, Cardenas J, Peters JI. The effect of a pediatric asthma management program provided by respiratory therapists on patient outcomes and cost. Heart Lung. 2005 Nov-Dec;34(6):423-8; Weinstein AG, McKee L, Stapleford J, Faust D. An economic evaluation of short-term inpatient rehabilitation for children with severe asthma. J Allergy Clin Immunol. 1996 Aug;98(2):264-73.
[18] Sullivan SD, Weiss KB, Lynn H, Mitchell H, Kattan M, Gergen PJ, Evans R; National Cooperative Inner-City Asthma Study (NCICAS) Investigators. The cost-effectiveness of an inner-city asthma intervention for children. J Allergy Clin Immunol. 2002 Oct;110(4):576-81.
[19] Woods, E. R., Bhaumik, U., Sommer, S. J., Ziniel, S. I., Kessler, A. J., Chan, E., Wilkinson, R. B., Sesma, M. N., Burack, A. B., Klements, E. M., Queenin, L. M., Dickerson, D. U. and Nethersole, S. (2012). Community asthma initiative: evaluation of a quality improvement program for comprehensive asthma care. Pediatrics 129(3), 465–472.

Evaluation Methodology: Part Three: Process Evaluation

Introduction

An important feature of the PWTF program is that partnership members met regularly in Learning Collaboratives where they compared notes and perspectives, shared successful strategies and problem-solved, received training and reviewed statewide data on progress toward goals, and built collegial contact throughout the project. That said, the interventions were implemented independently across the nine communities. While there was significant focus on training and technical assistance to ensure standards of fidelity to the evidence-based interventions, the partnerships appropriately adapted their implementation to their respective contexts and constituents. This approach reflects the PWTF's origins and intent: the understanding that health reform requires creative testing of new ways to combine clinical and community-based strategies to improve outcomes and reduce costs. The PWTF was not only about changing outcomes; it was also about changing systems. This approach complicates traditional evaluation methodology but it makes it all the more critical to build sound implementation research into the overall evaluation.

In some cases, the PWTF interventions began as much as a year before the Harvard evaluation commenced. The methods and instruments used to collect data on the implementation were designed and operationalized by MDPH in collaboration with the nine community partnerships, largely for quality improvement purposes, before Harvard began its work. The Harvard team designed and collected its own process evaluation data, utilizing implementation science and social network analysis methods as explained below. It sought to accomplish these objectives:

1. Describe how the PWTF evidence-based interventions were implemented in the nine community partnerships;
2. Identify actionable contextual factors that influenced the implementation of PWTF interventions;
3. Understand how partnerships and contextual factors explain differential implementation of the PWTF interventions; and
4. Synthesize lessons learned during PWTF that may be useful to the development of reforms in health delivery systems.

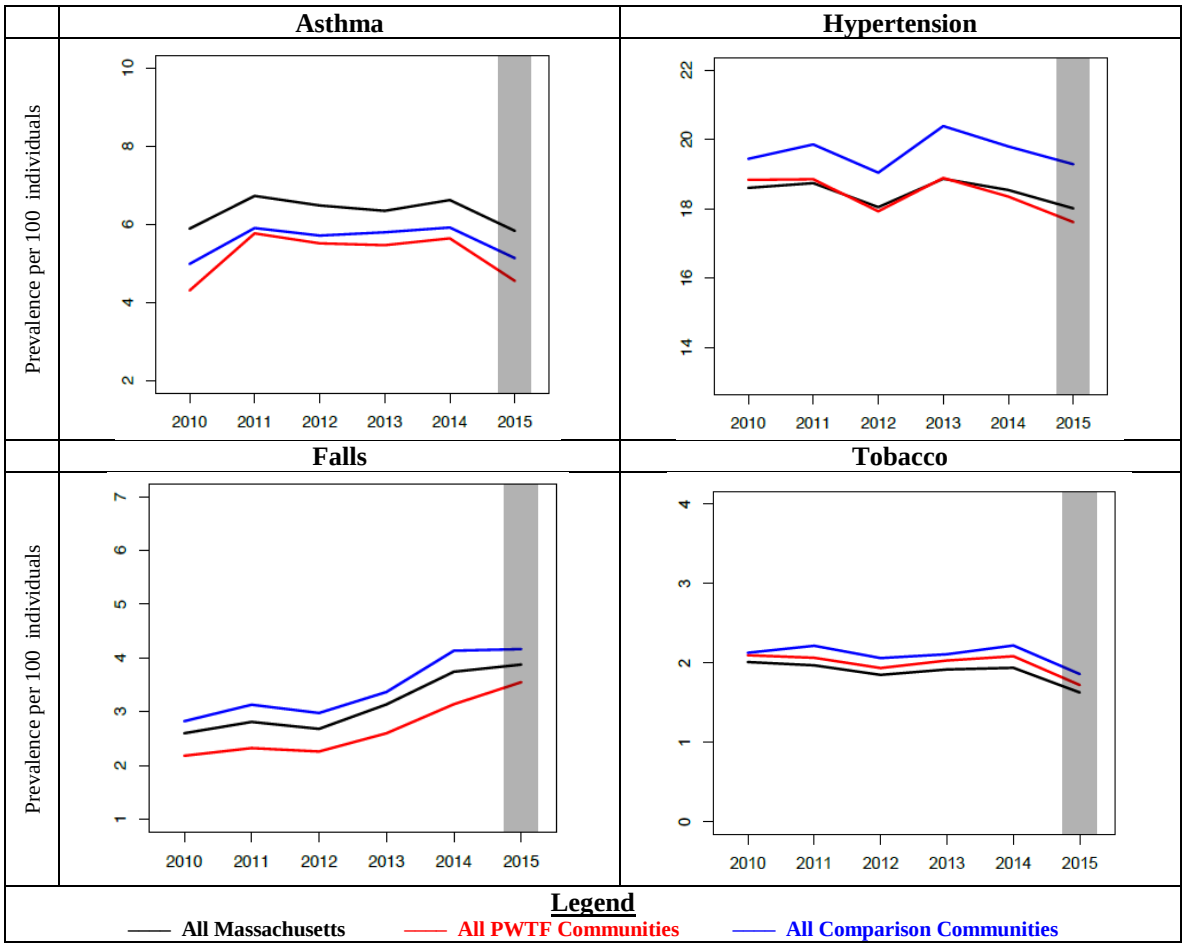
More information on our Process Evaluation methodology will be detailed in Section Seven: Process Data Methodology and Results.

Section Six: Quantitative Data Results

Introduction: Prevalence of Each Condition, 2010–2015 (APCD)

The charts in **Figure 10** provide age- and sex-standardized estimates, utilizing APCD data (commercial payers only), of 2010–2015 prevalence rates for each of the four health conditions across all PWTF communities that implemented interventions for that specific health condition, across all corresponding comparison communities, and across all of Massachusetts. Prevalence rates in all PWTF communities implementing a given intervention closely mirror trends found in their comparison communities and across Massachusetts. For asthma and falls, aggregated PWTF communities show lower prevalence rates than Massachusetts, but this is likely an effect of the absence of complete MassHealth and Medicare data in these analyses.

Figure 10: Condition-Specific Age- and Sex-Standardized Prevalence in All PWTF Intervention Communities, Comparison Communities, and Statewide Average, 2010–2015 (APCD)

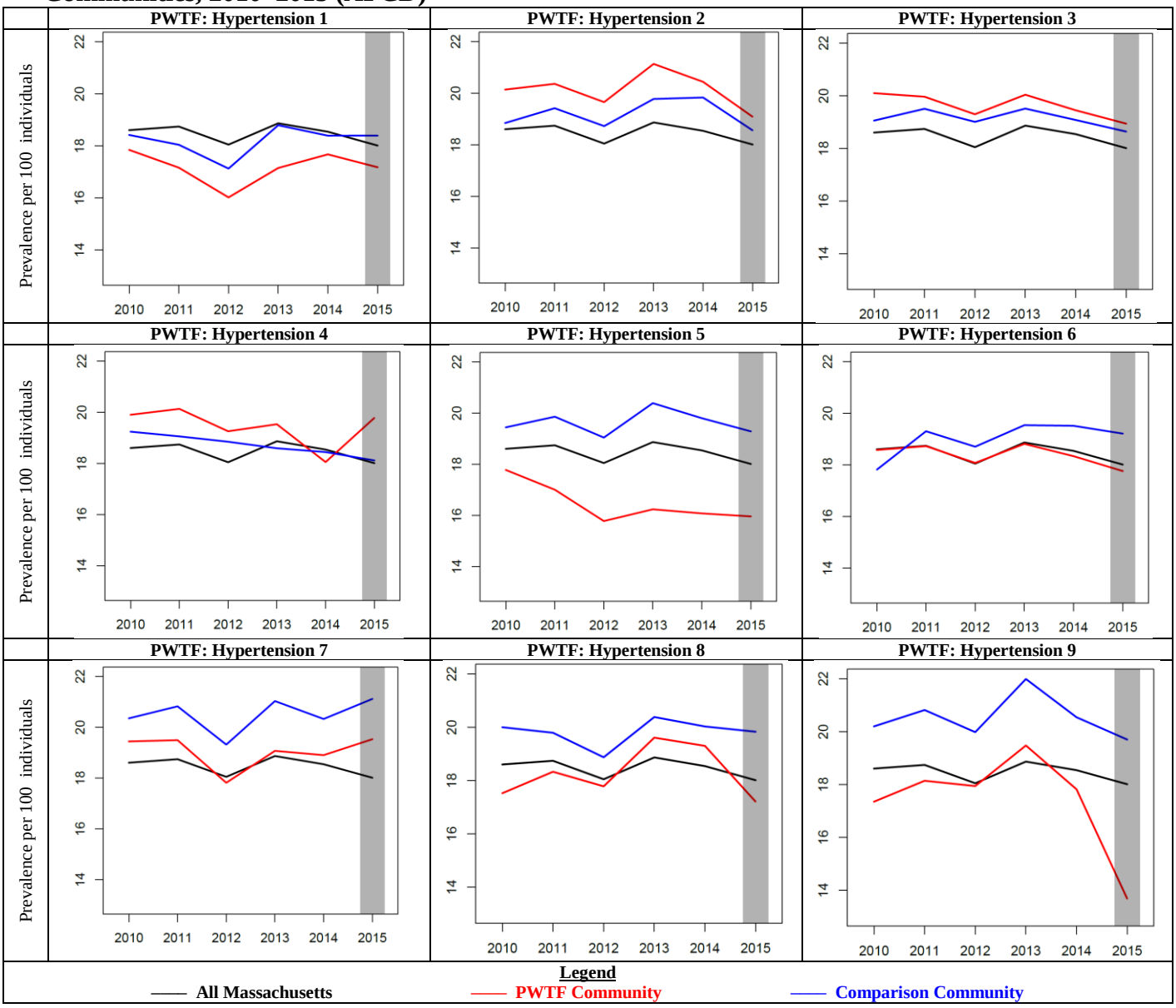


Hypertension

APCD Analysis: Prevalence

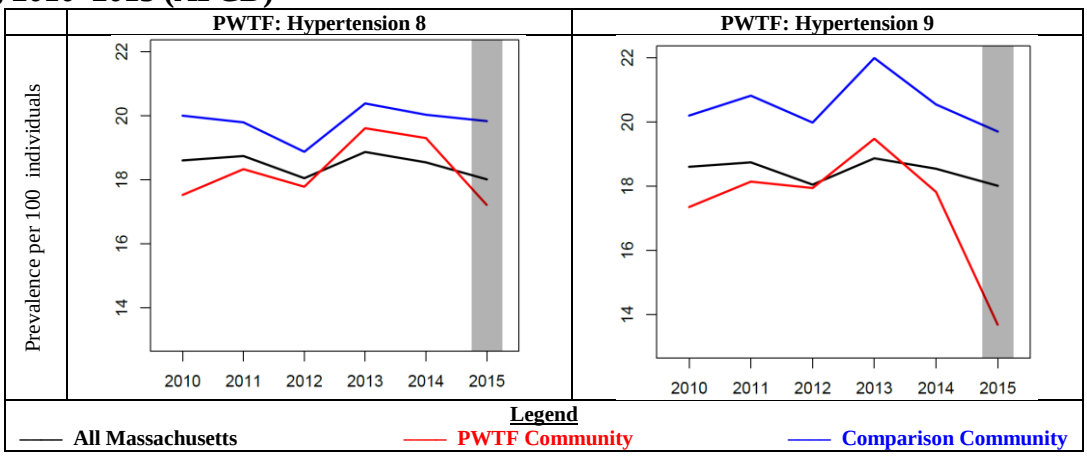
APCD data show that hypertension prevalence in adults 18–85 years of age was greater than the other conditions, remaining steady at 18–19% statewide and ranging from 16% to nearly 22% in PWTF and comparison communities between 2010 and 2015.

Figure 11: Age- and Sex-Standardized Hypertension Prevalence in PWTF Intervention Communities, 2010–2015 (APCD)



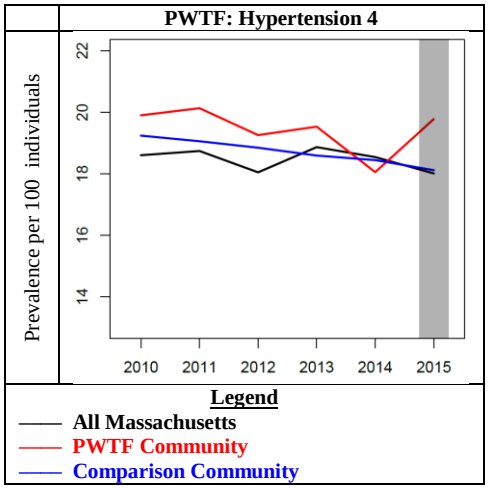
Prevalence trends in intervention communities generally reflected those observed in comparison communities. As illustrated in **Figure 12**, however, the prevalence in two communities (**PWTF: Hypertension 8** and **PWTF: Hypertension 9)** dropped at a slightly greater rate from 2014–2015 than their comparison communities and the state average.

Figure 12: Age- and Sex-Standardized Hypertension Prevalence in PWTF: Hypertension 8 and 9, 2010–2015 (APCD)



Conversely, as illustrated in **Figure 13**, prevalence in one community **(PWTF: Hypertension 4)** seemed to increase in 2015 (following a decline in 2014) while its comparison community showed a slight, steady decline between 2010 and 2015.

Figure 13: Age- and Sex-Standardized Hypertension Prevalence in PWTF: Hypertension 4, 2010–2015 (APCD)



APCD Analysis: Costs and Cost Trends

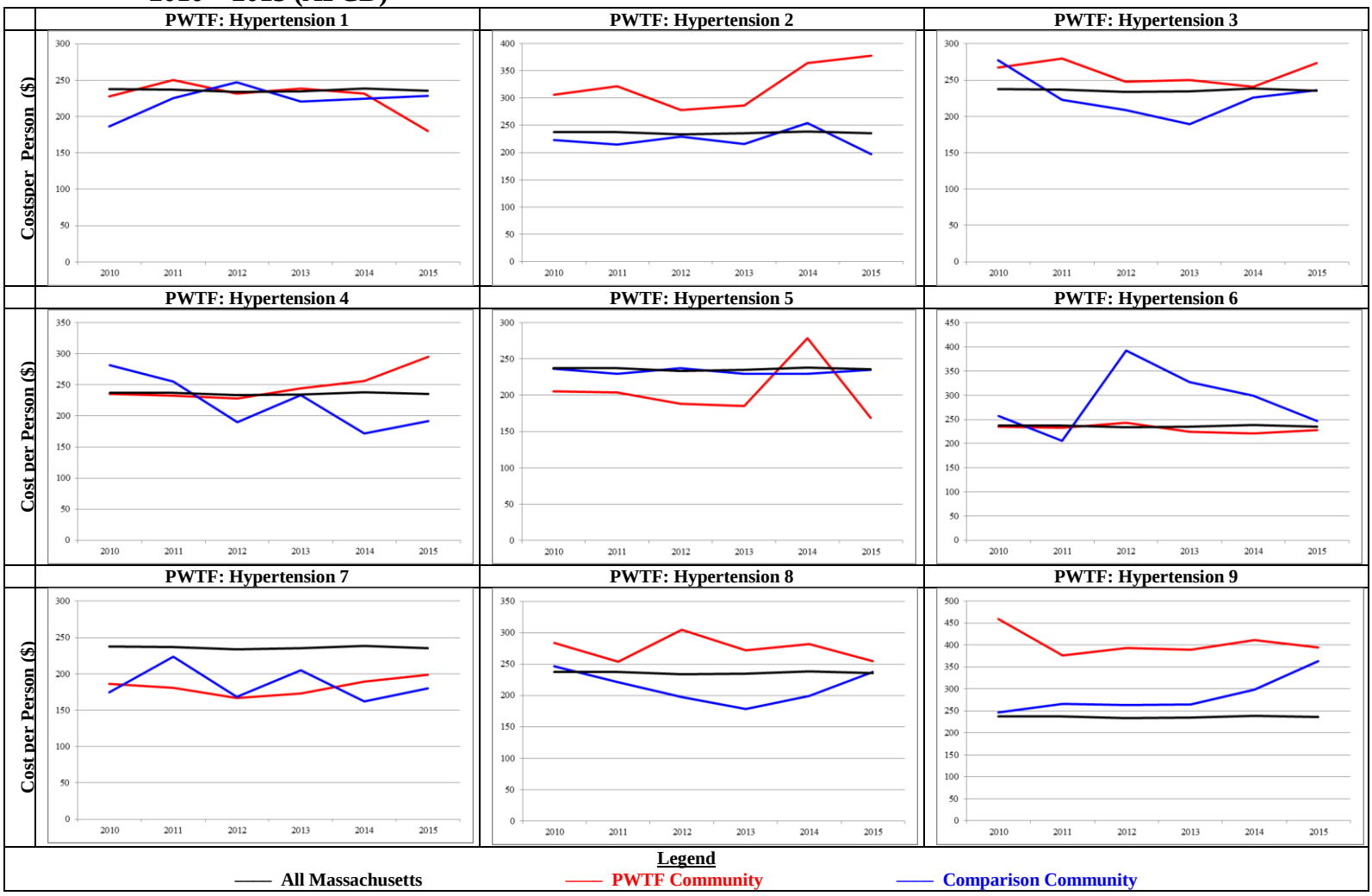
As illustrated in **Figure 14**, six PWTF communities saw an overall decline in total hypertension-related costs between 2010 and 2015 while their comparison communities either remained flat or increased. However, it is important to note that the decreases began prior to the start of the PWTF intervention period. In terms of the intervention period itself, three communities (**PWTF: Hypertension 1, 5,** and **8**) each saw declines from 2014 to 2015, though **PWTF: Hypertension 5's** decline followed an increase from 2013 to 2014.

Figure 14: Total Hypertension-Related Costs in PWTF Intervention Communities, 2010—2015 (APCD)



With respect to total hypertension-related costs per person, as seen in **Figure 15**, four PWTF communities (**PWTF: Hypertension 1, 5, 8,** and **9**) also saw a decline from 2010 to 2015, though again, these declines began before the intervention period. Further, **PWTF: Hypertension 5's** decline from 2014 to 2015 follows an increase from 2013 to 2014, similar to what was observed in its total cost trend as well. Lastly, it is worth noting that these four communities also saw declines in total costs as observed in **Figure 14** above.

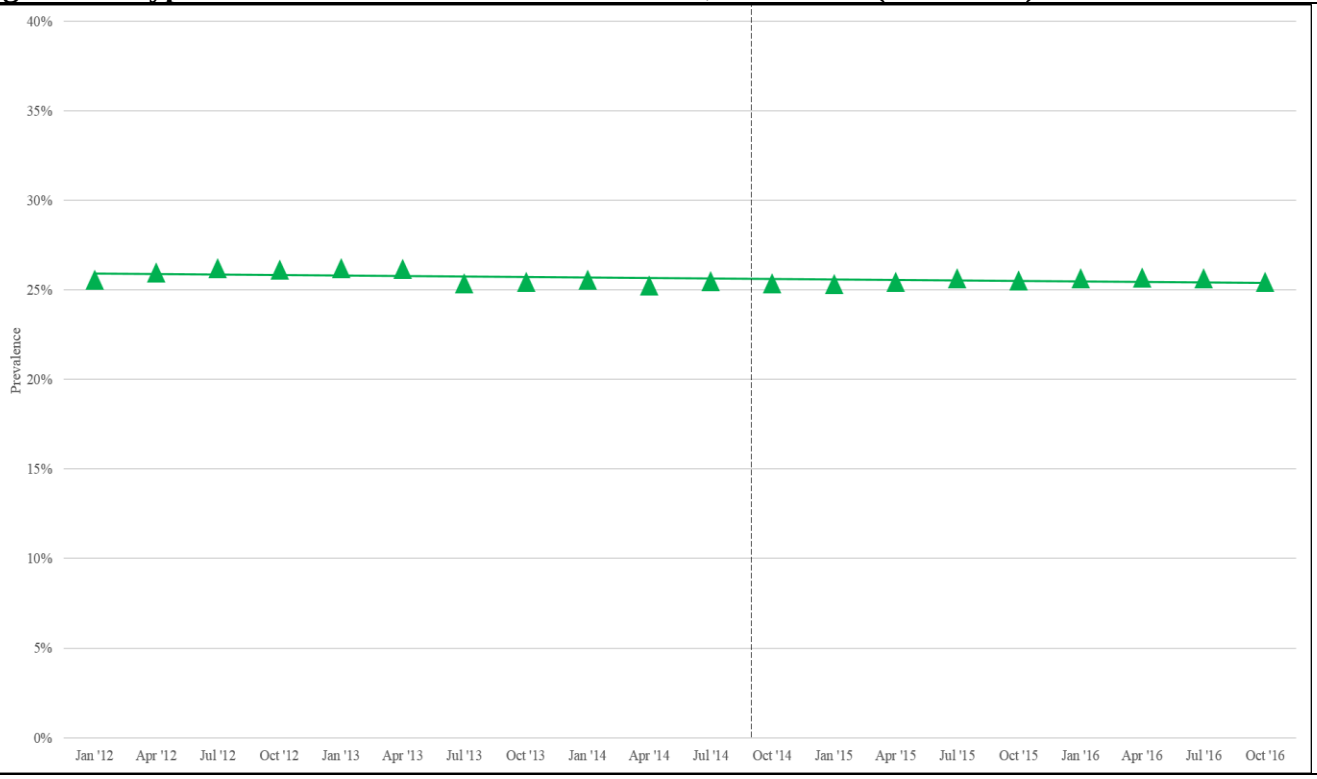
Figure 15: Hypertension-Related Costs per Person in PWTF Intervention Communities, 2010—2015 (APCD)



MDPHnet Analysis

MDPHnet data through September 2016 show that the prevalence of hypertension remained steady in Massachusetts for the population (aged 20+) as a whole at approximately 25% (**Figure 16**). The prevalence was steady statewide for all racial/ethnic subgroups as well: Blacks (30%), Whites and Native Americans (26%), Hispanics (19%), and Asians (15%). (Race and ethnicity data not shown.)

Figure 16: Hypertension Prevalence in Massachusetts, 2012–2016 (MDPHnet)



Massachusetts

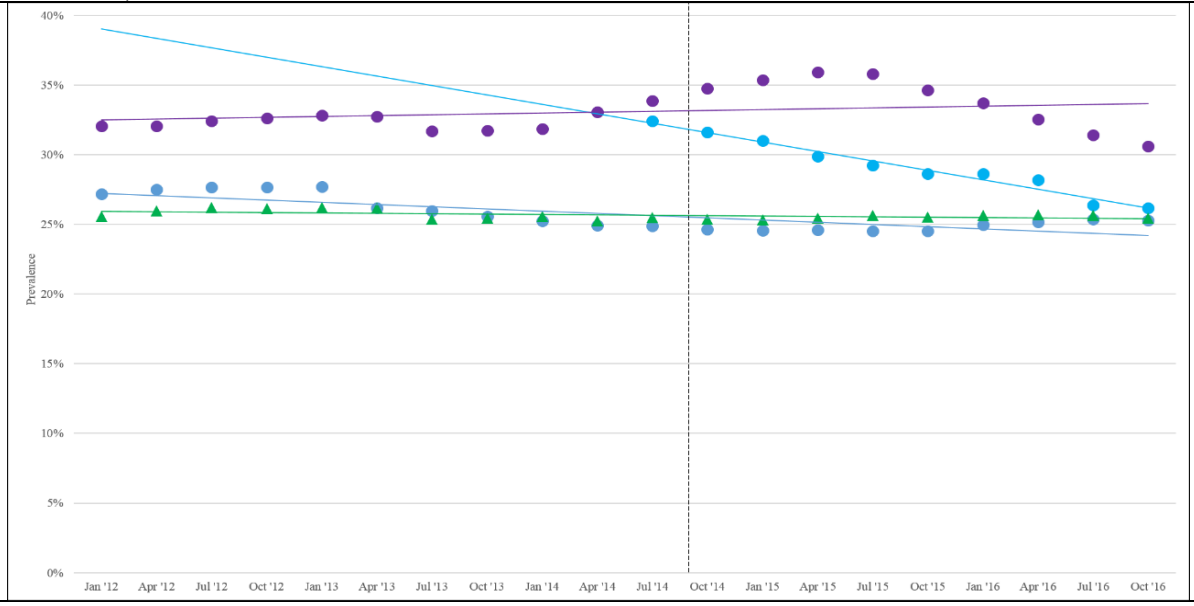
Hypertension in Ages 20 and Older (Adjusted for Age, Sex, and Race/Ethnicity)
Vertical line denotes start of intervention period in September 2014

MDPHnet estimates of hypertension prevalence are higher than those derived from APCD. This difference is expected insofar as APCD only includes claims codes whereas MDPHnet includes electronic health record data, including actual blood pressure measurements, in addition to claims-like diagnosis codes. We observed mild to modest decreases in prevalence of hypertension in three of the nine PWTF communities when compared with their comparison communities.

As seen in **Figure 17**, in **PWTF: Hypertension 1**, there was a 19.2% decrease from July 2014 to September 2016, while prevalence remained steady in its comparison community, and in **PWTF: Hypertension 8** and **9**, there were smaller decreases while rates in their comparison communities remained steady or increased. (Data for comparison communities not show.)

It should be noted that **PWTF: Hypertension 1's** data for MDPHnet begins in July 2014 and was not available before that time.

Figure 17: Hypertension Prevalence in PWTF: Hypertension 1, 8, and 9, 2012–2016 (MDPHnet)

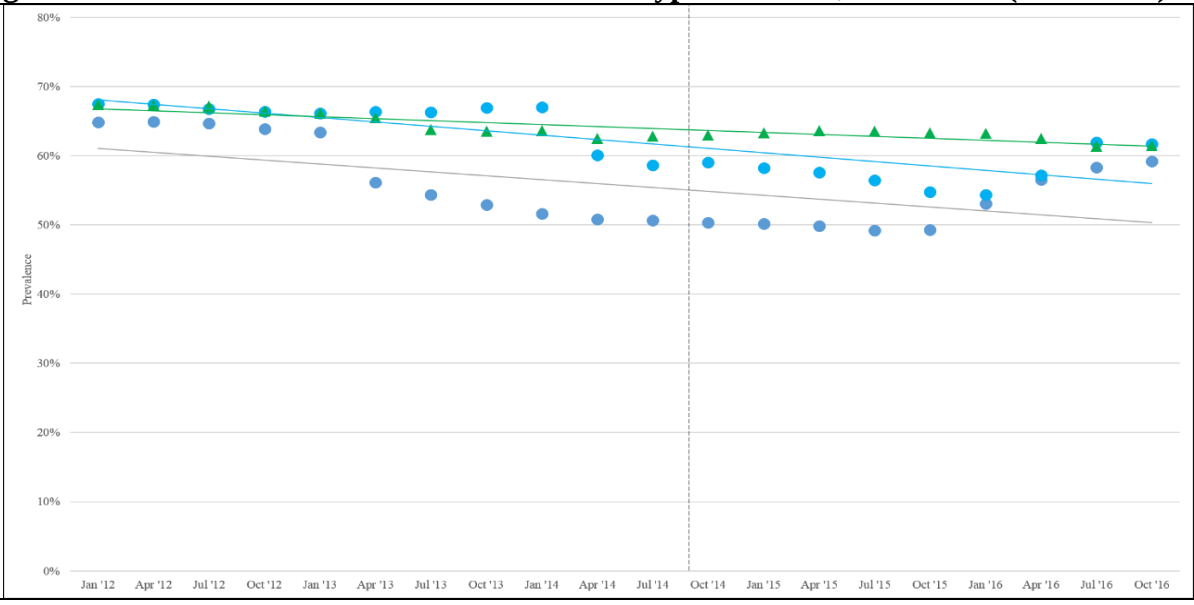


Massachusetts || PWTF: Hypertension 1 || PWTF: Hypertension 8 || PWTF: Hypertension 9

Hypertension in Ages 20 and Older (Adjusted for Age, Sex, and Race/Ethnicity)
Vertical line denotes start of intervention period in September 2014

Average diastolic blood pressure was stable in Massachusetts with very slight decreases in two PWTF communities compared with their comparison communities. As seen in **Figure 18**, **PWTF: Hypertension 9** increased its fraction of the population in whom blood pressure was measured within one year of the first day of the quarter, reaching the same steady level (approximately 60%) as in the state as a whole and in its comparison community.

Figure 18: Blood Pressure Measured in PWTF: Hypertension 9, 2012–2016 (MDPHnet)



Massachusetts || PWTF: Hypertension 9 || Comparison Community

Blood Pressure Measured in Ages 20 and Older (Adjusted for Age, Sex, and Race/Ethnicity)
Vertical line denotes start of intervention period in September 2014

With respect to treated hypertension, **PWTF: Hypertension 9** observed a small increase while its comparison community showed a decrease during the same time period, while **PWTF: Hypertension 8** showed a decrease in treated hypertension from January 2014 until April 2015, but then reversed the trend and showed a steady increase through September 2016. (Data not shown.)

With respect to controlled hypertension, **PWTF: Hypertension 9** also showed an increase beginning in October 2015 while its comparison community remained stable or showed a mild decline, and four other PWTF communities (**PWTF: Hypertension 1, 4, 6,** and **8**) all showed increases in the rates of controlled hypertension while their comparison communities either remained stable or did not increase as much. (Data not shown.)

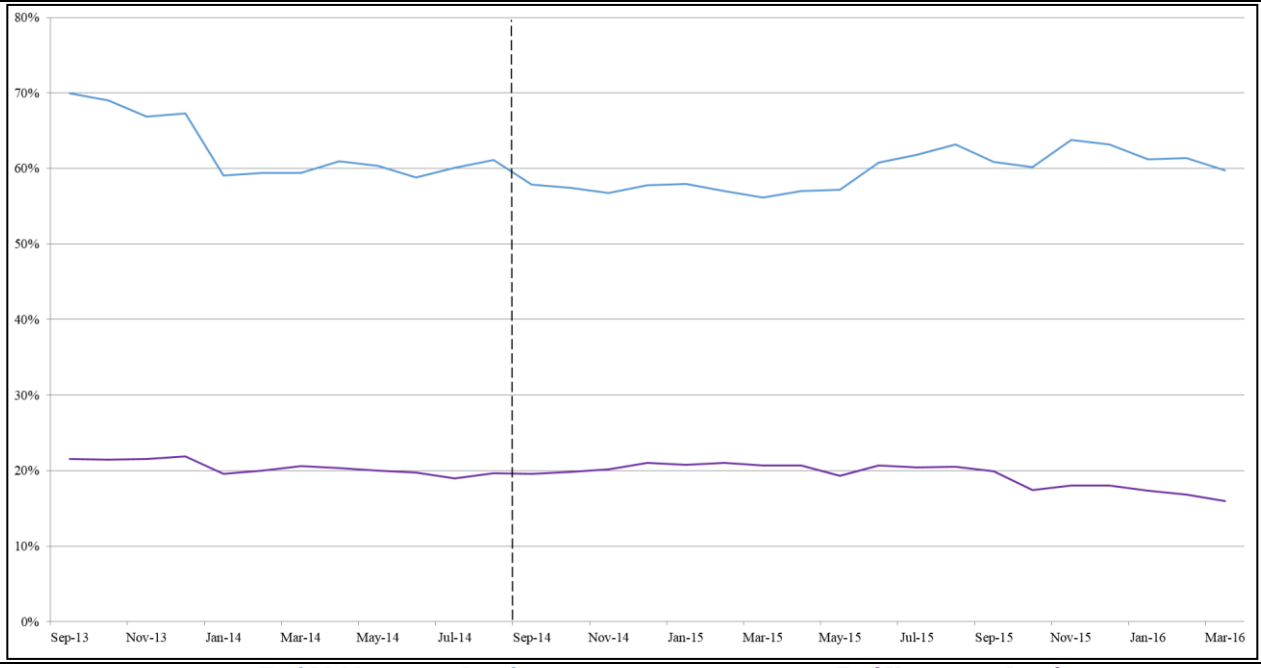
CE/ROI Analysis

As noted earlier, the Tier 1 clinical hypertension intervention in all nine PWTF communities included primarily the adoption of either JNC-7 or JNC-8 guidelines that encourage screening and then improved management of those identified with hypertension and the referral of patients with hypertension to community-based or home-based self-monitoring. The predominant effect that should have been seen if the interventions were effective would be increased screening rates, improved management of those identified as being hypertensive, and ultimately improvements in the blood pressure (BP) level of individuals with hypertension.

Prevalence rates could have declined or increased independent of the interventions due to the direction of other secular changes related to dietary changes, physical activity changes, and a host of other population-based factors that were not a target of the specific interventions around this condition, particularly those that were directed at the clinics. However, declines in BP among those with hypertension could have been a result of the intervention, and if realized, could have a significant impact on reducing morbidity and mortality over the long-term. We used the Harvard CVD PREDICT model to evaluate both the potential health effects and costs, both incurred and saved, over time. Costs incurred include the cost of the intervention and costs saved include the costs of future events (mainly hospitalizations for coronary artery disease and stroke), over time, assuming the intervention effects persist.

We used EHR data to assess both the prevalence of hypertension and screening rates within the entire population and then evaluated changes in BP among those without hypertension and those with previously diagnosed hypertension. In evaluating the prevalence of hypertension, we saw a downward trend in prevalence, but without comparison communities in our data set, we were unable to determine if there was a change in the prevalence of hypertension compared to non-intervention communities. In terms of screening, as illustrated in **Figure 19**, it appears that screening increased over time in the PWTF sites from 58% to 62%. However, both the analyses of the screening and the prevalence are limited by the nature of the data collection.

Figure 19: Total Prevalence of Blood Pressure Measurements and Hypertension in EHR Data from PWTF Clinical Sites



Vertical line denotes start of intervention period in September 2014

Our analysis was dependent upon those seen on a monthly basis at the clinics, which was not random, nor was the screening necessarily random. It is possible that those screened were of higher risk, and thus, the prevalence of hypertension may have actually increased among those screened as a result. In other words, previously undiagnosed patients were added to the pool of hypertensive patients, thus increasing the total number of patients with the condition, which is actually a positive outcome in that screening and identification are the first steps toward managing the condition and improving health outcomes. The data were cross-sectional in nature, providing monthly snapshots of screening and prevalence, as opposed to an ongoing assessment for individual patients over the baseline and intervention periods. The samples each month were not randomly selected, and it is possible that differences in populations at each month may have led to the differences observed, as opposed to real changes in screening rates.

We therefore turned to the evaluation of blood pressure changes among unique individuals who had repeated measurements. We evaluated those who had a least two BP measurements where at least one of the two was in the intervention period. We then compared the means of the individual patient differences between the later measurement and the earlier measurement. We then stratified the analysis for those who had a diagnosis of hypertension and those who did not. Further, for the earlier measurement, we evaluated one scenario where we chose the latest BP value recorded in the baseline period prior to the intervention and, in an alternative scenario, we compared the mean of all the BP values available in the baseline period.

As illustrated in **Table 11**, our results when using the last systolic BP measured in both the intervention and the baseline period show that there was an increase of nearly 0.2 mmHg in systolic BP in patients without hypertension. This increase is consistent with what is expected in changes

in systolic BP related to age alone. Further, there was a 0.3 mmHg decline in systolic BP among those with hypertension.

The net difference among those with hypertension was estimated to be at least 0.5 mmHg given the decline and the expected increase over time associated with aging. The difference was nearly 1 mmHg when using the mean BP in the baseline period compared to the intervention period. This is a relatively small reduction for an individual, but at the population level, can have meaningful impacts of an approximate 1.5% reduction in ischemic heart disease events and up to 4% in stroke reductions.

Table 11: Mean Changes in Systolic (SBP) and Diastolic (DBP) Blood Pressure Using Two Different Definitions, by Gender

	Last Visit in Baseline Period (Definition #1)[1]	Mean for All Visits in Baseline Period (Definition #2)[2]
	Mean Change (mmHg)	Mean Change (mmHg)
Hypertensives[3]		
SBP	-0.284	-0.843
DBP	-0.615	-0.897
Hypertensive Females		
SBP	-0.133	-0.666
DBP	-0.498	-0.758
Hypertensive Males		
SBP	-0.455	-1.04
DBP	-0.749	-1.05
Non-Hypertensives		
SBP	0.231	0.102
DBP	0.0764	0.0242
Non-Hypertensive Females		
SBP	0.328	0.184
DBP	0.123	0.0701
Non-Hypertensive Males		
SBP	0.0399	-0.0602
DBP	-0.0143	-0.0658
Difference in mean SBP values for HTN+ and HTN- (mmHg)	**-0.515**	**-0.945**

(1) See Figure 3; (2) See Figure 4; (3) Hypertension is defined as the number of persons with SBP > 140 mmHg OR DBP > 90 mmHg OR listed use of anti-hypertension medications OR listed diagnosis of hypertension using either ICD-9/10 or SNOMED CT (Systematized Nomenclature of Medicine – Clinical Terms) codes, among the number of visits for unique individuals per month at each participating clinic.

From these results, we then estimated the stroke and ischemic heart disease events that could be prevented, the overall changes in quality-adjusted life expectancy, and both the costs incurred due to implementing the intervention and the costs averted due to reduced hospitalizations. Changes in costs and health effects were then computed to arrive at cost-effectiveness ratios (CER) for the different scenarios. As noted earlier, costs for the hypertension interventions were derived from the expenditure data collected via interviews with three communities, the weighted mean of which totaled approximately $3.86 per capita. Costs per hospitalization for stroke and ischemic heart disease were evaluated using APCD data and ranged from $15,604 to $26,463, respectively, per event.

Ultimately, we found that the hypertension events were cost-effective at a range of about $9,000 to $21,000 per quality adjusted life-year (QALY) gained using the blood pressure reductions of 0.945 and 0.515 mmHg, respectively. Using just changes in screening rates alone, the intervention was not comparatively as attractive. If the per capita cost of the intervention could be lowered to less than $2, then the intervention is cost-saving. At $5 per capita, the interventions have CE ratios of $14,771 to $31,000 per QALY for the 0.945 and 0.515 mmHg reductions, respectively. Even if

the BP reduction was 0.3 mmHg, the CE ratio is attractive at $41,000/QALY. At the high end of the 95% CI associated with reduction in blood pressure (i.e., 1.15 mmHg), the CE ratio is $5,860/QALY. **Tables 12–14** summarize these findings.

Table 12: Predicted Cardiovascular Disease (CVD) Outcomes Compared to Usual Care (Hypertension)

		Increase Screening Rate	Decrease in SBP - Low	Decrease in SBP - High
		Screening rate increase from 0.579 to 0.622; screening every 5 years.	SBP decrease of 0.515 units for those starting out with SBP > 140.	SBP decrease of 0.945 units for those starting out with SBP > 140.
		Change from Usual Care	**Change from Usual Care**	**Change from Usual Care**
Lifetime	Life Expectancy	0.0007	0.0032	0.0054
	Number MI events	-86	-81	-140
	Number CVA events	-147	-444	-784
	TOTAL IHD deaths	-38	-32	-58
	TOTAL CVA deaths	-31	-95	-193
1-Year	Number MI events	-12	-4	-5
	Number CVA events	-14	-18	-42
	CVD deaths	-15	-7	-12
5-Year	Number MI events	-26	-21	-28
	Number CVA events	-33	-96	-145
	CVD deaths	-31	-28	-48

SBP: Systolic Blood Pressure (mmHg)
MI: Myocardial Infarction
CVA: Cerebrovascular Accident (stroke)
IHD: Ischemic Heart Disease

Table 13: Cost-Effectiveness of Hypertension Interventions Comparing Increased Screening and Changes in Systolic Blood Pressure to Usual Care

CEA	Cost ($)	QALY	ICER ($/QALY)
Base Case: Cost of Intervention = $3.86 per capita			
Scenario 1: Usual Care Compared to Increased Screening			
Usual Care	19,981.2	15.8957	-
Increased Screening	20,068.4	15.8963	145,333
Scenario 2: Usual Care Compared to SBP Decrease (0.515 mmHg)			
Usual Care	19,981.2	15.8957	-
SBP Decrease (0.515 mmHg)	20,027.3	15.8978	21,952
Scenario 3: Usual Care Compared to SBP Decrease (0.945 mmHg)			
Usual Care	19,981.2	15.8957	-
SBP Decrease (0.945 mmHg)	20,013.8	15.8992	9,314

Table 14: Sensitivity Analyses for Costs of Hypertension Interventions Comparing Increases in Systolic Blood Pressure to Usual Care

CEA	Cost ($)	QALY	ICER ($/QALY)
Base Case: Cost of Intervention = $3.86 per capita			
Scenario 1: Usual Care Compared to SBP Decrease (0.300 mmHg)			
Usual Care	19,981.2	15.8957	-
SBP Decrease (0.300 mmHg)	20,034.70	15.8978	41,154
Scenario 2: Usual Care Compared to SBP Decrease (1.150 mmHg)			
Usual Care	19,981.2	15.8957	-
SBP Decrease (1.150 mmHg)	20,006.40	15.8992	5,860

If we compare the PWTF interventions for hypertension to other interventions used in public health or health systems (please refer to **Figure 5** on page 30) we see the cost-effectiveness results are well in line with other highly effective interventions already in place and approved. The cost-effectiveness ratio of the PWTF hypertension interventions were between $6,000/QALY and $41,000/QALY gained, depending on the assumptions of the cost per capita and the overall effectiveness, putting them on par with beta-blockers after myocardial infarction, mammography for breast cancer, colon cancer screening, cholesterol management, and management for depression with antidepressant medications. The cost-effectiveness ratios for the PWTF intervention are well below other interventions approved for care by Medicare and Medicaid such as implantable defibrillators and dialysis for those with kidney failure. In other words, not only are PWTF interventions in-line with other interventions, but in some cases, they are more so.

Interpreting the Cost-Effectiveness Results

Assuming the results in reduced blood pressure among those with hypertension persisted beyond the one-year intervention period evaluated thus far, the intervention would be expected to reduce hospitalization costs over time and would turn out to be cost-effective, given the cost of the intervention. To put these results in context, we first reviewed the published public health and medical literature on all interventions. As illustrated in **Figure 5**, less than 20% of all interventions (prevention or treatment-based) evaluated in the medical literature prove to be cost-saving. Cost-saving means that costs in medical care saved over the long-term are greater than the costs of the intervention itself and any other costs induced by the intervention. The remainder of interventions either improve longevity, health outcomes, or the quality of health, but usually at increased overall costs. Societies have then placed judgments, either directly or indirectly, on what is considered "worthwhile" by precedent or by quantifying good "value for money" in comparative terms.

The American Heart Association and the American College of Cardiology have determined that all interventions that are less than $50,000/QALY are considered "High Value" or highly cost-effective, those less than $150,000/QALY as "Intermediate Value" or cost-effective, and those greater than $150,000/QALY as "Low Value" or not cost-effective. The PWTF interventions related to hypertension appear to be of "High Value" according these criteria. Furthermore, if the cost per capita could be reduced to below $2 capita to achieve the 1 mmHg reduction, then the intervention would be not only "High Value" but would have a positive ROI.

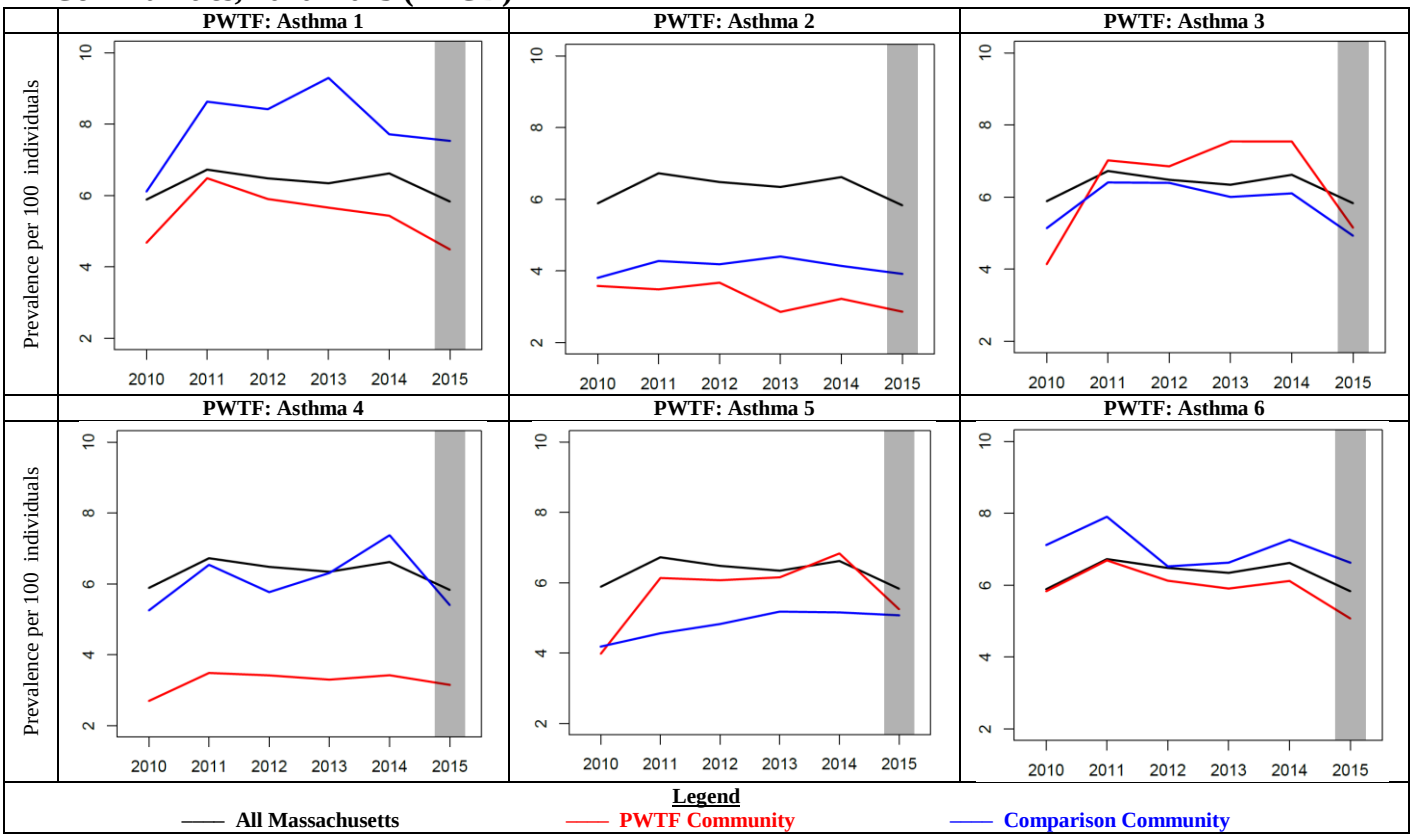
In short, if the changes in blood pressure among those with hypertension during the intervention period persisted, this could result in up to 500–1,000 fewer heart attacks and strokes per million residents over their lifetime. The changes in blood pressure would also lead to between 125 to 250 fewer deaths due to cardiovascular disease per million treated. The hypertension interventions, including screening and community-based education efforts, appear to be highly cost-effective (good value for money spent) using national standards and are comparable in value to other common accepted interventions such as mammography screening, treatment for heart attacks, and treatment for elevated cholesterol. Lastly, if the cost of the intervention per individual could be reduced to less than $2, then the intervention would have a positive return on investment.

Pediatric Asthma

APCD Analysis: Prevalence

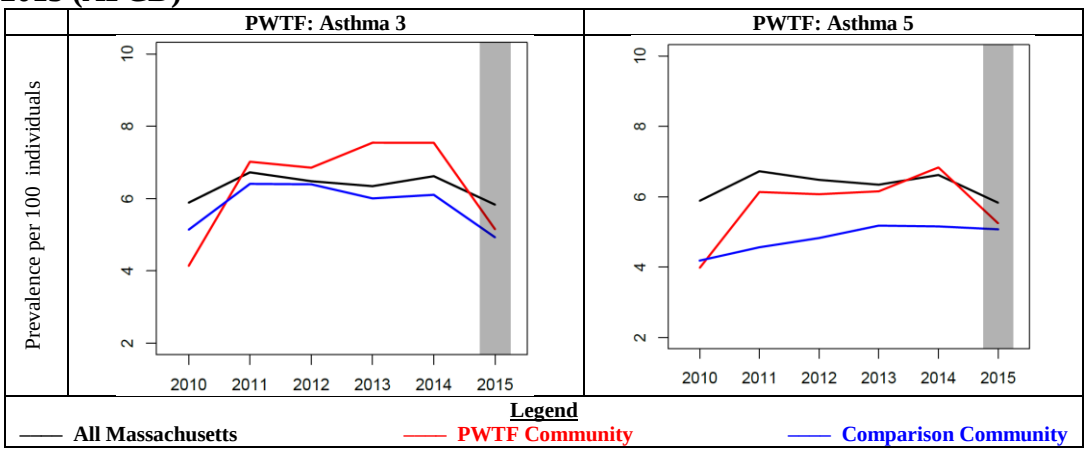
APCD data indicate that most PWTF and comparison communities had pediatric asthma (i.e., ages 2–18 years) prevalence rates ranging between 3–8% from 2010 to 2014, as shown in **Figure 20**. Prevalence trends remained relatively constant into 2015 (the intervention period) in both PWTF and comparison communities.

Figure 20: Age- and Sex-Standardized Asthma Prevalence in PWTF Intervention Communities, 2010–2015 (APCD)



As illustrated in **Figure 21**, two communities (**PWTF: Asthma 3** and **5)** showed a decrease in prevalence during the intervention period of slightly greater magnitude than in the baseline period, while prevalence in their comparison communities remained constant or decreased less during the same time span.

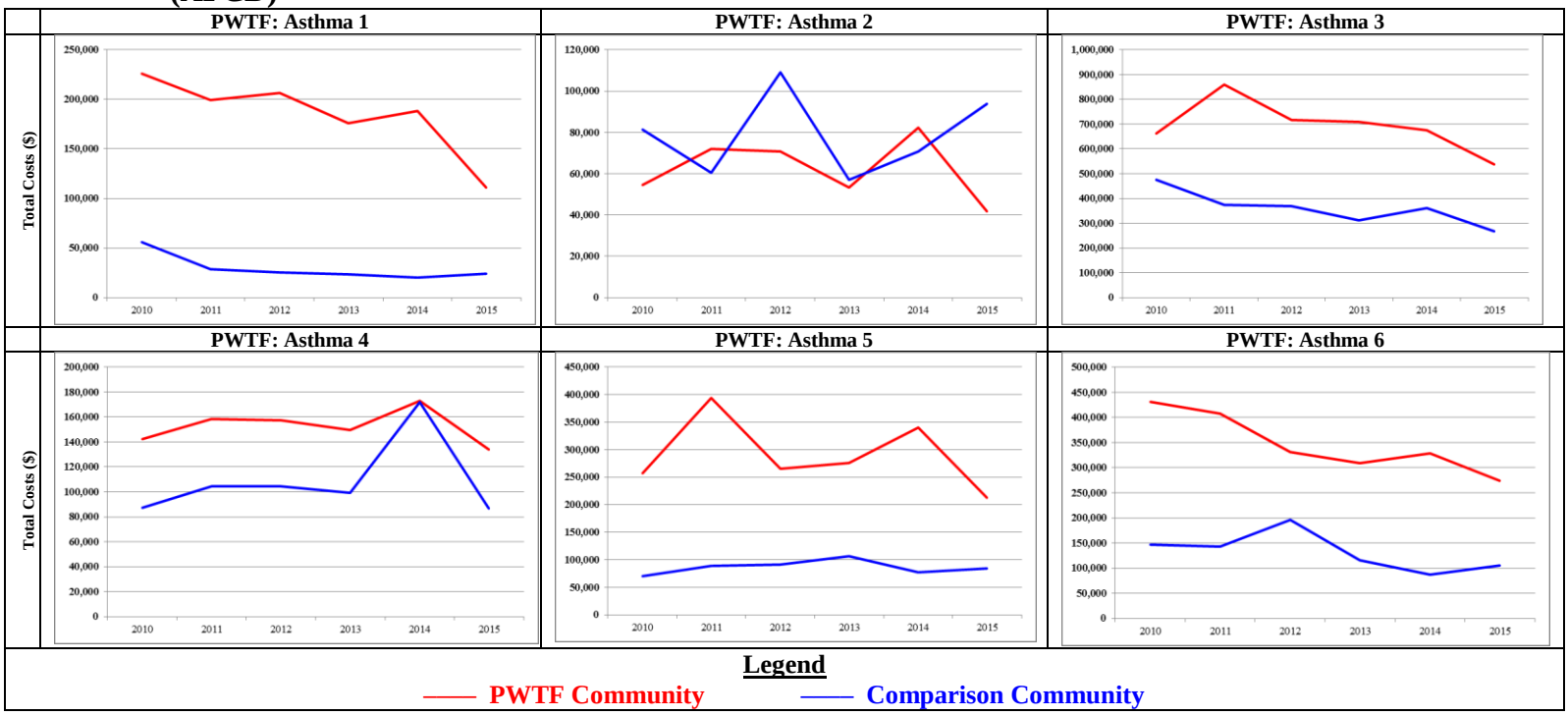
Figure 21: Age- and Sex-Standardized Asthma Prevalence in PWTF: Asthma 3 and 5, 2010–2015 (APCD)



APCD Analysis: Costs and Cost Trends

All six PWTF communities addressing pediatric asthma have shown an overall decrease in total asthma-related costs from 2010 to 2015, though it is important to note that there are year-to-year fluctuations in the overall trend lines (i.e., up in some years, down in others). These trends closely mirror the comparison communities, with one exception (**PWTF: Asthma 2**) as illustrated in **Figure 22**.

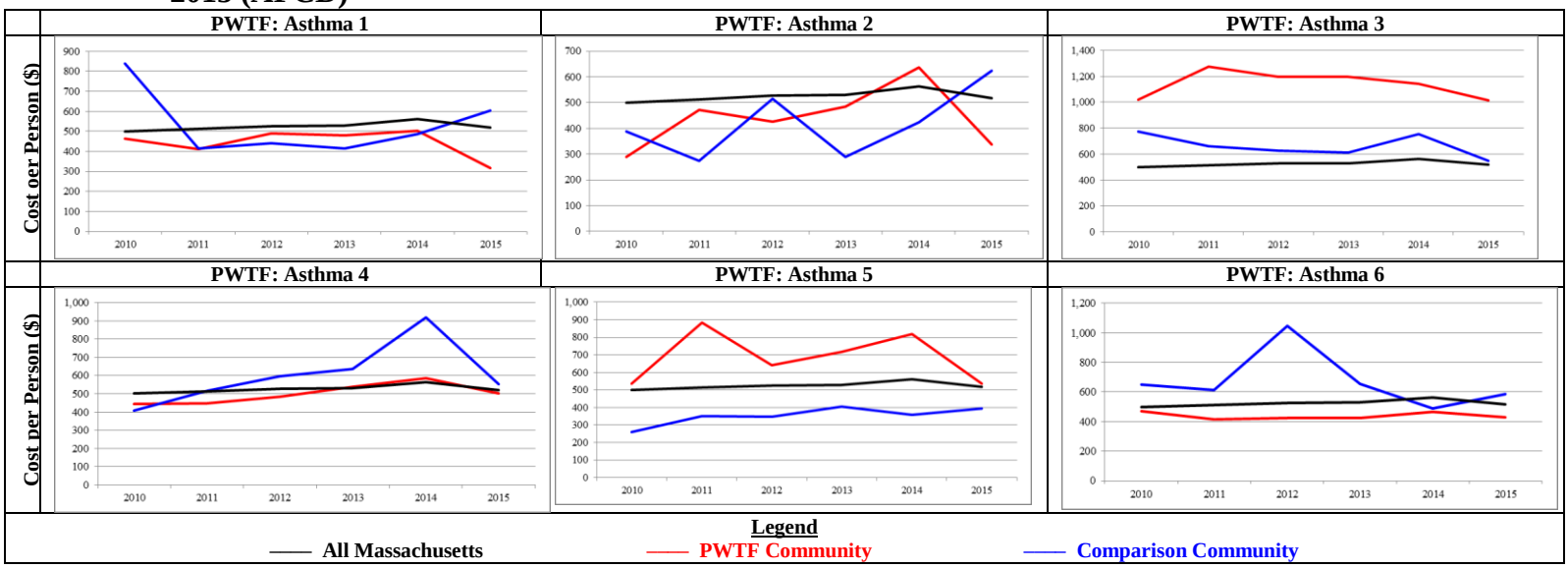
Figure 22: Total Asthma-Related Costs in PWTF Intervention Communities, 2010-2015 (APCD)



With respect to total asthma-related costs per person, as illustrated in **Figure 23**, two communities (**PWTF: Asthma 1** and **2**) showed a decline in the total costs per person that is sharper than both the state trend while both comparison communities saw an increase during the same period. The

other four communities saw trends that were, overall, largely consistent with the state trend, though **PWTF: Asthma 5** did observe some up and down fluctuations, ultimately ending at a 2015 level that was consistent with 2010.

Figure 23: Asthma-Related Costs per Person in PWTF Intervention Communities, 2010-2015 (APCD)

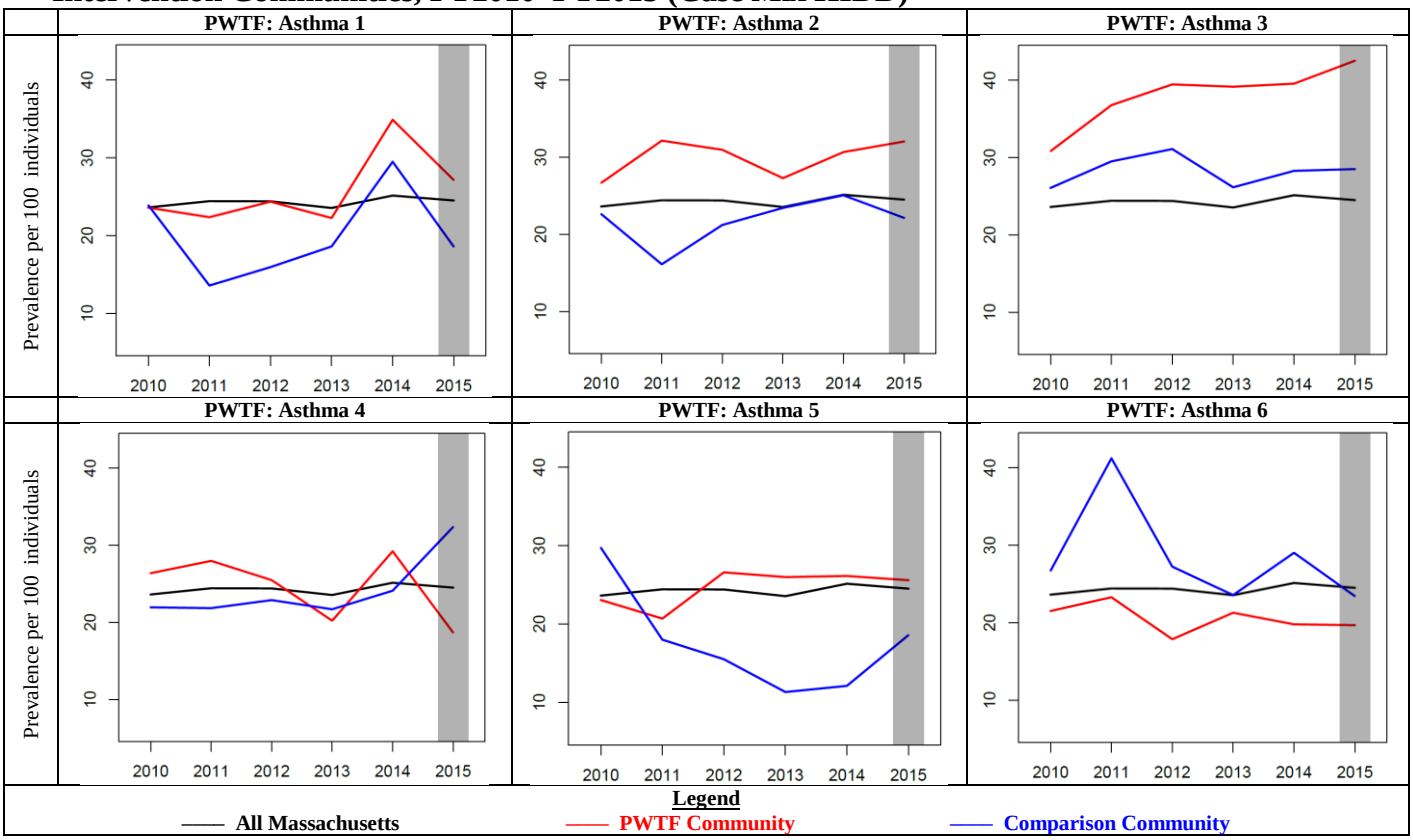


Case Mix Analysis

Limited Case Mix data were used to measure the inpatient hospitalizations related to pediatric asthma in PWTF intervention communities. As Case Mix data is based on Fiscal Year terms, these data only represent claims made through September 30, 2015.

As seen in **Figure 24**, two communities, (**PWTF: Asthma 2** and **3**) observed increases in inpatient hospitalizations during the intervention period that were greater than both their comparison communities and the state average. **PWTF: Asthma 1** and **PWTF: Asthma 4** both saw increases from 2013 to 2014 that then declined in 2015. Again, it is important to note that these data only cover a period through September 30, 2015, and thus, the full effects of the PWTF interventions are likely not yet to be observed, and additional claims data are needed to more fully capture any potential impact.

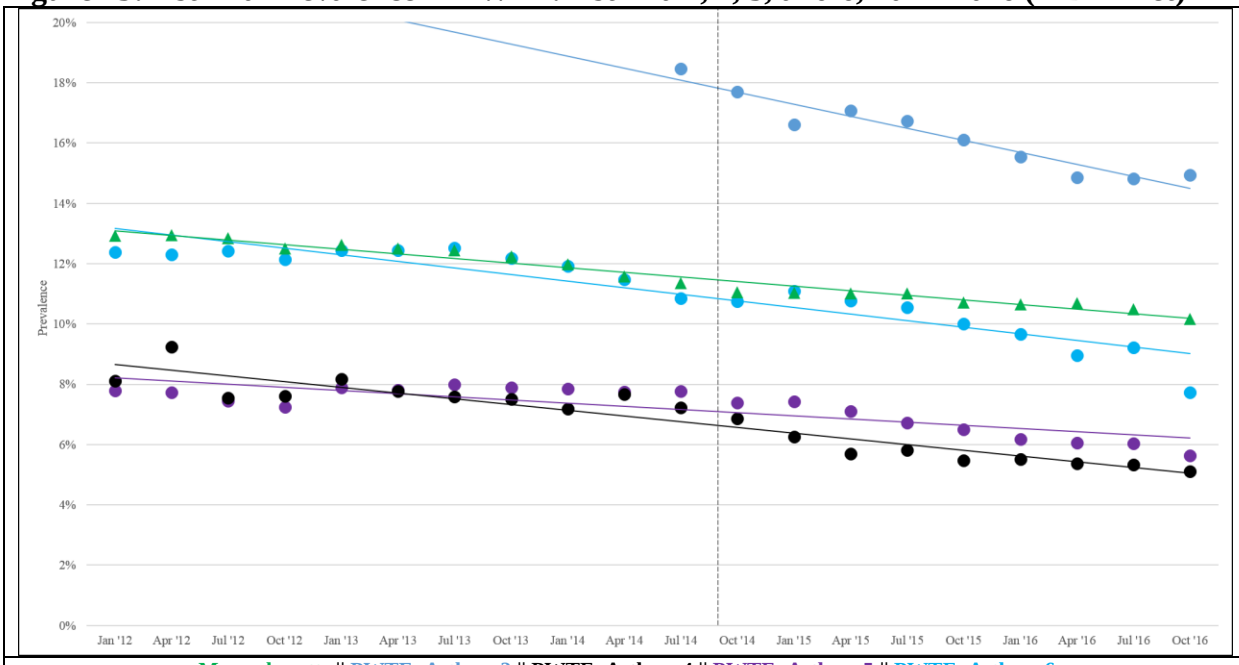
Figure 24: Age- and Sex-Standardized Asthma-Related Hospitalizations in PWTF Intervention Communities, FY2010–FY2015 (Case Mix HIDD)



MDPHnet Analysis

MDPHnet data were used to assess pediatric asthma prevalence among 0–9 year-olds and 10–19 year-olds separately. MDPHnet data indicate that while the statewide prevalence of asthma in 0–9 year-olds has decreased between 2012 and mid-2016, as seen in **Figure 25**, there were relatively larger decreases in rates in four PWTF communities (**PWTF: Asthma 2, 4, 5,** and **6**) while the comparison communities for these PWTF sites (not shown) either did not show a decline or had milder declines.

Figure 25: Asthma Prevalence in PWTF: Asthma 2, 4, 5, and 6, 2012–2016 (MDPHnet)



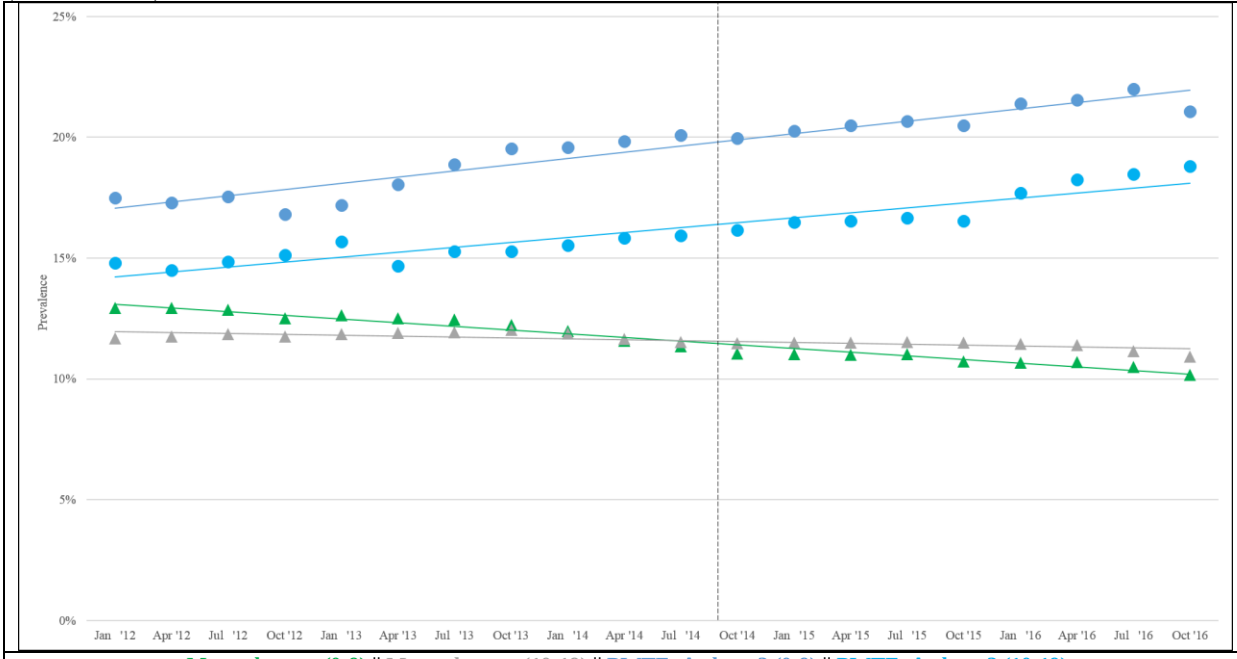
Massachusetts || PWTF: Asthma 2 || PWTF: Asthma 4 || PWTF: Asthma 5 || PWTF: Asthma 6

Asthma Among 0–9 Year-Olds (Adjusted for Age, Sex, and Race/Ethnicity)
Vertical line denotes start of intervention period in September 2014

These results may reflect the fact that three of the PWTF partnerships either launched their asthma interventions somewhat earlier than others and/or were building on strong pre-existing programs as suggested by their substantially lower prevalence than the state rate at all points in the documented time period. It should be noted that **PWTF: Asthma 2** data for MDPHnet begins in July 2014 and was not available before that time. **PWTF: Asthma 6**, on the other hand, which showed declines in asthma among both 0–9 and 10–19 year-olds, did not start its PWTF enhancement to its existing program until well into 2015 and even 2016.

In **PWTF: Asthma 3**, there was an increase in prevalence among 0–9 year-olds (**Figure 26**), primarily among Blacks and Hispanics (**Figure 27**), and an increase among 10–19-year olds, especially among Blacks (**Figure 28**). These increases may have been attributable to the use of strategies, such as aggressive outreach to schools and Head Start centers, that seek to identify new cases and therefore could result in an increase in the overall prevalence of children with asthma (i.e., more individuals identified and/or receiving treatment for the condition), though not necessarily resulting in more severe cases (i.e., an increase in emergency department visits or inpatient hospitalizations).

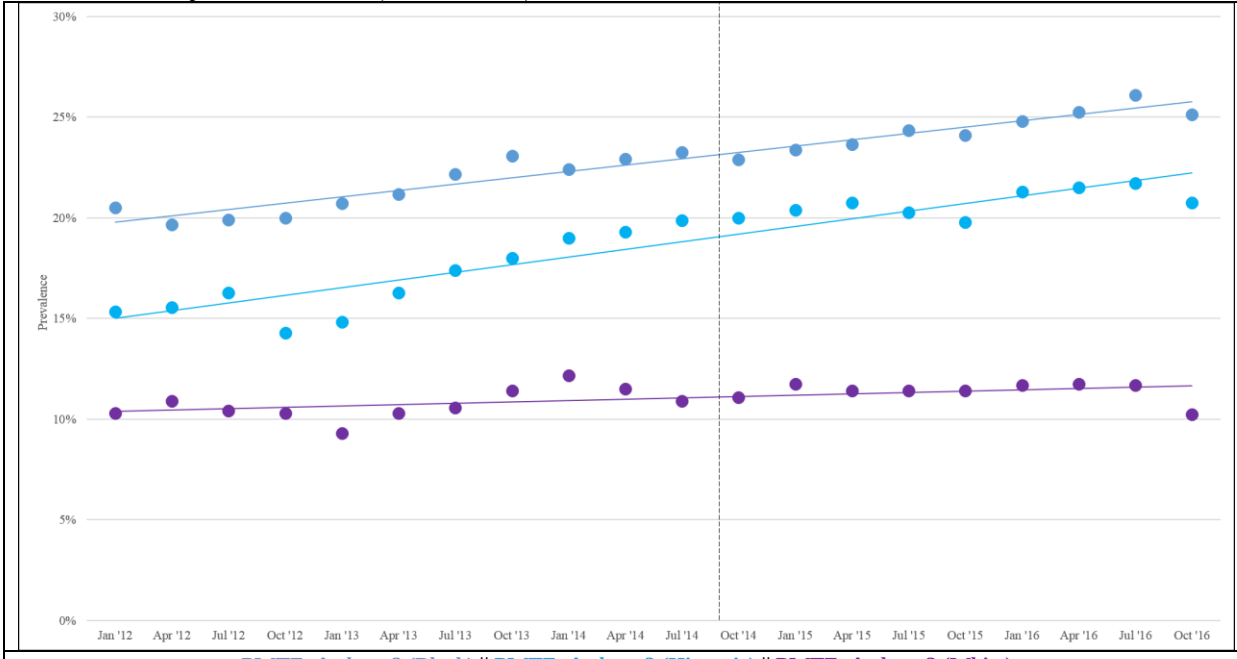
Figure 26: Asthma Prevalence in PWTF: Asthma 3 Among 0–19 Year-Olds, 2012–2016 (MDPHnet)



Massachusetts (0-9) || Massachusetts (10-19) || PWTF: Asthma 3 (0-9) || PWTF: Asthma 3 (10-19)

Asthma Among 0 – 9 Year-Olds and 10 – 19 Year-Olds (Adjusted for Age, Sex, and Race/Ethnicity)
Vertical line denotes start of intervention period in September 2014

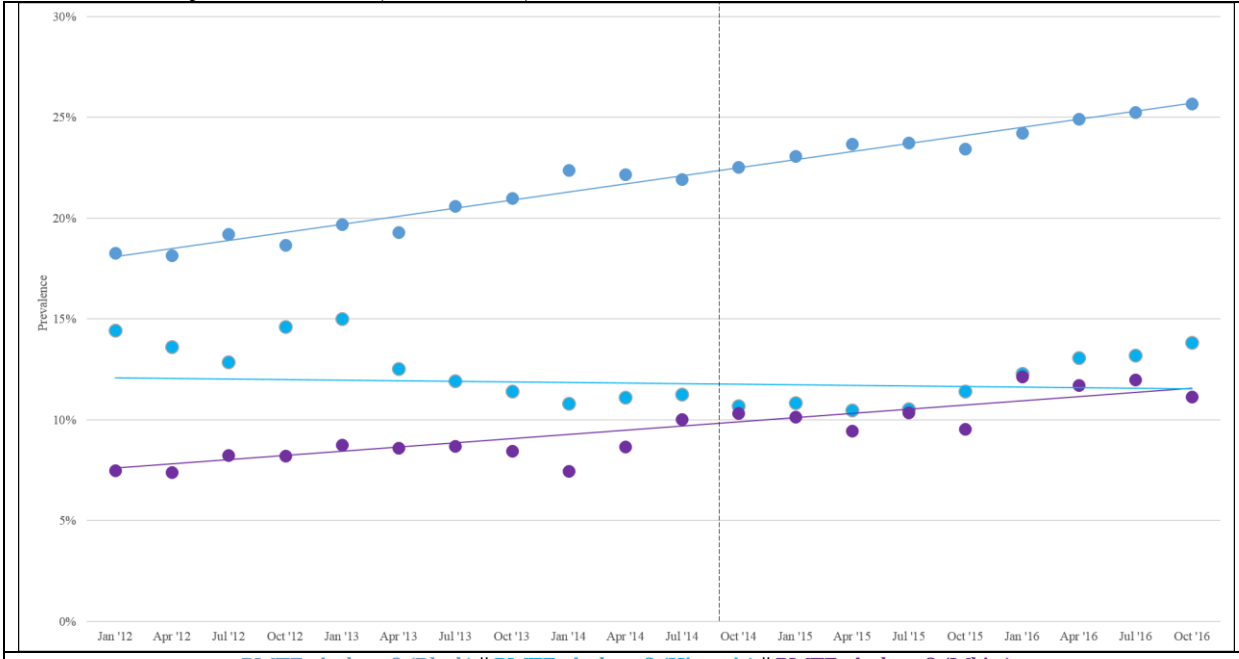
Figure 27: Asthma Prevalence in PWTF: Asthma 3 Among 0–9 Year-Olds, Stratified by Race/Ethnicity, 2012–2016 (MDPHnet)



PWTF: Asthma 3 (Black) || PWTF: Asthma 3 (Hispanic) || PWTF: Asthma 3 (White)

Asthma Among 0–9 Year-Olds (Adjusted for Age, Sex, and Race/Ethnicity)
Vertical line denotes start of intervention period in September 2014

Figure 28: Asthma Prevalence in PWTF: Asthma 3 Among 10–19 Year-Olds, Stratified by Race/Ethnicity, 2012–2016 (MDPHnet)



PWTF: Asthma 3 (Black) || PWTF: Asthma 3 (Hispanic) || PWTF: Asthma 3 (White)

Asthma Among 10–19 Year-Olds (Adjusted for Age, Sex, and Race/Ethnicity)
Vertical line denotes start of intervention period in September 2014

Racial/ethnic disparities in asthma persist in some PWTF communities but show early trends in reduction in others. In **PWTF: Asthma 2**, prevalence among 0–9 year-olds decreased in both Hispanics and Whites, but the disparity remains substantial, with Hispanics having more than three times the prevalence of Whites. In **PWTF: Asthma 5**, the decline is primarily in Blacks, who now have the same prevalence as Whites. In **PWTF: Asthma 4**, the decline is among Blacks and Whites but not Hispanics, while in **PWTF: Asthma 6**, the decline in both 0–9 and 10–19 year-olds was in most groups. Lastly, the overall prevalence of asthma in children and teens (ages 10–19) was stable, going from 12% in 2012 to 11% in 2016, and in addition to the decrease mentioned for **PWTF: Asthma 6**, the three other PWTF communities cited for 0–9 year-olds showed trends similar to their comparison communities. (Data for these observations are not shown.)

CE/ROI Analysis

The effect of PWTF asthma programs is not yet detectable in population-level asthma surveillance and utilization data and has not been directly measured among participants. As such, it is difficult to estimate ROI. A further complication is that the allocation of PWTF funding to asthma programs is not known as clearly as for the other priority conditions given that we were only able to obtain specific intervention cost information from one community addressing asthma. This community's report indicated directly-allocated asthma spending of $47,000. When general recurring costs were proportionally added on, the total asthma spending in this community was $101,000, which is 7% of the total recurring PWTF funds spent by June 2016. This community reported 75 asthma referrals and 47 clients enrolled in home visits through June 2016, implying a cost of $1,000–

$2,000 per client enrolled. At this cost per client, if the program is as effective as those reported in the literature[20], it could be cost-saving and have a favorable ROI.

We hesitate to speculate further about the ROI for PWTF asthma initiatives in other partnerships, including those that have achieved the greatest scale, because our estimates of the amount of funds allocated to asthma (reported in **Table 7** on page 35) is based on spending data from only one partnership. Overall, we estimated $863,000 has been spent on asthma interventions, reaching 6,432 clients, which implies a very modest program delivery cost of $134/client. This overall cost is likely to be an underestimate as our method of cost extrapolation may not have accounted adequately for the variation in client volume between communities. However, even if actual asthma spending was four times higher than we estimated, and if the program effectiveness is comparable to that observed in other studies of similar interventions, one could anticipate that the PWTF asthma programs are delivering very good value and may well result in a net cost savings.

[20] Woods, E. R., Bhaumik, U., Sommer, S. J., Ziniel, S. I., Kessler, A. J., Chan, E., Wilkinson, R. B., Sesma, M. N., Burack, A. B., Klements, E. M., Queenin, L. M., Dickerson, D. U. and Nethersole, S. (2012). Community asthma initiative: evaluation of a quality improvement program for comprehensive asthma care. Pediatrics 129(3), 465–472.

Falls Among Older Adults

APCD Analysis: Prevalence

APCD data indicate that between 1–6% adults age 65 and older had a fall-related injury between 2010 and 2015 (**Figure 29**). However, as illustrated in **Figure 30,** two communities, **PWTF: Falls 2** and **8**, showed slightly reduced prevalence of fall-related injuries during the intervention period. Further, **PWTF: Falls 2's** comparison community showed an increase during the same period. However, other communities, such as **PWTF: Falls 4** and **6**, showed an increase in the prevalence of fall-related injuries while prevalence in their comparison communities declined.

Figure 29: Age- and Sex-Standardized Falls Prevalence in PWTF Intervention Communities, 2010–2015 (APCD)

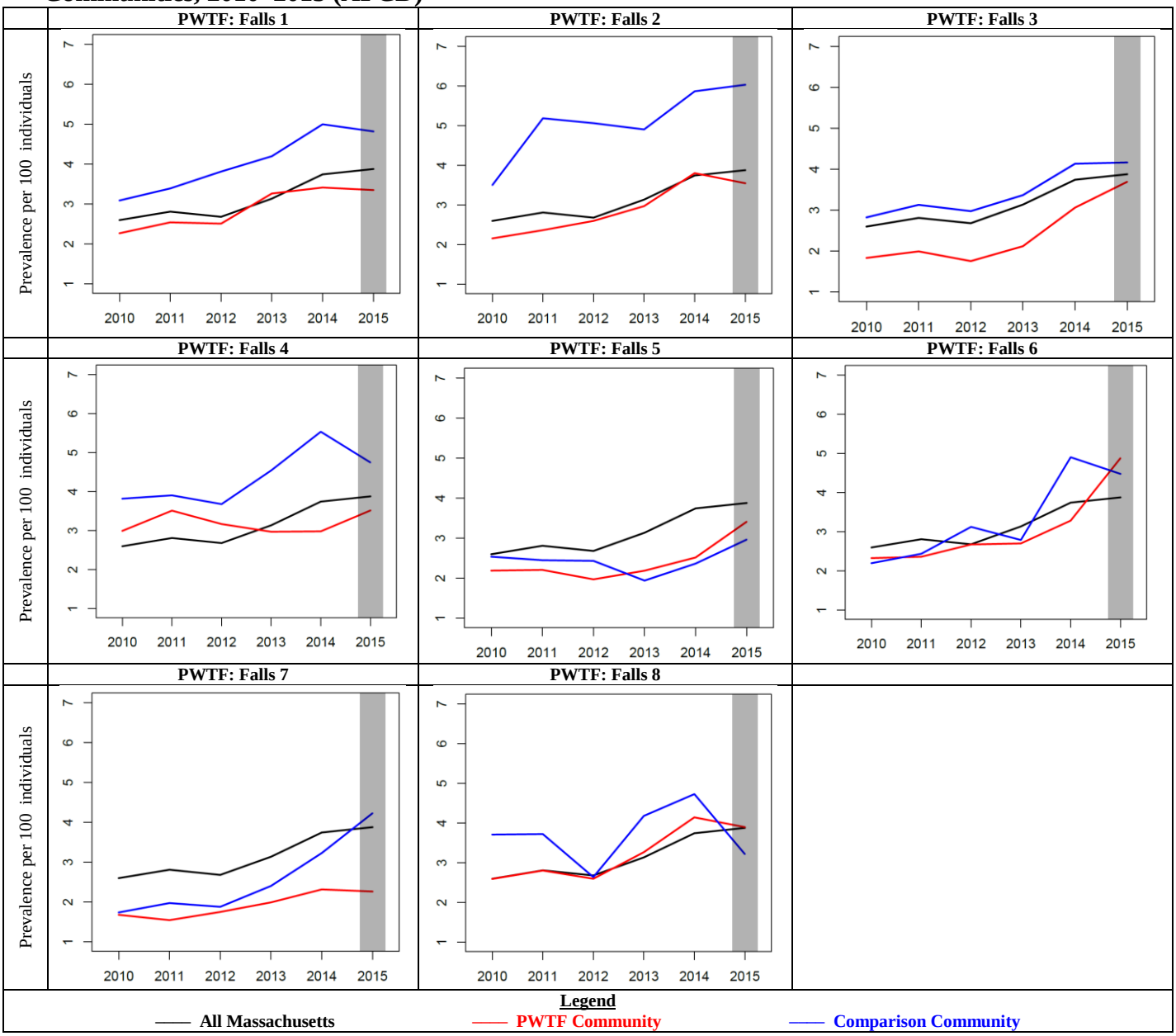
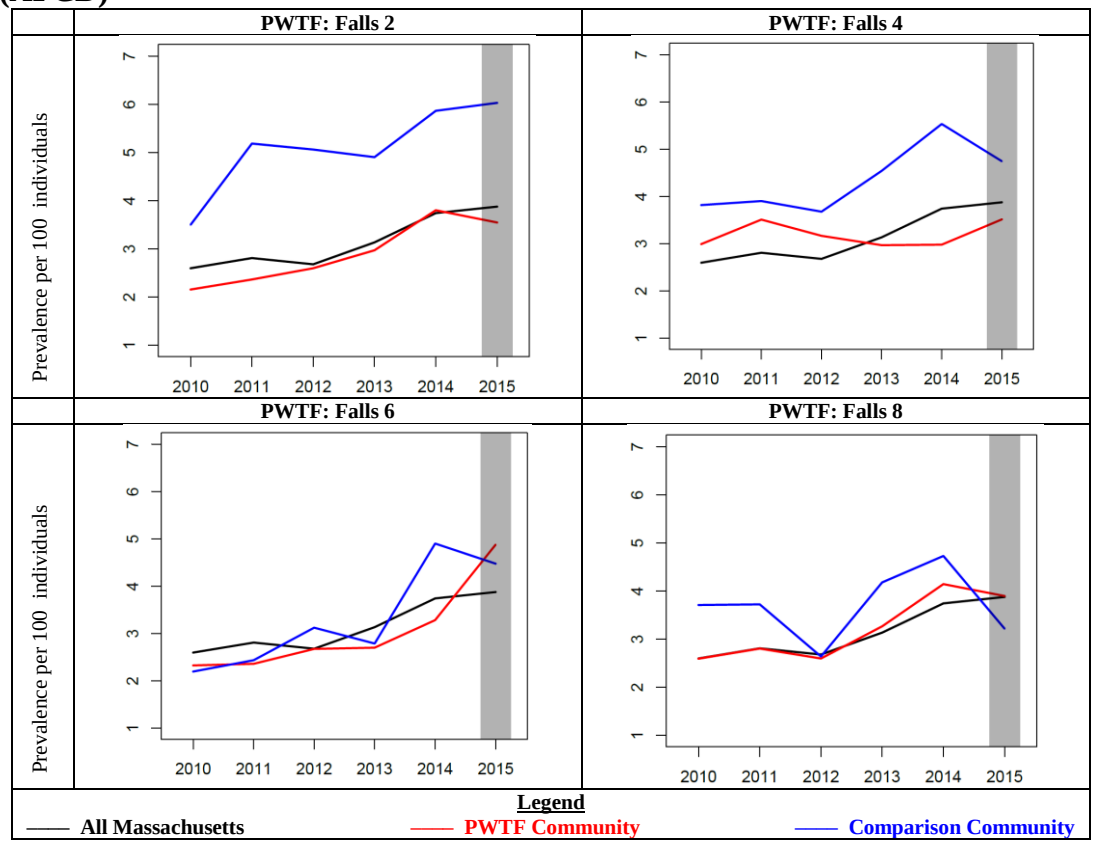


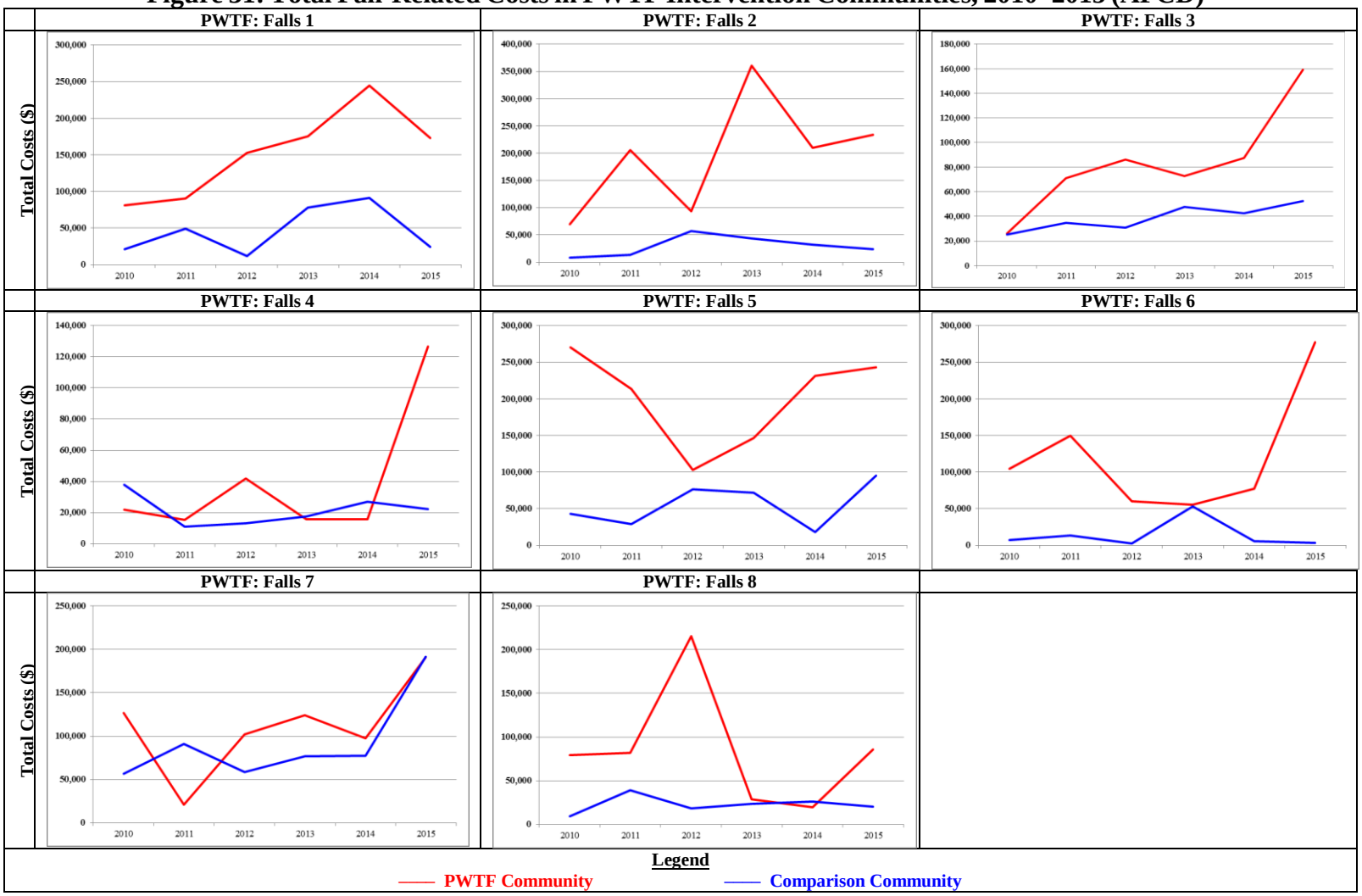
Figure 30: Age- and Sex-Standardized Falls Prevalence in PWTF: Falls 2, 4, 6, and 8, 2010–2015 (APCD)



APCD Analysis: Costs and Cost Trends

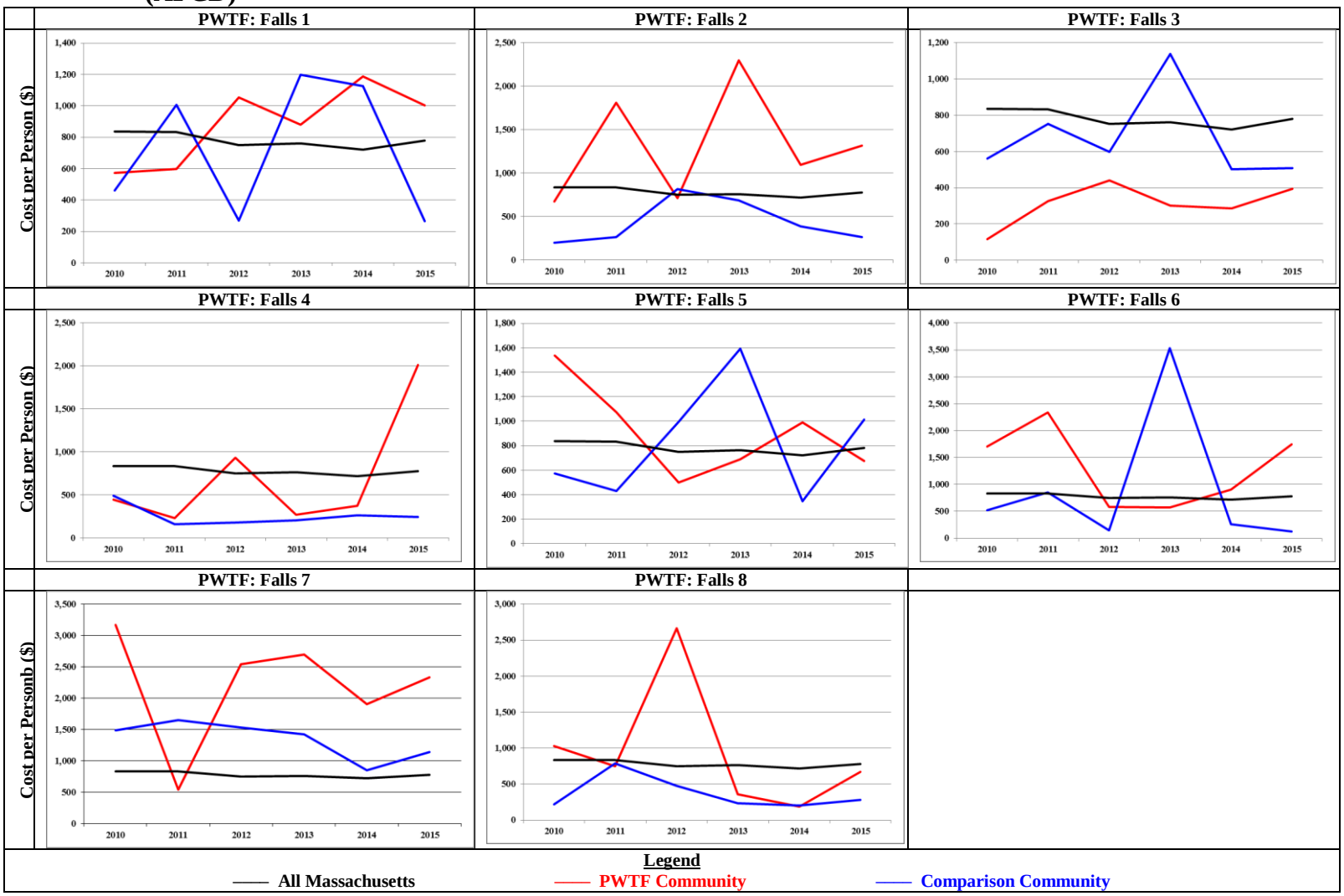
As illustrated in **Figure 31**, from 2010 to 2015, only one PWTF community, **PWTF: Falls 5**, saw an overall decline in total annual costs associated with falls, including a large drop from 2010 to 2012 followed by an increase. The other seven communities have either seen increases or remained flat during the same period. One community, **PWTF: Falls 1**, saw a decline during the intervention period from 2014 to 2015, though this closely mirrors its comparison community.

Figure 31: Total Fall-Related Costs in PWTF Intervention Communities, 2010–2015 (APCD)



With respect to total per-person costs associated with fall-related injuries, as illustrated in **Figure** 32, four communities (**PWTF: Falls 5, 6, 7,** and **8**) have all observed overall declines from 2010 to 2015, though year-to-year fluctuations exist in each case, and in only one of these instances (**PWTF: Falls 5**) did per-person costs decline during the intervention period. Lastly, **PWTF: Falls 1** saw an overall increase from 2010 to 2014, then declined in the intervention period.

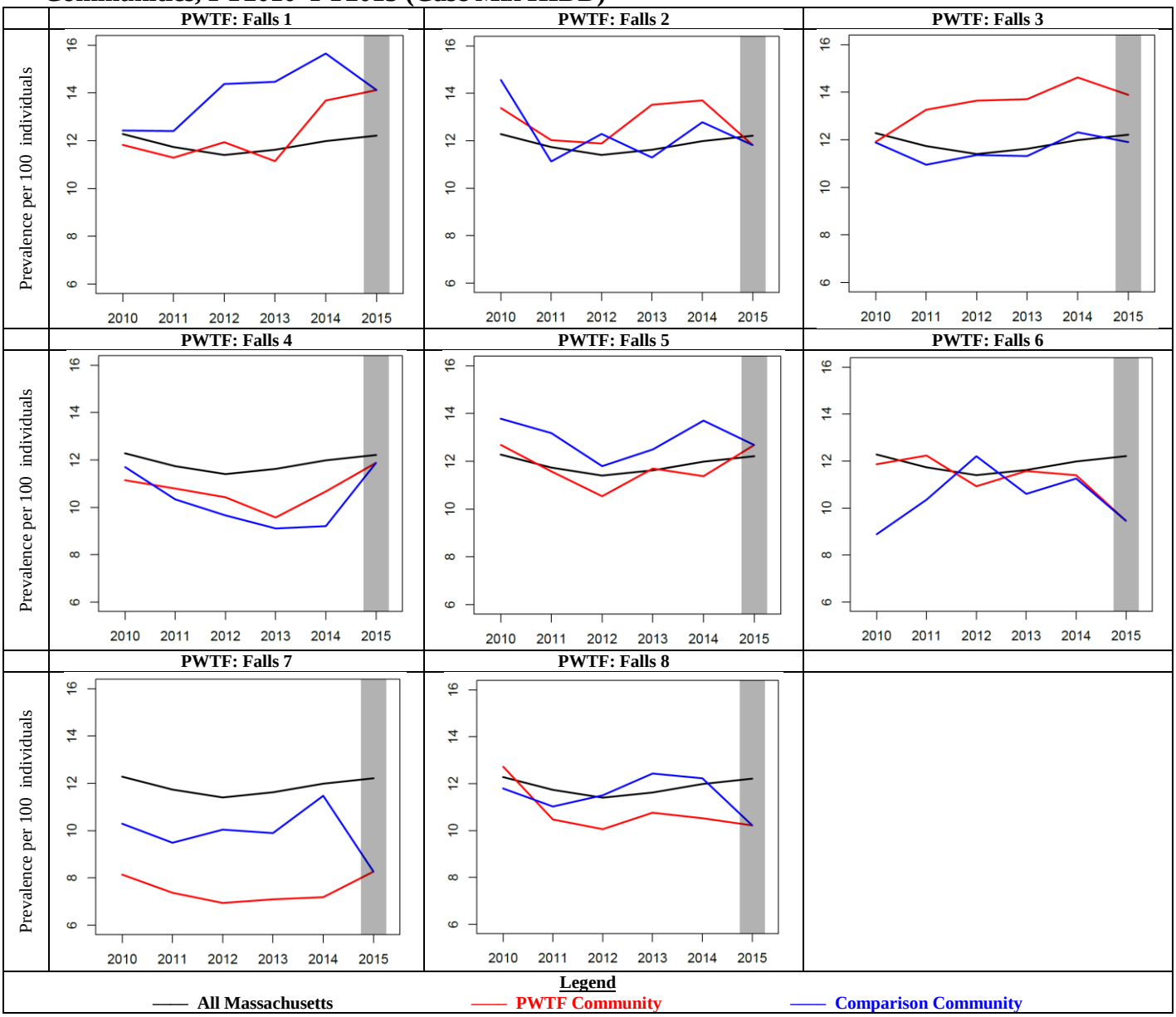
Figure 32: Fall-Related Costs per Person in PWTF Intervention Communities, 2010—2015 (APCD)



Case Mix Analysis

Limited Case Mix data were used to measure the inpatient hospitalizations related to falls in older adults in PWTF intervention communities. As Case Mix data is based on Fiscal Year terms, these data only represent claims made through September 30, 2015. As seen in **Figure 33**, three PWTF communities (**PWTF: Falls 2, 6,** and **8**), observed overall declines in fall-related hospitalizations from 2010 to 2015, though these largely mirror the trends of their comparison communities. **PWTF: Falls 3** showed a slight decline from 2014 to 2015 consistent with its comparison community and **PWTF: Falls 7** showed an increase while its comparison community showed a decrease.

Figure 33: Age- and Sex-Standardized Fall-Related Hospitalizations in PWTF Intervention Communities, FY2010–FY2015 (Case Mix HIDD)



MDPHnet Analysis

As noted in the section on data sources, there are no data on falls in MDPHnet at the present time.

CE/ROI Analysis

We assumed that the age-specific risk levels observed in the 2014 BRFSS for the United States applied to the PWTF communities, and calculated the expected number of falls and injury events (**Table 15**). Systematic review of the effectiveness of falls interventions similar to those undertaken in PWTF suggests a 20% reduction in fall events might be a reasonable prediction of the magnitude of effect while an optimistic upper bound estimate would be a 40% reduction[21]. As

[21] Gillespie LD, Robertson MC, Gillespie WJ, Sherrington C, Gates S, Clemson LM, Lamb SE. Interventions for preventing falls in older people living in the community. Cochrane Database of Systematic Reviews 2012, Issue 9. Art. No.: CD007146. DOI: 10.1002/14651858.CD007146.pub3.

a reference point, economic impact modeling of similar falls prevention interventions in the United Kingdom uses a baseline assumption of 24% reduction in falls incidence.[22] Based on these assumptions, we utilized an estimated reduction of between 20% or 40% in number of fall events and computed the number of events that could be prevented if fall prevention programs reached all 136,000 persons in PWTF communities age 65+.

Table 15: Model Assumptions for Extrapolating BRFSS Fall-Related Injury Data to Eight PWTF Communities

		BRFSS (% with at least one event)		BRFSS (Incidence per 1,000 per year)		No PWTF Scenario	
Age	**Population**	**Fall**	**Injury**	**Fall**	**Injury**	**#Falls/year**	**#Injuries/year**
65-69	39,791	0.267	0.099	0.65	0.154	25,864	6,128
70-74	28,888	0.267	0.099	0.65	0.154	18,777	4,449
75-79	24,463	0.298	0.114	0.669	0.17	16,366	4,159
80-84	20,834	0.298	0.114	0.669	0.17	13,938	3,542
85+	21,846	0.365	0.135	0.82	0.199	17,914	4,347
Total	135,822					92,859	22,624

If all 136,000 seniors (age 65+) living in the PWTF communities had received a community-based PWTF falls intervention, a total of between 18,600 and 37,100 falls, and between 4,525 and 9,050 fall-related injuries could have been prevented, ranging from mild scrapes and bruises to very serious hip fractures. Preventing 4,525 such injuries would avoid the need for medical care in about 980 cases (22% of injurious falls) and would avoid 136 inpatient hospitalizations (3% of injurious falls). **Table 16** illustrates these figures.

An analysis of Community Intervention data through June 30, 2016 suggests that 3,295 enrollments occurred in community-based falls intervention programs supported by the PWTF (approximately 2.4% of the target age population in PWTF communities). Thus, as of July 2016, PWTF will have produced at least the following fall-related benefits: about 220 fall-related injuries prevented, including about 48 that would have required medical care, seven of which would have required hospitalization (**Table 16**). As the PWTF is still very much ongoing, these results are expected to increase. Lastly, data on clinical encounters (i.e., STEADI screening for falls risk) suggest that for every one patient referred to a PWTF falls intervention, almost 15 patients were screened, of which about 25% screened positive.

Starting in April 2016, clinical sites began reporting their STEADI data in Excel sheets. From April through June 2016, 7,725 patients received a STEADI screening in PWTF clinics, of which 2,191 (28.3%) screened positive, 521 received a "gait, strength, balance" assessment, and 832 received a plan of care (POC) and a multifactorial risk assessment. This clinical activity generated 507 referrals to PWTF community interventions. From July through September more than 8,000 additional STEADI screenings were documented. According to MDPH, this represents a significant uptake of screening for falls, potentially exceeding national standards. Moreover, it is plausible that care at the clinic level generates additional health benefits, both for those referred and those not referred, beyond those derived from the community-level programs. For example, risk factors pertaining to medication use or vision might be identified and addressed at clinics. (It

[22] http://www.csp.org.uk/documents/falls-prevention-economic-model

should be noted that vision-related interventions may actually increase the risk of falls as these interventions lead to individuals becoming more active.[23])

Table 16: Annual Falls and Related Events Prevented in PWTF Communities

	Number of Events with No Intervention	Number of Events Prevented with Full Coverage of PWTF Community (20% Reduction)	Number of Events Prevented with Full Coverage of PWTF Community (40% Reduction)	2.4% Coverage of PWTF Community
Falls	92,859	18,572	37,144	901
Injuries	22,624	4,525	9,050	220
Medical Care	4,909	981	1,963	48
Hospital Admissions	678	136	271	7

As articulated earlier in this report, we endeavored to estimate spending on PWTF interventions by analyzing both quarterly financial reports as well as conducting in-depth interviews with three partnerships. However, it is difficult to quantify exactly how much was spent on each condition, and more to the point, how much was spent on each intervention. Our analysis indicates that the PWTF grantees spent approximately $6.7 million on falls-related interventions, including both clinical and community activities. This is likely a high-end estimate as falls interventions and related activities were largely new and had not been undertaken before as opposed to other condition areas such as asthma or hypertension where the infrastructure was already largely in place. As such, this estimate for falls interventions is likely inflated and includes some inefficiencies that will be corrected over time. If so, recurring costs in the future could flatten as the interventions mature.

If we were to count only the 3,295 individuals who were enrolled in community interventions as having been "reached" by the intervention, and that $6.7 million was spent on falls interventions, then the cost per person would be quite high at $2,033. However, this figure does not capture clinical intervention activities. When we include the 7,725 individuals who received a STEADI screening at PWTF clinical sites (regardless of whether they screened positive or not) in addition to the 3,295 who were enrolled in community interventions, the total intervention reach through June 30, 2016 would be 11,020, or closer to $608 per person. If we were only to count the 2,191 individuals who were both screened and received a positive assessment, the total intervention reach would be 5,486, or $1,221 per person. Lastly, as there is some overlap between the clinical and community populations served (i.e., those screened in clinics who then participated in community interventions), the calculations are imprecise, but do generate a sense of how much was invested in these activities on a per-person basis.

Taking another approach, MDPH estimates that the community/clinical allocation for falls intervention was more or less equally divided. Under this scenario, if we assume $3.35 million was spent on community activities and $3.35 million was spent on clinical activities, the cost per person would be $1,016 for community interventions ($3.35 million / 3,295 individuals) and $433 for clinical interventions ($3.35 million / 7,725). Again, these figures are highly speculative, and more precise calculations would depend on future data collection that is designed in a manner more conducive to evaluation efforts.

Preventing falls averts injury-related medical spending. If we were to assume that each of seven hospital admission costs $20,000 and each of the 41 other episodes of medical not involving

[23] Gillespie LD, Robertson MC, Gillespie WJ, Sherrington C, Gates S, Clemson LM, Lamb SE. Interventions for preventing falls in older people living in the community. Cochrane Database of Systematic Reviews 2012, Issue 9. Art. No.: CD007146. DOI: 10.1002/14651858.CD007146.pub3.

hospitalization cost $1,000, the total costs averted would be $181,000 ($140,000+41,000). If we were to assume the full $6.7 million spending on falls interventions, this savings would equal just 2.7% of the total spent. If we were to take the $3.35 million figure instead, the savings are still relatively low at 5.4%. Although there is significant uncertainty about the amount of PWTF spending allocated to falls prevention, it is very unlikely the programs would "pay for themselves," through reduced spending on injury care given the current data. Again, however, the falls interventions were perhaps the most challenging to establish as they were a new endeavor undertaken by the partnerships, and costs early in the intervention may have been higher than they will be as the programs become more refined. If the interventions persist and can reach a level of spending more consistent with other established programs, the financial benefits may indeed catch up as a result. For example, MDPH referenced a cost analysis conducted by the Healthy Living Center of Excellence (HLCE) suggesting that 3,200 participants were reached with just $520,000 in funding, a rate of $156 per person. This funding was provided by the Administration for Community Living (ACL) for Matter of Balance and Tai Chi programs, both of which are PWTF interventions. If the PWTF were able to reach this level of per-person spending, the interventions themselves would be much more cost effective than current data would suggest.

One study estimated the potential return on investment of having persons 65+, who were treated for fall-related injuries, undergo Matter of Balance, one of the PWTF community interventions.[24] This analysis provides an interesting point of comparison. The authors concluded that the intervention would be cost saving with an ROI of 144%. Statewide savings for Massachusetts were estimated to be $5.6 million if the participation rate is 50% among the 44,000 older adults presenting at Massachusetts emergency departments in 2012. The authors' calculations assume that among 100 fallers, 18 will return to the ED at a cost of $2,823 each and six hospitalizations at a cost of $25,465 each.

One potential reason for the favorable economic analysis described above is that the authors model a program in which the intervention is targeted at those who have previously suffered a fall-related injury serious enough to result in an ED visit. A history of falling is a strong predictor of subsequent falls, but most critically, the authors assume the cost of delivering MOB is $176 per client, in contrast with the estimates based on current PWTF data as articulated earlier, though more in line with the HLCE estimate provided by MDPH. If the PWTF had been able to deliver falls interventions for $176 per client, with $6.7 million, they could have reached almost 38,000 clients, more than 25% of all seniors 65+ in the PWTF communities. Of course, a major source of uncertainty in these analyses is the assumption that $6.7 million of PWTF funds has gone to the recurring cost of falls interventions.

Many existing cost-effectiveness studies of falls interventions are not based upon programs operating at large scale; they may underestimate the large costs of scaling up, recruiting, and retaining clients. The PWTF experience thus far suggests that these costs can be quite large, though the extent to which these costs will lessen as the programs mature is unknown.

Translating the injuries prevented by PWTF into QALYs is not feasible without making assumptions about the impact of interventions on the fear of falling. Anxiety associated with the fear of falling has been estimated to account for a large majority of fall-related quality of life

[24] Howland, J., Shankar, K. N., Peterson, E. W. and Taylor, A. A. (2015). Savings in acute care costs if all older adults treated for fall-related injuries completed matter of balance. Injury Epidemiology 2(1), 25.

impacts.[25] As noted earlier, PWTF grantees may have spent as much as $6.7 million in PWTF funds, excluding startup costs, on falls prevention. To compare favorably to a cost-effectiveness threshold of $50,000/QALY, the program will have had to have gained 134 QALYs, or 0.041 QALY per enrollment in falls intervention.

This level of benefit is possible. For example, one study found that 597 QALYs were lost per 10,000 women due to fear of falling.[26] If 2,500 PWTF participants in the clinic or community interventions had a fear of falling eliminated by the intervention, this alone would translate to enough QALYs for the interventions to be considered cost-effective. One would also expect some QALY gain associated with preventing an estimated seven fall-related hospitalizations, which would further improve the value of the interventions. While it may not be realistic that such a large fraction of participants have a major fear of falling or that the intervention is so effective at eliminating this fear, it does suggest that if the cost-efficiency of PWTF falls intervention programs continues to improve as programs mature, they might be cost-effective. It also suggests that measuring health related quality of life (HRQoL) and fear of falling outcome measures among those reached in the remaining phase of PWTF would be useful for better understanding the program's value.

Speculating further, if we were to take the 2,191 individuals who received a positive screen during a STEADI intervention through June 2016 and the 3,295 individuals who received a falls intervention in the community through the same time period, we would have 5,486 individuals who were both reached by an intervention and who have the potential to benefit. While we do not know the prevalence of the fear of falling among this group or the reduction that is expected from the STEADI intervention, we do know that the community-based interventions do result in a small reduction in the fear of falling, though this effect may not persist after participation in the intervention ends.[27] If we assume that $50,000 per QALY is a good value, consistent with the hypertension-related interventions as discussed earlier in this report, and if we assume that the PWTF spent $6.7 million on falls interventions, we would need to generate 134 QALYs among the 5,486 people reached, or a rate of 0.024 QALY per benefiting participant, which is 8.76 Quality-Adjusted Life Days each, or the equivalent of extending their life in perfect health by 8.76 days each. While this analysis is highly speculative, it is not outside the realm of possibility, and is further supported by anecdotal evidence supplied by the grantees in terms of the positive effects these interventions have had on their target populations.

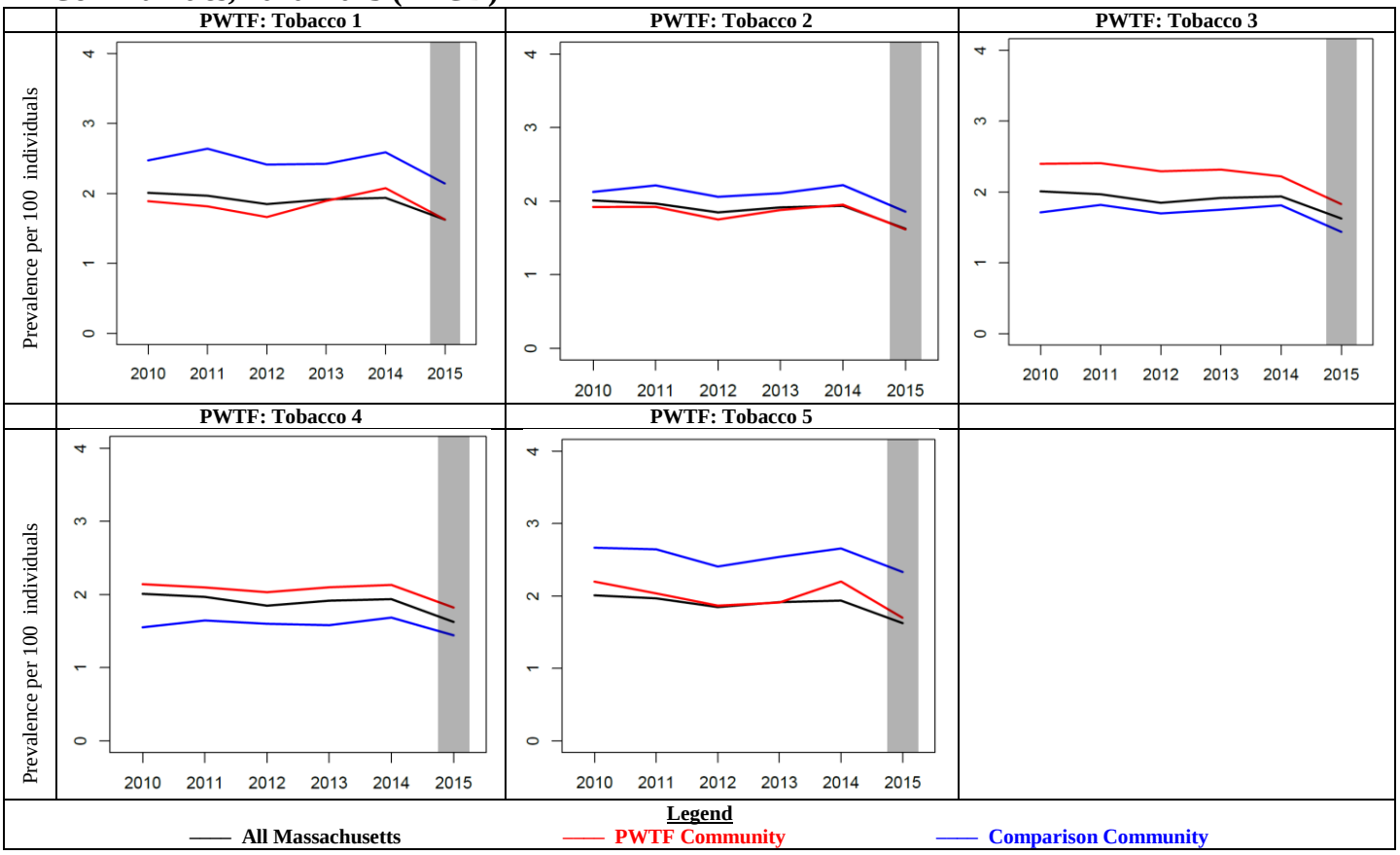
[25] Iglesias CP, Manca A, Torgerson DJ. The health-related quality of life and cost implications of falls in elderly women. Osteoporos Int. 2009 Jun;20(6):869-78.
[26] Iglesias CP, Manca A, Torgerson DJ. The health-related quality of life and cost implications of falls in elderly women. Osteoporos Int. 2009 Jun;20(6):869-78.
[27] Kendrick D, Kumar A, Carpenter H, Zijlstra GAR, Skelton DA, Cook JR, Stevens Z, Belcher CM, Haworth D, Gawler SJ, Gage H, Masud T, Bowling A, Pearl M, Morris RW, Iliffe S, Delbaere K. Exercise for reducing fear of falling in older people living in the community. Cochrane Database of Systematic Reviews 2014, Issue 11. Art. No.: CD009848. DOI: 10.1002/14651858.CD009848.pub2.

Tobacco Use

APCD Analysis: Prevalence

From **Figure 34**, prevalence of COPD in adults age 18 and over in the APCD remained consistently between 1–3% from 2010–2015 in all intervention and comparison communities. No changes were noted between the baseline and intervention periods as claims data are not expected to identify smokers given the nature of the data.

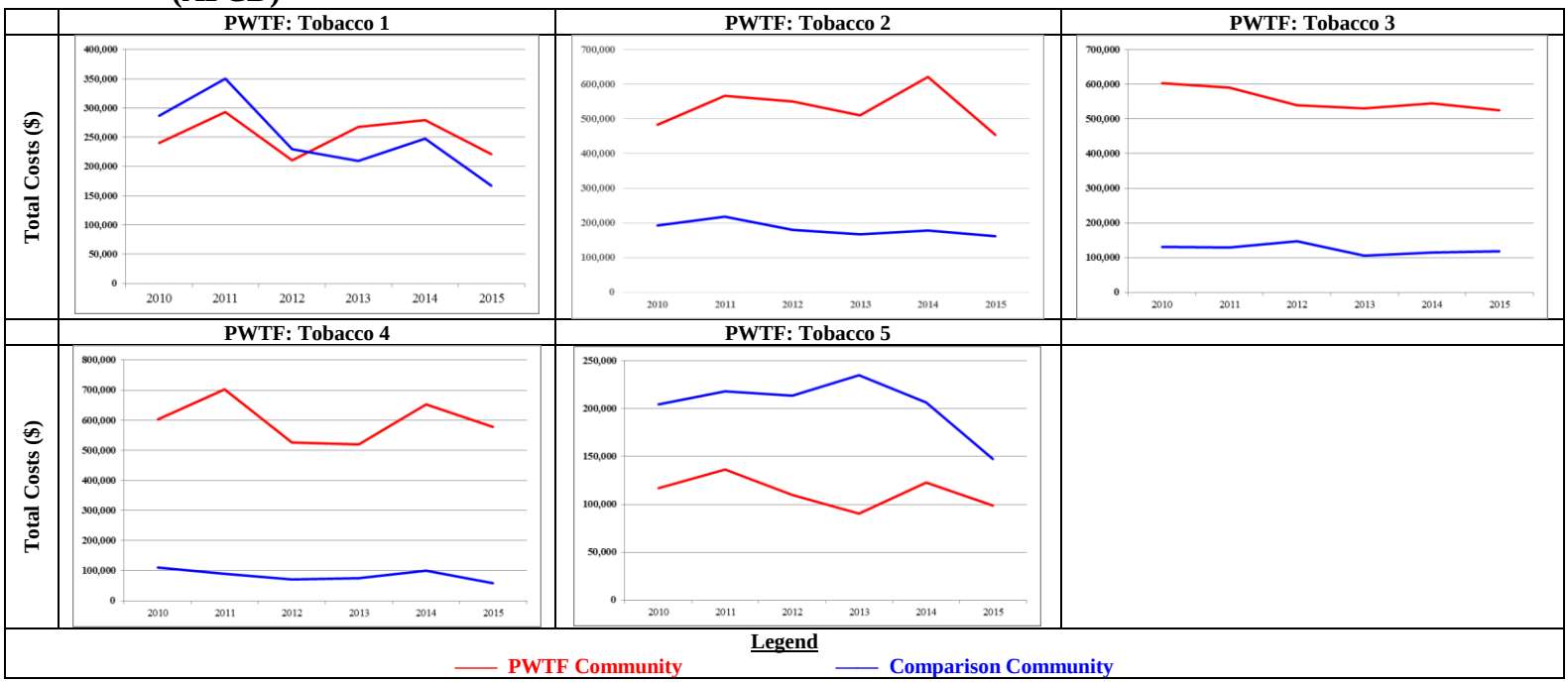
Figure 34: Age- and Sex-Standardized COPD Prevalence in PWTF Intervention Communities, 2010–2015 (APCD)



APCD Analysis: Costs and Cost Trends

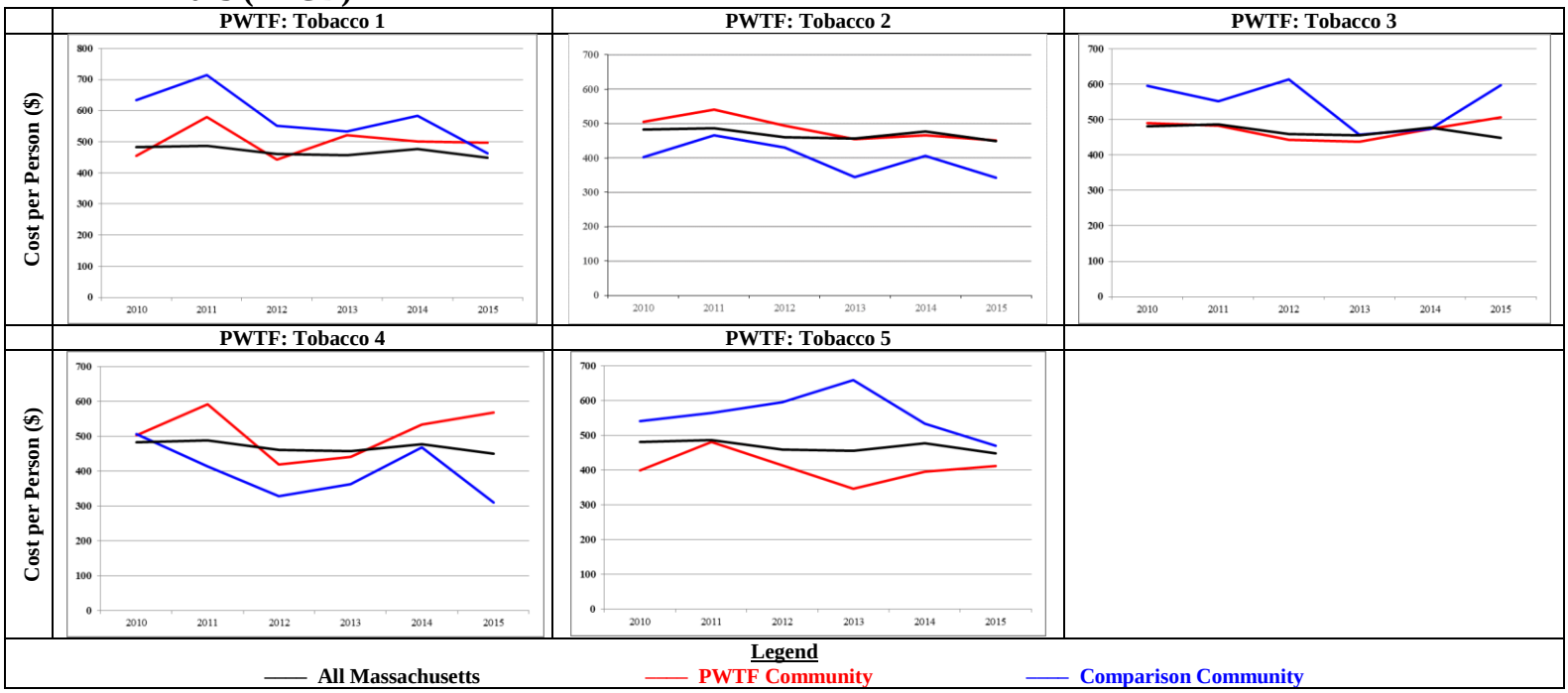
As seen in **Figure 35**, three PWTF communities (**PWTF: Tobacco 1, 3,** and **5**) showed mild declines in the total costs associated with COPD from 2010 to 2015, though these declines largely mirror their comparison communities.

Figure 35: Total COPD-Related Costs in PWTF Intervention Communities, 2010—2015 (APCD)



From **Figure 36**, we see that, with respect to total costs per person associated with COPD, four communities either remained stable or showed mild increases while the overall state trend has declined slightly in the same period. **PWTF: Tobacco 2**, however, showed a very small decline from 2010 to 2015 that largely mirrors its comparison group.

Figure 36: COPD-Related Costs per Person in PWTF Intervention Communities, 2010—2015 (APCD)



MDPHnet Analysis

MDPHnet provides a measure of how consistently community health centers are recording smoking status in their health records. In Massachusetts, there was a substantial increase in 2012 and a more gradual increase since 2014, so that by October 2016, approximately 88% of adults had their smoking status recorded. The 2012 increase in recorded smoking status is likely due to the impact of the Meaningful Use program that incentivized practices to ask and record smoking status in all patients. That increase in recorded status may help to explain rising rates of current smoking in 2012; rates have been stable since, with a prevalence of 16%. Three of the PWTF communities with smoking interventions, for which MDPHnet data are available, do not differ in terms of time trends from the rest of the state or their comparison communities. The other community for which MDPHnet data are available has data reliability/quality issues and we are not confident using their MDPHnet data for this analysis.

CE/ROI Analysis

The interventions for tobacco were largely aimed at getting current smokers to quit, although the impact on the prevention of increases in new smokers was also possible from the interventions adopted, but less so compared to current smokers. Nonetheless, the potential health benefits and savings from the intervention could be profound as smoking is a significant risk factor for cardiovascular disease. Unfortunately, the EHR data were not robust enough to evaluate potential trends in prevalence due to the limited number of responses to the questions regarding smoking habits. It does appear that there may have been declines in smoking rates in the PWTF communities but the absence of data for non-intervention sites in the EHR data prevented us from determining if the declines outstripped secular declines that may have been occurring in the non-PWTF communities.

While there is limited Community Intervention data that suggests some patients did receive smoking counseling by providers or through community-based cessation programs, the proportion reported for these communities suggest that only about 3–4% of all smokers were newly enrolled in these programs. Based on interviews conducted with three participating partnerships, the cost of the interventions was approximately $5 per capita.

Given the limited data, we cannot say with certainty whether significant changes in smoking prevalence occurred due to the interventions, and as such, we modeled three different scenarios. In the first scenario, we modeled the reductions in the overall prevalence rate that would have occurred if just 3% of the population were referred to smoking cessation programs, followed by a more optimistic scenario that assumed up to 30% were referred, and then a third scenario where most patients were referred and the other interventions around smoke-free zones and community education had further beneficial impacts. These scenarios would yield about 1 per 10,000, 1 per 1,000, and 1 per 100 additional smokers who quit and remain non-smokers compared to baseline trends among smokers, respectively. If 1 per 1,000 additional smokers quit, then an additional seven myocardial infarctions, 28 strokes, and eight premature deaths would be averted for every 150,000 smokers. If the quit rate increased to 1 per 100, then 115 myocardial infarctions, 165 strokes, and 98 premature deaths would be averted over the lifetime of current smokers compared to no smokers quitting.

We assessed if the costs associated with the interventions were one-time costs used in the last year in the PWTF sites or if the costs had to be maintained annually to achieve the persistent reductions in smoking prevalence. These two possible views of cost, together with three possible quit-rate scenarios, give us six different scenarios for which we have cost-effectiveness results. In both cost scenarios of 1 per 10,000 additional quitters, the intervention yields no significant return on investment and is not cost-effective. When looking at the 1 per 100 quit rate, the intervention is cost-saving if the costs of the intervention is only required for one year and approximately $50,000 per QALY if the expenditure is recurring annually to maintain the effect. Lastly, at a quit rate of 1 per 1,000, the CE ratio is $18,500/QALY if just one year of costs are needed and > $400,000/QALY if annual costs are required to maintain the effect. **Tables 17–20** summarize these findings.

Table 17: Predicted Cardiovascular Disease (CVD) Outcomes for Smoking Cessation, Applying Different Probabilities for Quitting Smoking

		Smoking: Low	**Smoking: Medium**	**Smoking: High**
		One-Time Smoking Quit Probability of 0.0001 **Change from Usual Care**	One-Time Smoking Quit Probability of 0.001 **Change from Usual Care**	One-Time Smoking Quit Probability of 0.01 **Change from Usual Care**
Lifetime	Life Expectancy	0	0.0003	0.0026
	Number MI Events	0	-7	-115
	Number CVA Events	0	-28	-165
	IHD Deaths	*-1*	*-6*	*-62*
	CVA Deaths	*2*	*-2*	*-36*
	CVD Deaths	1	-8	-98
1-Year	Number MI Events	0	0	0
	Number CVA Events	0	-1	-7
	CVD Deaths	0	-1	-4
5-Year	Number MI Events	0	-2	-7
	Number CVA Events	0	0	-14
	CVD Deaths	0	-1	-8

MI: Myocardial Infarction CVA: Cerebrovascular Accident (stroke) IHD: Ischemic Heart Disease

Table 18: Cost-Effectiveness of Tobacco Cessation Comparing Increased Probability of Quitting Smoking to Usual Care, Assuming One-time Cost

CEA	Cost ($)	QALY	ICER ($/QALY)
Base Case: Cost of Intervention = $5.46 per capita			
Scenario 1: Usual Care Compared to Increased Probability of Quitting of 0.0001			
Usual Care	199,81.2	15.8957	-
Probability = 0.0001	19,986.40	15.8957	Dominated (not cost effective)
Scenario 2: Usual Care Compared to Increased Probability of Quitting of 0.001			
Usual Care	19,981.2	15.8957	-
Probability = 0.001	19,984.90	15.8959	18,500
Scenario 3: Usual Care Compared to Increased Probability of Quitting of 0.01			
Usual Care	19,981.2	15.8971	-
Probability = 0.01	19,974.40	15.8971	Cost-Saving

Table 19: Cost-Effectiveness of Tobacco Cessation Comparing Increased Probability of Quitting Smoking to Usual Care, Assuming Annual Cost

CEA	Cost ($)	QALY	ICER ($/QALY)
Base Case: Cost of Intervention = $5.46 per capita			
Scenario 1: Usual Care Compared to Increased Probability of Quitting of 0.0001			
Usual Care	19,981.2	15.8957	-
Probability = 0.0001	20,072.3	15.8957	Dominated (not cost effective)
Scenario 2: Usual Care Compared to Increased Probability of Quitting of 0.001			
Usual Care	19,981.2	15.8957	-
Probability = 0.001	20,070.8	15.8959	448,000
Scenario 3: Usual Care Compared to Increased Probability of Quitting of 0.01			
Usual Care	19,981.2	15.8957	-
Probability = 0.01	20,060.4	15.8971	56,571

Table 20: Summary Table of Cost-Effectiveness of Smoking Cessation Scenarios

Scenario	ICER ($/QALY) for One-Time Cost	ICER ($/QALY) for Annual Cost
Low Change (0.0001)	Dominated (not cost effective)	Dominated (not cost effective)
Medium Change (0.001)	$18,500	$448,000
High Change (0.01)	Cost-saving	$56,571

Interpreting the Cost-Effectiveness Results

We evaluated a range of cost-effectiveness results depending on three different scenarios. In the first scenario, where there is a 1 per 10,000 increase in likelihood of quitting smoking compared to baseline, then the intervention is of "Low Value" or not cost-effective. If the quit rate turned out to be 1 per 1,000, then the intervention would be of "High Value," and if 1 per 100, the intervention would have a positive ROI and would be cost-saving. We were unable to determine which scenario was most likely, although the low uptake of referrals and ultimately enrollment for smoking cessation documented in the EHR data suggests the first scenario of gains near to 1 per 10,000 smokers, and that more would need to be done to ensure higher quit rates. However, if the enrollment increased or more physician counseling occurred, the intervention could be highly cost-effective. We are limiting our interpretation to the scenario where increased physician counseling could occur rather than asserting that only physician counseling occurred in the PWTF program.

In short, the data did not support significant evidence of referrals for smoking cessation programs or counseling. However, it is possible that more smoking cessation counseling occurred than what was recorded due to the fact that the data fields available do not allow for it to be captured and many providers do not code for this in their billing. Based on the limited data available, we projected that the effects of the intervention were not cost-effective at current observed rates. However, if quit rates from increased counselling referrals could occur at a rate of 10 times what was recorded in the data then it would be cost-effective, and if 100 times what was recorded, it would have a positive return on investment.

Section Seven: Process Data Methodology and Results

Mixed Methods Approach for Understanding Implementation and Systems Building

The evaluation's mixed methods approach consists of three primary components:

- Framework
- Methods:
  - Measures
  - Qualitative Interviews
  - Quantitative Surveys
  - Data Management and Analysis
  - Data Integration
  - Data Limitations
- Results:
  - Implementation Survey Analysis
  - Social Network Survey Analysis
  - Perceptions of Implementation Challenges and Successes
  - Integration of Process Data: Themes and Lessons Learned

Framework

The field of dissemination and implementation science is concerned with generating knowledge beyond clinical trials and effectiveness research to investigate change in real-world settings. Here, we focus on implementation, defined as the way and degree to which an intervention is put into place in a given setting.[28] Implementation includes the process of integrating evidence-based interventions within a community or clinical setting as well as developing partnerships and supportive systems for delivery. Additionally, we are concerned with understanding the contextual factors that influence successful implementation of evidence-based interventions.

The Consolidated Framework for Implementation Research (CFIR) provided a framework for our evaluation, aiming to identify actionable factors that influence success within five domains: the inner setting, the outer settings, characteristics of individuals, characteristics of the intervention, and processes.[29,30] Social network analysis further helps to describe the function and impact of such partnerships, as it focuses on relationships (here, between organizations) and takes a systems perspective.[31] Social network analysis has been applied effectively to the study of a range of collaborative efforts among organizations engaged in health promotion activities.[32,33,34] In applying this methodology to the PWTF evaluation, we used a community-focused social network analysis to gain a system perspective assessing relationships in defined networks within each of the nine PWTF communities. Our mixed methods approach is particularly useful when exploring the perspectives of practitioners of a given evidence-based program or strategy[35] and supports the multi-level assessments required for a comprehensive assessment of implementation efforts.[36]

[28] Brownson R, Colditz G, Proctor E: Dissemination and Implementation Research in Health: Translating Science to Practice. New York: Oxford University Press, 2012.
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[30] Damschroder LJ, Aron DC, Keith RE, et al.: Fostering implementation of health services research findings into practice: a consolidated framework for advancing implementation science. Implementation Science. 2009, 4.
[31] Luke DA, Harris JK: Network analysis in public health: history, methods, and applications. Annu Rev Public Health. 2007, 28.
[32] Ramanadhan S, Salhi C, Achille E, et al.: Addressing cancer disparities via community network mobilization and intersectoral partnerships: A social network analysis. PLoS One. 2012, 7:e32130.
[33] Valente TW, Chou CP, Pentz MA: Community coalitions as a system: effects of network change on adoption of evidence-based substance abuse prevention. American Journal of Public Health. 2007, 97:880-886.
[34] Valente TW, Coronges KA, Stevens GD, Cousineau MR: Collaboration and competition in a children's health initiative coalition: A network analysis. Evaluation and Program Planning. 2008, 31:392-402.
[35] Palinkas LA, Horwitz SM, Chamberlain P, Hurlburt MS, Landsverk J: Mixed-methods designs in mental health services research: a review. Psychiatric Services. 2011, 62:255-263.
[36] Aarons GA, Fettes DL, Sommerfeld DH, Palinkas LA: Mixed methods for implementation research application to evidence-based practice implementation and staff turnover in community-based organizations providing child welfare services. Child Maltreatment. 2012, 17:67-79.

Methods

Our three-phase mixed methods implementation evaluation began in March 2016 with 1.5-hour semi-structured qualitative telephone interviews with two leaders from each of the nine partnerships identified by MDPH. These key informants included the current PWTF project manager from each Coordinating Partner organization, as well as health department directors, community health center senior leadership, and past leaders in communities where turnover has occurred. The aim of these Phase 1 interviews was to document partnership development and function, intervention adaptation and delivery, and the influence of contextual factors on implementation.

Interview results informed a quantitative online Implementation Survey fielded with one to three contacts from each organization involved with implementing the PWTF interventions to assess the experiences and perception of clinical and community-based staff, and a Social Network organization-level online survey to assess the relationships among PWTF partner organizations. These surveys were completed in April–May 2016. The interviews and quantitative data then informed selection of staff who participated in 1.5-hour-long Phase 3 in-person interviews in June–August 2016 to explore the most successful experiences of implementing evidence-based interventions for the four conditions.

This study has been approved by the university's Office of Human Research Administration. Each interview was recorded (audio only) and transcribed verbatim. Surveys were conducted online via REDCap electronic data capture tools hosted at the Harvard T.H. Chan School of Public Health. Participants in the Implementation and Social Network surveys were entered in a raffle with a chance to win a $25 gift card and all Phase 3 interview participants were compensated with a $25 gift card.

Measures

The research team adapted an existing interview guide[37] and validated survey items[38,39] based on the Consolidated Framework for Implementation Research (CFIR) to the PWTF settings and outcomes.

Qualitative Interviews

Implementation factors explored in the Phase 1 interviews included buy-in among leadership and staff, a description of how interventions are delivered (including any adaptations), discussion of the easiest and most challenging changes, the role of community health workers, and strategies to address health equity. Participants were asked to describe their perceptions of the evidence-based interventions, with specific probes to elicit reflections on the complexity, relative advantage, and design quality/packaging of the PWTF interventions. Characteristics of individuals involved with implementation were captured with a description of the title and role of each key informant and perceptions of turnover experienced throughout the initiative. Participants were asked to describe their perceptions of the characteristics of the inner setting of the clinical and community organizations in the partnership that influenced implementation, with specific probes to elicit reflections on leadership engagement and available resources. Key informants were also asked to

[37] Damschroder LJ, Lowery JC: Evaluation of a large-scale weight management program using the consolidated framework for implementation research (CFIR). Implementation Science. 2013, 8.
[38] Fernandez ME, Calo W, Kegler M, et al.: Measurement of the Inner Setting Constructs in Federally Qualified Health Centers. 7th Annual Conference on the Science of Dissemination and Implementation. Bethesda, MD, 2014.
[39] Liang L, Kegler M, Fernandez ME, et al.: Measuring Constructs from the Consolidated Framework for Implementation Research in the Context of Increasing Colorectal Cancer Screening at Community Health Centers. 7th Annual Conference on the Science of Dissemination and Implementation. Bethesda, MD, 2014.

discuss the influence of the outer community setting and processes such as planning and engaging champions and opinion leaders. Finally, we utilized the initial key informant interviews to elicit three major types of information to drive the quantitative social network analysis:

1) Network boundary specification (or the set of organizations involved in the partnership)[40];
2) Specification of relationships that are most important to the network (such as collaboration or referrals); and
3) Understanding of the roles of unofficial partners and how best to elicit this information in subsequent interviews.

Examples of qualitative interview questions appear in **Table 21**.

Phase 3 interviews with practitioners were conducted to gain a deeper understanding of the on-the-ground experience of implementing the evidence-based interventions to address hypertension, falls among older adults, pediatric asthma, and tobacco cessation as part of the Prevention and Wellness Trust Fund. The interview guide was adapted to ask open-ended questions that would build on the descriptive statistics derived from the quantitative surveys fielded in Phase 2. We developed targeted interview probes for CFIR items with the highest or lowest average scores on the survey, which are hypothesized barriers and facilitators to understand in greater depth.

Implementation constructs explored in the Phase 3 follow-up interview included the experience of implementing specific evidence-based interventions as well as an exploration of the contextual influences on implementation. Elements of the implementation experience include buy-in among leadership and staff, a description of how interventions are delivered (including any adaptations), discussion of the easiest and most challenging changes, the role of community health workers, and strategies to address health equity. Clinical partners were also asked to discuss how quality of care initiatives impacted implementation of the PWTF interventions.[41] Again, all five domains in the CFIR were explored in this phase in reference to the specific target health conditions.[42] Similar to Phase 1 interviews as described above, participants were asked to describe their perceptions of the characteristics of the interventions, with specific probes to elicit reflections on the complexity, relative advantage, and design quality/packaging of the specific evidence-based interventions being implemented for each health condition. Characteristics of individuals involved with implementation were captured with a description of the title and role of each key informant and perceptions of turnover experienced throughout the initiative. Participants were asked to describe their perceptions of the characteristics of the inner setting that influenced implementation, with specific probes to elicit reflections on leadership engagement, available resources, and competing priorities.[43,44,45] Finally, key informants were asked to discuss the influence of the outer setting and processes such as planning and engaging champions and opinion leaders. There are examples of qualitative interview items in **Table 21.**

[40] Wasserman S, Faust K: Social Network Analysis: Methods and Analysis. New York: Cambridge University Press, 1994.
[41] Kruse G, Hays H, Orav E, Palan M, Sequist T: Meaningful use of the Indian Health Service Electronic Health Record. Health Services Research. In press.
[42] Damschroder LJ, Aron DC, Keith RE, et al.: Fostering implementation of health services research findings into practice: a consolidated framework for advancing implementation science. Implementation Science. 2009, 4.
[43] Rittenhouse DR, Schmidt L, Wu K, Wiley J: Contrasting trajectories of change in primary care clinics: lessons from New Orleans safety net. Ann Fam Med. 2013, 11 Suppl 1:S60-67.
[44] Liddy CE, Blazhko V, Dingwall M, Singh J, Hogg WE: Primary care quality improvement from a practice facilitator's perspective. BMC Fam Pract. 2014, 15:23.
[45] Holtrop JS, Potworowski G, Fitzpatrick L, Kowalk A, Green LA: Understanding effective care management implementation in primary care: a macrocognition perspective analysis. Implement Sci. 2015, 10:122.

Quantitative Surveys

The social network survey focused on the networks among all the organizations involved in each of the nine partnerships. It asked questions about a core set of relationships such as collaboration, communication, and referrals among network members for each of the four main PWTF health conditions. We also asked about past relationships and perceived sustainability of reported connections after funding is completed.

The organizational-level survey included questions about the individuals involved with implementation such as the proportion of turnover and staffing shortages as well as the inner setting measures of organization type and size (e.g., number of employees and staff). Those in clinical sites completed outer setting items related to external policies and incentives. Prior research shows competing priorities may consume the time and attention of a practice, acting as a barrier to implementation of practice initiatives.[46,47]

Among the possible competing priorities for practices during the PWTF were electronic health record (EHR) changes or adoption, federal Meaningful Use of EHR standards, Patient Centered Medical Home (PCMH) certification, or participation in risk-based Accountable Care Organization models. We sought to understand whether these or other competing priorities drew staff attention away from PWTF to impair implementation of PWTF interventions, or if they bolstered PWTF implementation because of common activities, overlapping incentives, or shared objectives. Another possible synergy for practices was overlapping reporting requirements. Many practices have required reporting to Federal agencies (e.g., HRSA or CMS) or as part of their health plan contracts. If reporting requirements overlapped with PWTF activities it is possible this shared goal also aided PWTF implementation.

Items included on the implementation survey included the perceived degree of implementation for each evidence-based intervention measured on a 3-point Likert scale with 0 indicating no implementation to 3 indicating the intervention has been implemented "fully and systematically."[48] Items measuring characteristics of the intervention include relative advantage, complexity, and compatibility. Inner-setting items assess learning climate, implementation climate, leadership engagement, and available resources. Items related to processes included planning, engaging with champion/opinion leaders, executing, reflecting & evaluating, and goals & feedback. These CFIR survey items are measured on a 5-point Likert scale with responses ranging from 1-strongly disagree to 5-strongly agree. Additionally, we asked each individual involved with implementation to report their title, role, age, sex, race/ethnicity, education, language spoken, and years of experience. **Table 21** includes examples of survey items.

[46] Holtrop JS, Potworowski G, Fitzpatrick L, Kowalk A, Green LA: Understanding effective care management implementation in primary care: a macrocognition perspective analysis. *Implement Sci.* 2015, *10:*122.
[47] Rittenhouse DR, Schmidt L, Wu K, Wiley J: Contrasting trajectories of change in primary care clinics: lessons from New Orleans safety net. Ann Fam Med. 2013, 11 Suppl 1:S60-67.
[48] Damschroder LJ, Aron DC, Keith RE, et al.: Fostering implementation of health services research findings into practice: a consolidated framework for advancing implementation science. Implementation Science. 2009, 4.

Table 21: Sample Qualitative Interview and Quantitative Survey Questions Aligned with the Consolidated Framework for Implementation Research

Construct	Qualitative Interview Questions	Quantitative Survey Items
Inner Setting		
Leadership Engagement	What level of involvement and support for the Prevention Wellness Trust Fund have you seen or heard from leaders within your institution during the implementation period?	The leadership makes sure that we have the time and space necessary to discuss changes to improve our practices [*5-point Likert scale]*
Available Resources	What costs were incurred by implementing the Prevention Wellness Trust Fund initiative? *Probes for personnel time, training, purchase*	The following are available to make [insert evidence-based intervention] work in our partnerships: equipment and materials, sufficient staffing, data systems/IT support [*5-point Likert scale]*
Outer Setting		
External Policies and Incentives	Were there any concurrent initiatives that influenced your ability to implement the PWTF interventions? • Examples include PCMH certification, transition to ACO model, EHR changes, behavioral health integration efforts • Did other initiatives help you to implement PWTF activities? How? • Did you delay or decline to do other initiatives because of the PWTF? What did you delay or decline?	Has your practice participated in any of the following initiatives or activities at the same time as the PWTF project activities? • Patient Centered Medical Home certification • Any electronic health record transition(s) • New risk-sharing or accountable care organization contracts • Meaningful Use attestation
Processes		
Goals	To what extent has your organization set goals for implementing the intervention? Have these changed over time?	Organizational leaders establish clear goals for using [insert evidence-based intervention] to address [health condition] [*5-point Likert scale]*
Characteristics of the Intervention		
Complexity	How would you gauge the time and effort required to implement the Prevention Wellness Trust Fund over the course of the project?	Overall, I believe that is was complicated to implement [insert evidence-based intervention] [*5-point Likert scale]*
Characteristics of the Individual		
Turnover	Did your organization experience any turnover this year? How did that influence your ability to implement Prevention Wellness Trust Fund evidence-based interventions?	Has your organization experienced any turnover of staff working on PWTF since September 2014? If yes, how many staff have left?

Data Management and Analysis: Qualitative

After audio-recordings of interviews were transcribed, the research team reviewed transcripts for key themes and constructs. Qualitative coding was managed using NVivo 11 software. For the qualitative investigation of contextual factors, we conducted a cross-case analysis that begins deductively according to CFIR, and then inductively coded additional patterns and themes. Rigor was ensured with analysis triangulation; a sub-sample of interviews were coded by two researchers to ensure reliability and multiple perspectives.[49,50]

Data Management and Analysis: Quantitative

Quantitative implementation survey data was analyzed in SAS. Descriptive statistics, such as mean scores for implementation outcomes and CFIR constructs, were calculated for all outcomes. We created a partnership-level implementation summary score for each evidence-based intervention, averaging ratings from all respondents in each partnership. This summary score was used to identify self-reported high implementation partnerships in each health condition for the Phase 3

[49] Patton M: Qualitative research and evaluation methods. 3rd edition. Thousand Oaks, CA: Sage Publications, 2002.
[50] Damschoder LJ, Goodrich DE, Robinson CH, Fletcher CE, Lowery JC: A systematic exploration of differences in contextual factors related to implementing the MOVE! weight management program in VA: A mixed methods study. Bmc Health Services Research. 2011, 11.

interviews. Implementation ratings range from 0 (no implementation) to 3 ("we have implemented this intervention fully and systematically"). CFIR ratings range from 0 ("strongly disagree") to 5 ("strongly agree").

Intervention complexity ratings were reverse-coded so all high scores could be interpreted as positive and low scores interpreted as negative. We assessed the internal consistency reliability of each of the CFIR constructs for each of the health conditions and created a summary score for each CFIR construct (e.g., implementation climate, compatibility of the intervention, etc.). We modeled univariate regression analyses to gain a preliminary understanding of the relationship between the perceived CFIR implementation factors and outcomes. Quantitative social network analyses center on whole-network analysis. For each of the nine partnerships, we assessed and mapped intra-partnership networks to identify patterns of interest regarding connections.

Data Integration

Integration of quantitative and qualitative data is key to conducting strong mixed methods research.[51] In this multi-phase evaluation, data were integrated or linked in several ways. First, while the mandated evaluation focused solely on the analysis of large quantitative datasets of medical claims, hospital discharges, and aggregated electronic health records, the PWTF Advisory Board and our research study team prioritized embedding qualitative data into the larger evaluation to understand the complexities of the local implementation experience. The integration of quantitative and qualitative data also involved building measures. For instance, the initial interviews with key informants were used to adapt survey items for a tailored quantitative assessment of partnership social networks and implementation of the PWTF evidence-based interventions.

Additionally, the study followed up on surveys with a second round of interviews as a means of explaining the quantitative results in greater depth through qualitative description. We used quantitative data on perceived level of implementation to sample "high implementation" partnerships and create qualitative probes to follow up on specific contextual factors with the highest and lowest mean scores in the survey. In the results section of this report, interview data is integrated with survey data, looking for concordant and discordant results, to help develop a comprehensive understanding of the implementation experience of the PWTF initiative.[52] Finally, we also used more open-ended interviews and focus groups with staff from four other partnerships as another way of triangulating our data and increasing integration across the PWTF initiative. In total, follow-up interview and focus group data was collected from eight of the nine partnerships.

Data Limitations

Limited scope of time to conduct the evaluation meant that we prioritized in-depth follow-up interviews with practitioners from "high implementation" partnerships. With more time, it would be valuable to explore in greater depth, via follow-up interviews, the process and contextual factors that influenced partnerships that have less success with implementation. The challenges of time constraints also limited our ability to use more objective quantitative data to define "high implementation" partnerships, given that a large amount of claims, hospitalization, and other data were not available until fall 2016. However, in the end, this self-report seemed to have served as a good proxy for clinical change data.

[51] Fetters MD, Curry LA, Creswell JW: Achieving integration in mixed methods designs-principles and practices. Health Serv Res. 2013, 48:2134-2156.
[52] Creswell JW, Plano Clark VL: Designing and Conducting Mixed Methods Research 2nd Edition. Los Angeles: Sage, 2011.

The partnership selected as a high implementer for the hypertension condition was one of the partnerships with a decrease in prevalence; the partnership selected as a high implementer for asthma was one of the four with larger drops in rates than the state average; and the partnership selected as a high implementer for falls was one of two with small reductions in fall-related injury prevalence. Finally, we note the limitations of our univariate regression analyses. The quantitative implementation survey data are currently being treated as continuous variables. In future analyses, we hope to explore whether treating the variables as ordinal using the scales for the implementation level and CFIR factors impact results. We also hope to fit multivariable models to determine which CFIR factors have the strongest relationship with perceived implementation of the PWTF evidence-based interventions.

Implementation Survey Analysis

Phase 1 interviews were conducted with pairs of leaders from all nine PWTF partnerships. Coordinating Partners identified 172 individuals involved in the four priority heath conditions to participate in the implementation survey. Of these, 151 completed the online survey for a response rate of 88%. **Table 22** shows the characteristics of the individuals who completed the implementation survey in spring 2016.

Table 22: Characteristics of Individuals who Completed the Prevention and Wellness Trust Fund Implementation Survey in Spring 2016 (N=151)

	N	Mean (SD) or Percent
Age (years), Mean (SD)	113	46.6 (12.5)
Gender (%)	117	
Women		88.9%
Men		11.1%
Race/Ethnicity (%)	151	
White		61.6%
Hispanic or Latino		9.3%
Asian		3.3%
Black or African American		2.0%
Other		2.7%
Education (%)	118	
Graduate school or higher		61.8%
College		27.1%
Some college/Associates		10.2%
High school		<1.0%
Language Spoken (%)	151	
Spanish		13.9%
Portuguese		6.0%
Chinese		2.0%
Arabic		1.3%
French		1.3%
Vietnamese		<1.0%
Role (%)	151	
Coordination/Management		41.1%
Leadership		34.4%
Community Outreach		30.0%
Administrative		27.8%
Quality Improvement		25.2%
Community direct services (including CHWs)		22.5%
Referrals		17.9%
Consultation		12.6%
Clinical Services		11.3%
Years of experience at organization, Mean (SD)	119	7.1 (7.5)
Average hours per week at this job, Mean (SD)	119	38.9 (29.0)

The roles of people who completed the survey were varied, ranging from management (41%) and leadership (34%) positions to community outreach (30%) and community direct services, such as community health workers (23%), to referrals (18%) and clinical services (11%), suggesting that we captured diverse perspectives on the implementation experience. The majority of participants were women and college- or graduate school-educated averaging 47-years-old. Sixty-two percent of respondents identified as white, 10% identified Hispanic or Latino; there were few Asian or Black respondents. Fourteen percent of respondents reported speaking Spanish.

Leaders from 82 organizations across the nine partnerships were invited to participate in the social network organizational survey. We received responses from 72 leaders for a response rate of 88%. Two organizations were excluded from the analysis given incomplete data. **Table 23** provides a

summary of the characteristics of organizations that completed the PWTF social network survey in spring 2016.

Table 23: Characteristics of Organizations that Completed the Prevention and Wellness Trust Fund Social Networking Survey in Spring 2016 (N=70)

	N	Mean (Range) or Percent
Organization Type	65	
Community/school	23	35.4%
Clinical	20	30.8%
City/county/town government	13	20.0%
Other	9	13.9%
People Served On-Site During a Typical Week	63	
1-100	18	28.6%
101-800	16	25.4%
800+	23	36.5%
NA - Organization does not provide direct services	6	9.5%
Number of Employees	61	338.1 (1-7000)
Current PWTF Staff Shortages	65	
No	50	76.9%
Yes	15	23.1%
PWTF Turnover Since 2014	68	
No	36	52.9%
Yes	32	47.1%
If turnover, number of PWTF staff left	32	2.2 (1-5)

There was a great diversity of organization types (35.4% community, 30.8% clinical, 20.0% government) within the PWTF partnerships, which may have played an important role in improving peer networks and collaboration across sectors and facilitating the implementation of the PWTF interventions. Phase 3 interviews were conducted with 24 practitioners in four partnerships. Ten participants worked in clinical settings with roles such as nurse manager, physician, tobacco cessation counselor, community health worker, and practice administrator; 14 worked in community-based settings in the roles of: community health worker, YMCA program leader/trainer, health department director, and school-based nurse. The open-ended interviews and focus groups conducted in August/September 2016 with the remaining four partnerships included a diverse group of about forty clinical and community-based providers.

Social Network Survey Analysis: Partnership Networks

The social network analysis provides insight into how the partnerships were developed, function to deliver the PWTF interventions, and may be sustained in the future. As illustrated in **Figures 37–40**, the maps present relationships between PWTF partners for a given health issue (i.e., tobacco use, hypertension, falls among older adults, and pediatric asthma). In these figures, each box, or node, represents an organization and each line represents a reported interaction between a pair of organizations. If a symbol has an arrow going into it, that means the corresponding partner reported a collaboration or referral relationship (color-coded) with them. The organizations at the "center" of the map (where applicable) can be thought of as more active in the collaboration network compared to those on the periphery of the map.

Figure 37: PWTF Partnership 1: Tobacco Network (N=12)

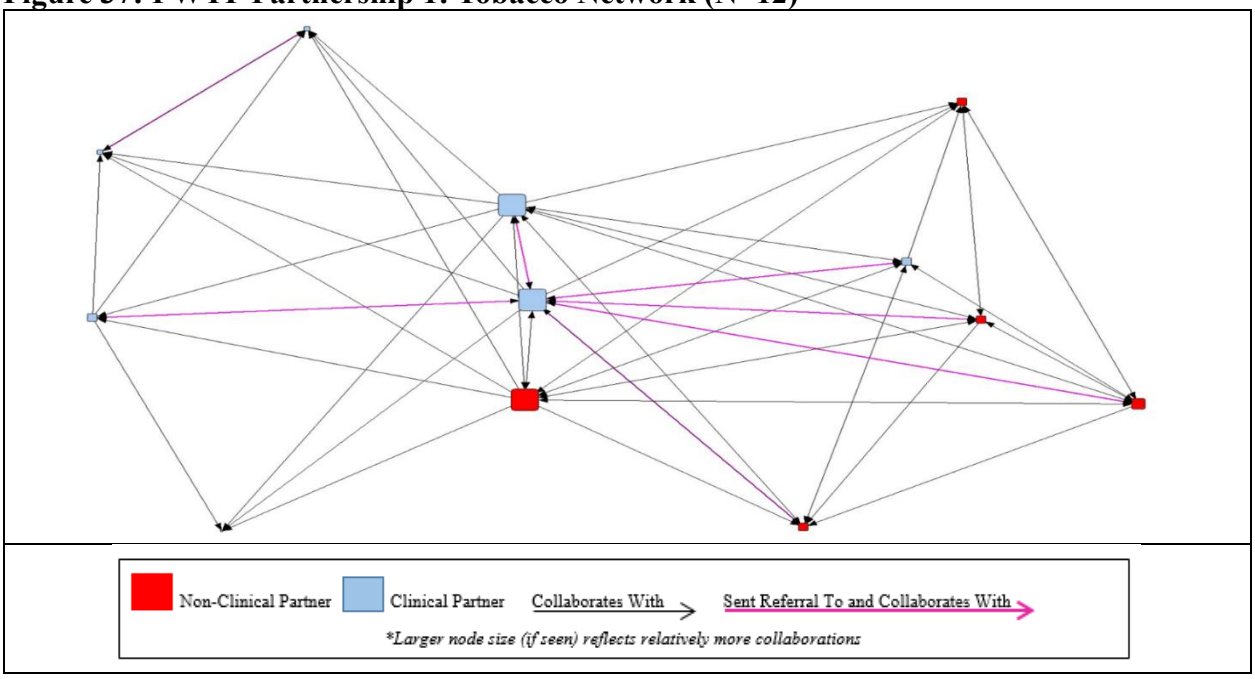


Figure 38: PWTF Partnership 2: Hypertension Network (N=3)

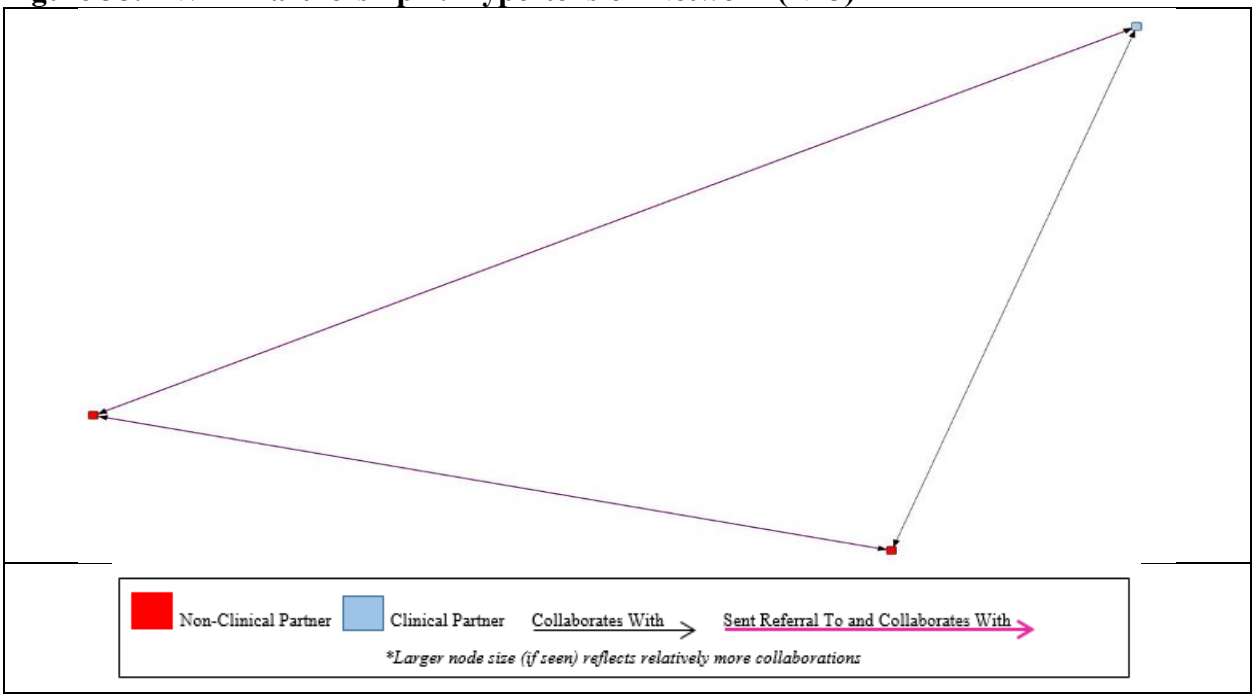


Figure 39: PWTF Partnership 3: Falls Network (N=7)

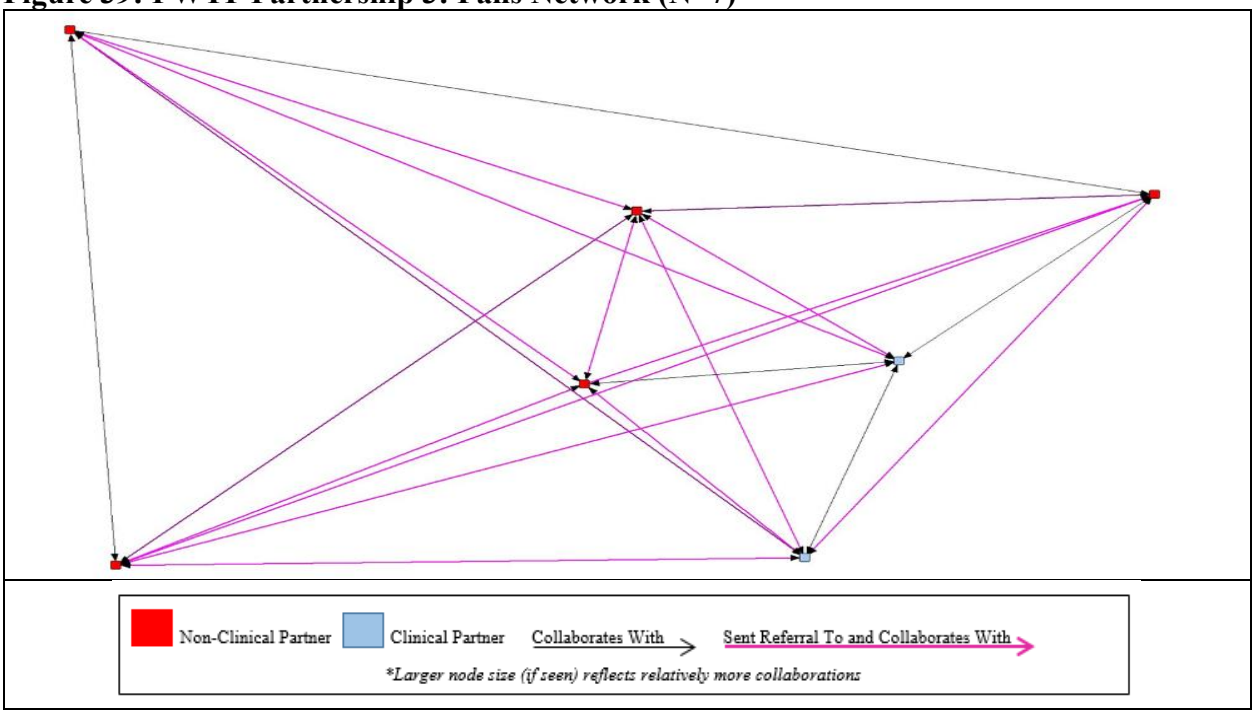
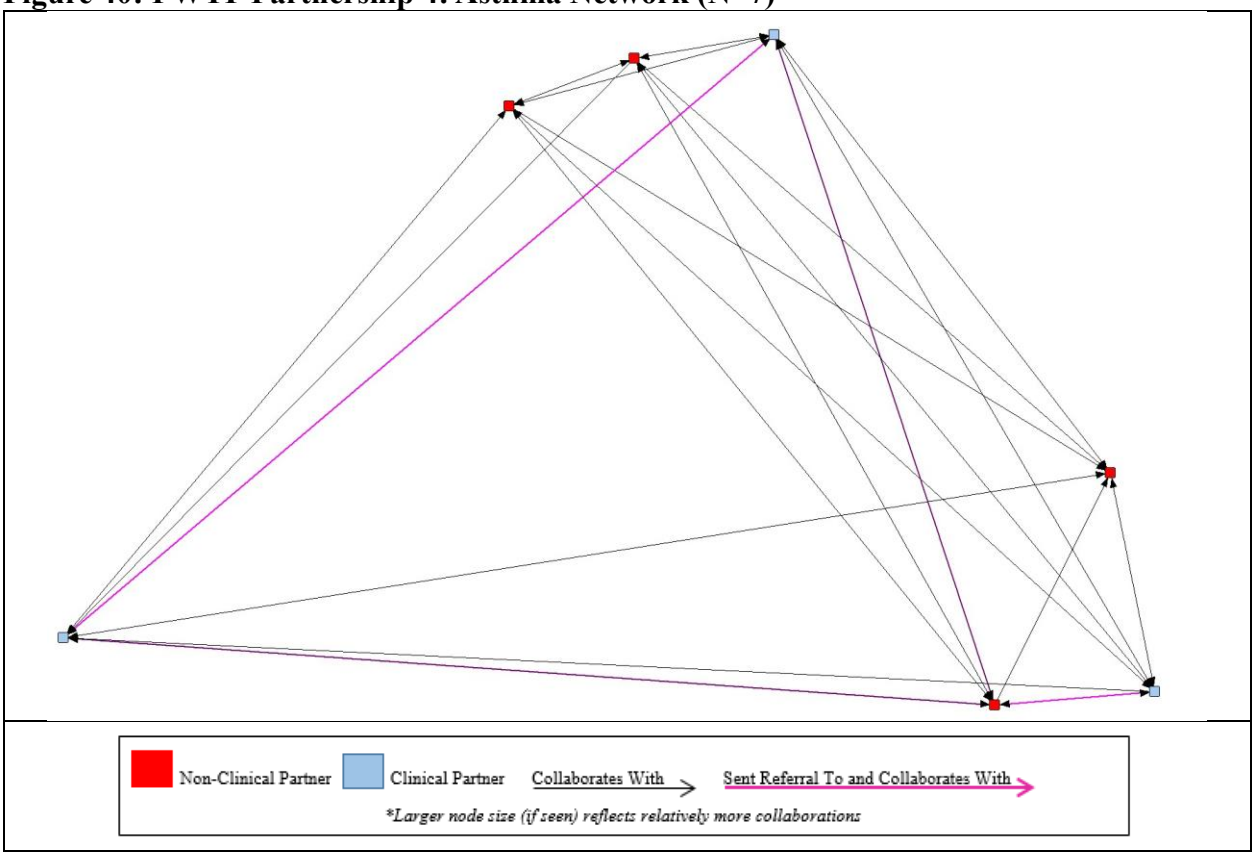


Figure 40: PWTF Partnership 4: Asthma Network (N=7)



The rate of reciprocation of collaboration connections was approximately 85%. In other words, each collaborating partner independently affirmed the same level of connection. About two-thirds of collaborations for the PWTF work were among partners with a prior history of collaboration. Network members played a wide range of roles: granting access to populations, connecting community members with services, sharing best practices, sending / receiving referrals, providing technical assistance, providing training / capacity-building, and sharing staff.

High expectations were shown regarding future collaboration with PWTF partners (mean = 4.27/5, where 1 = highly unlikely and 5 = highly likely) among social network survey respondents. However, implementers seemed to have a more cautious view and discussed challenges related to partners having different target populations, geographic service areas, etc. Elsewhere in this report, we discuss falls as the best example of new infrastructure development. The social network analysis supports the observation that this was a new component for many of the participating organizations. Only about 50% of falls partners were previous collaborators compared with 83% for asthma, 75% for hypertension, and 64% for tobacco.

Implementation of PWTF Evidence-Based Interventions

Survey respondents who reported being part of implementation for each of the four priority health conditions were asked to provide their perceived rating of implementation for each of the PWTF evidence-based interventions (**Table 24**). Ratings were given on the scale of 0-3 as follows:

0: 0ur partnership is not implementing this intervention
1: We are in the early stage of implementation
2: We have implemented this strategy, but inconsistently
3: We have implemented this intervention fully and systematically

Table 24: Perceived Implementation Level of the Prevention and Wellness Trust Fund Evidence-Based Interventions

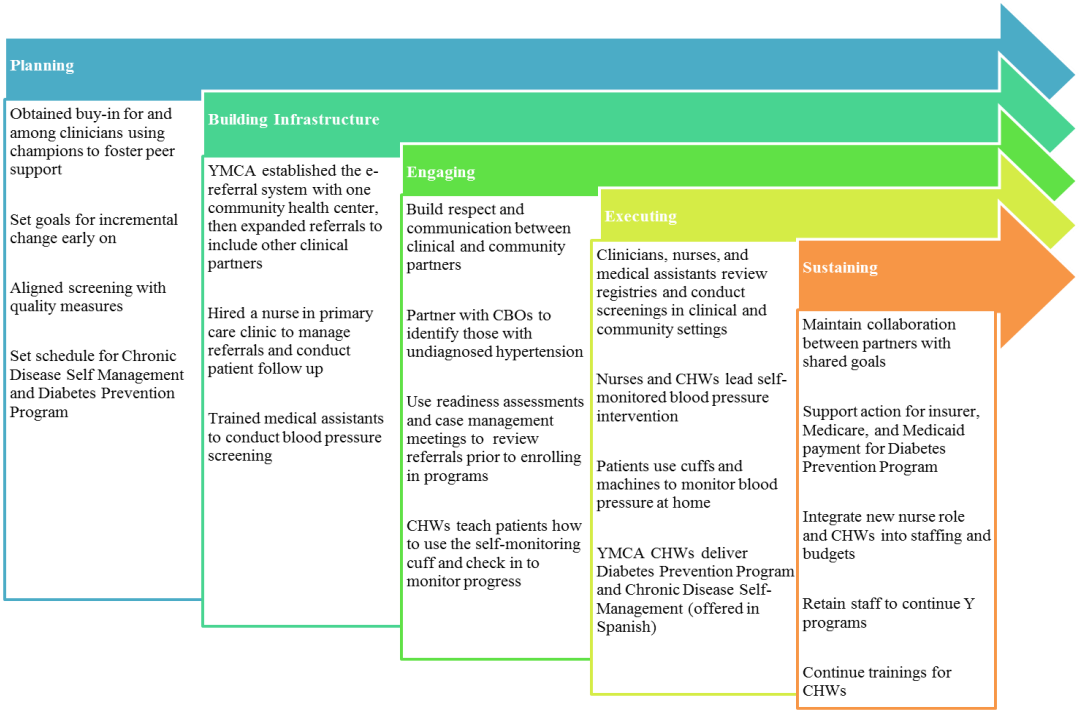
Conditions and Interventions	Mean (SD) Implementation Score [a]
Tobacco Use	
U.S. Preventive Services Task Force screening guidelines (N=30)	2.70 (0.65)
Tobacco cessation counseling (N=49)	2.57 (0.79)
Smoke-free environments (N=50)	2.48 (0.84)
Hypertension	
Evidence-based guidelines for hypertension screening (N=77)	2.48 (0.66)
Chronic disease self-management programs (N=86)	2.23 (0.99)
Self-measured blood pressuring monitoring with additional support (N=77)	1.71 (1.33)
Diabetes Prevention Program (YDDP or NDPP) for patients with hypertension (N=73)	1.23 (1.37)
Pediatric Asthma	
Care management for high risk asthma patients (N=37)	2.46 (0.93)
Asthma self-management in primary care (N=26)	2.17 (1.11)
Home-based multi-trigger component intervention (N=37)	2.16 (1.07)
Comprehensive school-based asthma program (N=38)	1.66 (1.15)
Comprehensive head start-based asthma program (N=30)	1.23 (1.36)
Falls Among Older Adults	
A Matter of Balance (N=79)	2.61 (0.72)
Home safety assessments and modifications (N=64)	2.28 (1.03)
STEADI clinical risk assessment (N=59)	2.10 (0.98)
Tai Chi: Moving for Better Balance (N=71)	1.59 (1.35)

Self-reporting implementation rates were as follows:
0: 0ur partnership is not implementing this intervention
1: We are in the early stage of implementation
2: We have implemented this strategy, but inconsistently
3: We have implemented this intervention fully and systematically
Respondent N differs for each evidence-based intervention because only respondents who reported being part of implementation were asked to provide a rating.

All tobacco use interventions were perceived as being implemented successfully, averaging scores of 2.5 to 2.7. Evidence-based screening guidelines were perceived as being implemented successfully (mean rating 2.5), while the Chronic Disease Self-Management Program received inconsistent implementation ratings (mean 2.2) and Self-Measured Blood Pressure Monitoring and Diabetes Prevention Programs for hypertension got low ratings (means 1.7 and 1.2, respectively) from practitioners. Similarly, with respect to asthma, clinical care management for high-risk patients had high ratings of implementation (mean 2.5), while self-management and home-based interventions received inconsistent implementation ratings (mean for both 2.2) and Head Start and school-based programs had low ratings (means 1.7 and 1.2). For falls, Matter of Balance had the highest implementation score (mean 2.6), indicative of success. Ratings for the home-based falls intervention and the STEADI falls assessment indicated inconsistent implementation (means 2.3 and 2.1) and Tai Chi implementation was low (mean 1.6).

Qualitative data from the Phase 3 interviews help to explain how the PWTF evidence-based interventions were implemented in partnerships that reported success in the implementation survey. **Figure 41** illustrates the many stages that are required in the process of PWTF implementation using the case example of hypertension. It consists of the four clinical and community interventions: hypertension screening (clinical), self-monitored blood pressure (clinical and community), the Chronic Disease Self-Management Program (community) and the Diabetes Prevention Program for Hypertensive Patients (community). Careful planning, infrastructure building, and engagement were all required before the evidence-based interventions could be delivered. Practitioners also provided insights into how the hypertension work could be sustained after PWTF, including what resources and activities would be most important to continue as well as plans they had already made to weave elements of the work into their existing organizations.

Figure 41: Hypertension Implementation Process Case Example



Perceptions of Implementation Successes and Challenges

Table 25 shows quantitative data on practitioners' perceptions of the factors related to implementation of the PWTF evidence-based interventions. Mean scores of 4.0 and above indicate that respondents agree or strongly agree with statements about the construct. Ratings of implementation climate were high for all tobacco interventions, hypertension screening, self-monitored blood-pressure, the home-based asthma intervention, and Matter of Balance. Intervention compatibility was the lowest for all interventions and simplicity ratings were low for the asthma intervention, home-based falls intervention, and the STEADI assessment. Ratings indicate that sufficient resources were available for the tobacco interventions, self-monitoring blood pressure, and Matter of Balance, but more resources were needed for most interventions. Data systems received consistently low ratings, while buy in and resources such as equipment were typically rated higher. (Data not shown.)

Respondents rated the learning climate and leadership engagement of their organization as supportive (all mean ratings greater than 4.0); however, perceived availability of financial resources, training, and staffing were more limited (all mean ratings less than 4.0). Practitioners also reported supportive processes such as programs that aligned well with their mission or strategic plan, using data to guide operations, and good communication about changes within their organization (all mean ratings greater than 4.0).

Table 25: Perceived Factors from the Consolidated Framework for Implementation Research Influencing Prevention and Wellness Trust Fund Implementation

Conditions and Interventions	Implementation Score (Range 1-3)[a]	Implementation Climate (Range 1-5)[bi]	Intervention Compatibility (Range 1-5)[ci]	Intervention Simplicity (Range 1-5)[di]	Resources (Range 1-5)[ei]	Processes (Range 1-5)[fi]
Tobacco Use						
U.S. Preventive Services Task Force screening guidelines	2.70 (0.65)	4.09 (0.66)	2.80 (0.46)	3.28 (0.50)*	4.20 (0.59)	4.04 (0.77)
Tobacco cessation counseling	2.57 (0.79)	4.04 (0.59)	2.88 (0.41)	3.28 (0.57)	3.90 (0.66)	4.00 (0.68)*
Smoke-free environments	2.48 (0.84)	4.08 (0.60)*	2.99 (0.32)	3.22 (0.65)	3.99 (0.51)*	4.00 (0.80)
Hypertension						
Evidence-based guidelines for hypertension screening	2.48 (0.66)	4.04 (0.64)*	2.95 (0.36)	3.28 (0.76)*	3.81 (0.69)*	3.91 (0.82)*
Chronic disease self-management programs	2.23 (0.99)	3.87 (0.69)*	2.71 (0.56)*	2.99 (0.76)*	3.80 (0.71)*	3.80 (0.71)*
Self-measured blood pressuring monitoring with additional support	1.71 (1.33)	4.04 (0.70)*	2.93 (0.44)	3.09 (0.93)*	4.00 (0.74)*	4.04 (0.83)*
Diabetes Prevention Program for patients with hypertension	1.23 (1.37)	3.77 (0.73)	2.80 (0.44)	3.12 (0.71)	3.84 (0.60)	3.75 (0.87)
Pediatric Asthma						
Care management for high risk asthma patients	2.46 (0.93)	4.11 (0.56)	3.04 (0.35)	2.95 (0.76)	3.97 (0.63)	4.17 (0.66)
Asthma self-management in primary care	2.17 (1.11)	3.88 (0.56)	2.89 (0.37)	2.84 (0.78)	3.77 (0.60)	4.00 (0.66)
Home-based multi-trigger component intervention	2.16 (1.07)	4.02 (0.56)	2.93 (0.38)	2.57 (0.75)	3.77 (0.59)	4.15 (0.61)
Comprehensive school-based asthma program	1.66 (1.15)	3.68 (0.64)	2.80 (0.51)	2.95 (0.44)	3.54 (0.69)*	3.86 (0.72)
Comprehensive head start-based asthma program	1.23 (1.36)	3.69 (0.60)	2.83 (0.31)	2.67 (0.66)	3.22 (0.69)	3.62 (0.46)*
Falls Among Older Adults						
A Matter of Balance	2.61 (0.72)	4.00 (0.73)*	2.89 (0.40)*	3.31 (0.79)*	3.93 (0.74)*	4.01 (0.86)*
Home safety assessments and modifications	2.28 (1.03)	3.82 (0.67)*	2.72 (0.55)	2.92 (0.86)*	3.74 (0.76)*	3.80 (0.86)*
STEADI clinical risk assessment	2.10 (0.98)	3.76 (0.63)*	2.67 (0.45)*	2.94 (0.75)*	3.75 (0.70)*	3.78 (0.75)*
Tai Chi: Moving for Better Balance	1.59 (1.35)	3.83 (0.78)	2.74 (0.46)	3.13 (0.90)	3.78 (0.73)*	3.76 (0.86)

a. Implementation score rated on a scale of 0-3, with 0 being not implemented and 3 being fully and systematically implemented.
b. Implementation climate consists of 4 questions about intervention priority in the organization, staff expectations, support, & recognition for implementation.
c. Intervention compatibility consists of 2 questions about alignment with current organizational activities and fit with the way implementers like to work.
d. Intervention simplicity consists of 4 questions about the ease of training staff and implementation as well as degree of changes to practice & amount of work.
e. Intervention-specific resources include equipment, public awareness or need, staff buy in, sufficient staffing, and data systems/IT support.
f. Processes construct consists of 2 questions about goal setting and accountability for results related to the specific interventions.
g. Respondent N differs for each evidence-based intervention because only respondents who reported being part of implementation were asked to provide a rating.
h. Implementation factors with an asterisks (*) were significantly associated with implementation scores in univariate linear regression analyses at the p<0.05 level.
i. Self-reported implementation factors were rated on a scale of 1-5, with 1 being strongly disagree and 5 being strongly agree.

Characteristics of the individuals involved in implementation of the intervention may also influence implementation. Survey respondents indicated a high level of experience with an average of seven years working within their respective organizations (**Table 22**). However, in the implementation survey, sufficient staffing was consistently rated low as a resource (data not shown) and in the social network survey, 23.1% of responding organizations reported PWTF staff

shortages in the Spring of 2016, and 47.1% reported turnover of PWTF staff since 2014 (**Table 23**). Staff shortages and turnover may have influenced the ability of organizations to implement interventions as planned.

Among the clinical partners, most were participating in a concurrent initiative at the same time as PWTF. The most common concurrent activity was Patient Centered Medical Home (PCMH) certification with 68% of practices having undergone or still undergoing certification during PWTF. Many also participated in electronic health record transitions (58%) and Meaningful Use attestation (58%) during the PWTF. Most practices also had reporting requirements to external agencies or organizations that overlapped with PWTF activities. External reporting on hypertension screening or management was the most commonly reported requirement (63%) followed by tobacco screening or cessation treatment (58%). Reporting requirements were also commonly reported for falls screening (42%) and pediatric asthma management (42%). In interviews, most PWTF staff perceived these as synergistic rather than competing activities. Staff noted that workflow changes needed for PWTF activities had often already been established for Meaningful Use reporting or PCMH certification and participation in Accountable Care Organizations led to growing interest in preventive health interventions and support for the PWTF activities. **Table 26** summarizes these findings.

Table 26: Characteristics of Clinical Organizations that Completed the Prevention and Wellness Trust Fund Social Networking Survey in Spring 2016 (N=20)

	N	Percent
Practice required to report any of the following to an outside organization (e.g. HRSA, CMS, NCQS, commercial payers, or others) (%):	19	
Hypertension screening or management	12	63.2%
Tobacco screening or cessation treatment	11	57.9%
Falls screening or risk reduction	8	42.1%
Pediatric asthma management	8	42.1%
Practice received any of the following for screening or management of tobacco use, hypertension, falls, or pediatric asthma (%):	19	
Financial incentives	6	31.6%
Any other reward or recognition	2	10.5%
Practice participated in any of the following initiatives or activities at the same time as the PWTF project activities (%):	19	
Patient Centered Medical Home certification	13	68.4%
Any electronic health record transition(s)	11	57.9%
Meaningful Use attestation	11	57.9%
New risk-sharing or accountable care organization contracts	7	36.8%

In univariate regression analyses, we found that CFIR factors related to the inner setting, such as implementation climate and resources, and intervention characteristics, such as compatibility and simplicity, were significantly associated with perceived level of implementation.

Integration of Process Data: Themes and Lessons Learned

These quantitative results have value of their own, but we also used them for hypotheses building in conducting an in-depth qualitative analyses of the Phase 3 interviews to help better understand the factors that practitioners perceived as important for implementation. In this section, we review key themes and lessons learned culled both from the Phase 3 interviews with providers from the four partnerships self-perceived as most successful, and from interviews and focus groups with the four additional partnerships.

Capacity-Building and System Readiness

Qualitative interviews with Coordinating Partners and on-the-ground practitioners indicated that much work had to be done to build the capacity of clinical and community organizations as well as the partnerships themselves to put the PWTF evidence-based intervention into place. There was variability in terms of the engagement of hospitals in the nine partnerships. The two partnerships with the highest perceived implementation success with the hypertension intervention had hospital implementation climates that place a high value on prevention and carefully planned staffing resources to support the intervention. Two nurses leading the PWTF work described the benefits:

> *Our CEO… he's really for wellness, and community wellness is a focus, not just clinical care. You would think he would be so hospital oriented, acute care, but he's not. So that's a huge advantage.*

> *Our hospital is definitely trying to find out how to be most successful in offering a lot of preventative care and participating in that area seemed to be the right choice.*

By contrast, another partnership described the difference between their participating community health center and their medical center:

> *That was just such a great example of what within our partnership differentiates a couple of our clinical partners. So you see this community health center as a member of the community, as someone who serves the community. You have almost an identical patient pool at the ambulatory clinic at [our] Medical Center. They don't on any level consider themselves part of the community. They consider themselves an outpost to the hospital for residents to come through. And so it doesn't ever occur to them to be involved in these community activities. This project was like unbelievably a foreign concept to that ambulatory care clinic, and yet they serve extremely high need diverse patients. So it's just such a funny comparison within one partnership of people that have for all intents and purposes the same patients and who approach how they think about caring so differently.*

On the clinical side, obtaining buy-in and aligning PWTF work with other quality measures and existing workflow were key steps before intervention delivery could begin. This process of developing clinical buy in took longer than expected and had multiple stages.

> *We reached out to a provider who was going to be sort of our champion or was most interested in participating, and so we started with one provider at one practice and then spread it to the other practices and the other providers. So getting the professional peers' buy in was to help get the doc[tor]s on board.*

> *Who became the local champion within each community health center was very different, you know. In [one clinic] it was sort of a mid-level program coordinator who led that with her community health worker, but in [another] it's the CEO herself.*

> *We had an all staff retreat where we had a patient come, and that patient really was more the champion than we could have been.*

We heard from one community health worker how connecting with new requirements incentivized physicians: *We had to use the Medicare with PQRS [Physician Quality Reporting System]. They had a new requirement that needs fall risk screening. So getting them—making it a requirement important for insurance was definitely a good buy in.*

Numerous partnerships talked about developing ways to facilitate and simplify the integration of screening and referral processes into workflows.

> *Getting a template put together in our EHR, training everyone on how to use it, because there's always some resistance to change, so kind of dealing with that and working with providers and our clinical staff. It just takes time to kind of shift and get people all on the same page. And then also just the IT side of it and then kind of streamlining workflows and solidifying them–those just take a lot of time.*

> *I would say that the clinical partners probably prior to the falls work in Prevention Wellness Trust Fund were monitoring older people for drug interactions and potential–you know, that sort of stuff. But…routine screening was not going on. The first phase of it was trying to figure out how to integrate the falls questionnaires and the referrals into their EMR's. So both of them approached it from a sort of EMR structure point of view before they really rolled it out heavily to their staff to try and implement it. They wanted the EMR structures in place first for their staff to use so long as they were standing up something new.*

Building the skills of community health workers, from training on hypertension screening and education to various outreach and home modification techniques, emerged as an important precursor to implementing the PWTF interventions. That was expected; but what surprised many partnerships was the need to build awareness and knowledge among clinical staff:

> *I had to introduce the program, introduce screening to each of the providers and the MAs [medical assistants] and staff, not like individually but at site meetings or clinical management meetings because most of them never heard of STEADI.*

> *Screening is critical. Anybody who is an adult, 18 and over has to be screened for blood pressure. So it's being embedded within our practice. And an increasing number of people who didn't have any screening before now being diagnosed. So for us we've been adding more people from the community who now have a diagnosis and getting treatment.*

> *For hypertension there's a lot of clinical inertia issues. Providers are sick of hypertension. They're sick of telling people to lose weight because they don't. They just feel like they're banging their heads against the wall. So they stopped trying. I think we brought it to the forefront again. You know, don't forget about hypertension. Hypertension is really important. They're revisiting their accuracy of measurement and saying wait a minute how do the MA's do it? You know, there's been tons of training on accuracy of [measurement].*

> *All of these people that have hypertension that have never been diagnosed. And the clinical sites sort of raise an eyebrow like what do you mean? Well we'll pull our hypertension registry, but what do you mean that–how are we going to…? so there's a new report in DRVS where you can look back if they've had two elevated readings in a twelve month*

period to pull that registry, and that's your undiagnosed registry and diagnose them and get them on meds. And it seems ridiculous, but this is kind of this like new thing of oh you want us to look at that too. This undiagnosed hypertension population–it's huge. It's 30% or 40% of every clinical site. Sites are diagnosing a lot more people. And we hope they're getting on meds and they're getting under control.

Systems Change

In addition to PWTF's outcomes and costs goals, it was an initiative designed to stimulate local creativity to test different ways of changing how health promotion and disease prevention are delivered. For both MDPH and the partnerships, PWTF was breaking new ground, learning, evolving and adapting as it tried to achieve both its impact and its systems development objectives.

One of the really positive things about this project is it's given us the freedom and luxury to experiment and try a lot of different things and for the staff who are involved in it to really be creative and to try to figure things out in a way that will engage patients more, engage the staff more.

Interviews indicated that communication and the development of a strong e-Referral infrastructure were important to establishing a system to deliver the PWTF interventions. Given that MDPH's original plan and timetable for a bi-directional e-Referral system proved too optimistic, developing these electronic referral systems often required new software and took over a year to put in place. Several Coordinating Partners described their perceptions of limitations of the MDPH system:

Now if e-Referral were actually up and running and…could be the robust thing that everyone intended at the beginning of this, that would have been I think more predictive of—much more seamless collaboration on a larger geographic scale. They're just having a ton of problems rolling it out.

Some partnership leaders described their efforts to do this systems building work on their own and shared their priorities for building comprehensive referral systems:

If you're going to serve a whole community as an integrated delivery system regardless of whether they're part of the health system or not part of the health system we felt we needed a platform that would connect people with providers across the continuum. And we needed it to work in the system that the physicians were already working in since they were key in this linkage that this being trying to be created here between the community side and the clinical side. We felt it was important to have an IT database that accomplished the e-Referral within the way that people were working.

Some partnerships described the struggle to begin the referral process electronically and the need to begin with paper referrals to get the interventions up and running given the short grant period:

So we can start with the YDP referral that goes electronically from our providers' electronic medical record to the Y. Our goal there was initially to get it electronic just because our providers were completely electronically. And while we had the referral process in place by paper, we weren't getting a lot of referral just because it wasn't part of the normal workflow.

In another partnership, we heard how community members and organizations drove the systems building for the PWTF interventions with "reverse referrals":

> *We had people that were trained as instructors, and we had people in the community that were anxious for these programs. So we developed a referral form, like a reverse referral form that we could get the patient's signature, and send it back to the doctor. The doctor would sign off on it and send it back to use those that we could connect with the doctor….that's kind of what helped us get through the first year because that's how we were able to not only get people into the programs but connect them back to the clinical side so that the doctors knew that they were going through these programs*

While electronic referrals have been put into place between the YMCA and one community health center in this partnership, the majority of referrals are still being initiated by community organizations in this manner. In a similar vein, other communities began using "universal referral forms" as a means to drive referrals from community settings to the PWTF interventions, rather than through the traditional clinical referral. Apart from the complications of e-Referral, for some months early in the intervention period several partnerships understood that they should only count as participants in community-based PWTF interventions those who were referred by the clinics, even though this reduced their reach and did not represent their conception of desirable clinic-community connection. In our cost effectiveness analysis, however, we counted total exposures as a product of PWTF.

We often heard about innovative strategies to make sure the intervention implementation and referral process worked within the current clinical workflow with minimal additional time:

> *We realized that…our referral process took more clicks than the normal process of referral for the providers. So we had our nurse be the "go between," so they would complete some of the information and then send it to our nurse. Then she would finish filling in the rest of the information and then send the referral over to the Y. She would also validate with the Y that the material went through and then make sure that she received the feedback as well.*

> *The hardest part for me is getting it simplified and integrated into the procedure of encounters without extending the time of the appointment. Because our providers are limited to fifteen minutes for medical appointments and maybe thirty minutes for physical exams or more for longer cases. So they're only spending five to ten minutes with the MA [medical assistant] getting their screenings and their basic intake and another five minutes with provider to get whatever reason for the visit was. So how do I implement thirteen questions…and all that into the system without angering providers and taking time away from what they feel like they needed to do?... So normally most screenings are done inside the exam room by the MA. So they just open the EMR and a list will pop up of things they need to get screened for during this checkup…So it's a very simple question that they can just read over. And it also sparks the interest that, oh, we have these programs. 'I do have some worries I will fall; maybe I'll ask the doctor about it'. So it's easier to get them interested than having a person just fire off questions for you while you're sitting in a room.*

One partnership even set up a centralized "hub" designed to manage the referrals for all of the PWTF health conditions—helping to connect those who had been screened to counseling and programs to improve their health:

> *The hub made it just so much easier than us actually doing the referral. The doc[tor]s would put in electronic referral, and that referral travels to the hub. The hub [staff] reached out to the patient, set up the appointment…took that out of the hands of my staff having to then track them down, then relayed back the information to the providers…, nurse, or the MA working with the provider…. I think the hub played a very big part in helping us to get our patients to where they needed to go. Without them I'm not sure that we would have had the time to pursue with the patients the appointments and whatnot.*

Systems building was not restricted to referrals, however. One community health worker described her processes of integrating the STEADI falls assessments into the clinical workflow at her community health center: she began with materials from CDC and MDPH as her base and then worked to create a process that worked well with the medical system based on other screenings they have done before. Tools like Google Scheduler were used to coordinate signup and scheduling for Matter of Balance and Tai Chi classes that were being delivered by different organizations throughout the community in order to meet the needs of the most community members possible. We also heard about a partnership that developed a measure to systematically collect data during home visits that could then be used for tracking and feedback.

This capacity-building and systems change work took considerable time to get started. One YMCA staff member summed up her perspective: *I really feel like we're entering year three now, and now we're like seeing they're starting to click. Like it's in much more of like a routine process now. And it's taken two years to get there.*

The past experiences of the hospitals in these successful partnerships varied. One hospital that was new to the work described the gradual process of getting buy in from clinicians and the importance of developing the new role of a nurse coordinator in the primary care practice:

> *While our providers are definitely strapped for time they really do want to do what's best by their patients. And so when we were sort of able to capture their ear and…the potential to be able to refer for nurse education, nutritionist education, exercise therapy, self-measured blood pressure programming, to be able to have those resources was really rewarding for the provider because they felt like they were doing more than 'here let me change your meds and come back in three months.'*

They went to on describe changes in their staffing that have contributed to success:

> *In our particular practices, they do not have–let's call it the middle clinical persons. They have MAs [medical assistants], who are very task oriented but cannot make clinical judgments, and they have providers. But they didn't have like the nurse who could do that really extensive dietary or life coaching. So allowing the sort of sell to the practice was–we're recommending that you do XYZ, but you're going to have all these other resources. Have a patient who is out of range, now you can refer them for a nurse visit, refer them to the Y, and refer them for home visit.*

The partnership that was more experienced in hypertension work described how expanding from a one-person self-monitored blood pressure program to a team effort with physicians and nurses on board was a PWTF success that will be important for sustainability. The supportive implementation climate at the YMCA where the chronic disease self-management and diabetes prevention program for hypertension patients were being delivered was also perceived as an important element for success. The staff at the Y described how PWTF came at a "perfect time" with evidenced-based interventions that had compatibility: *On a national level, the Y is moving into a lot of chronic disease prevention work. PWTF really increased our readiness because we were now going to have this like constant stream of referrals.*

Beyond a supportive organizational climate, participants described the benefit of having practitioners implementing the hypertension intervention that had both expertise and flexibility and expressed how fortunate they had been to have consistent staffing with no turnover in this area. Practitioners from both partnerships interviewed discussed addressing the complexity of the intervention referrals by centralizing the work in one department. The chronic disease self-management program was perceived positively as relatively simple with a minimal time commitment. They expressed the strategies they had used to adapt the program to populations they specifically hoped to reach by offering Spanish-language classes and "just finding that right block of time that meets the highest number of people's needs."

Qualitative data also helped to explain the relationship between the perceived implementation of falls interventions with the implementation climate, resources, intervention compatibility, and simplicity. For the STEADI intervention, a community health worker from the partnership with the highest perceived success described how she addressed the issue of insufficient time for providers to conduct the screening by integrating the work into the medical assistants' tasks at the start of the appointment. This type of task shifting reported in multiple partnerships ensured that higher level providers could keep their short appointment lengths. Practitioners also mentioned the challenges of fitting the screening into the physical space available in exam rooms that sometimes adding to the complexity of administering STEADI.

For the falls home safety assessments, staffing challenges like turnover and lack of occupational therapists/physical therapists made the PWTF community-driven model appealing to practitioners at senior-serving organizations in one successful partnership. While staff from these community-based organizations could see the benefit of including community practitioners as the staff conducting the visits in order to reach more older adults in need, referral from clinical settings were perceived as the biggest barrier to implementation. Clinicians still tended to prefer to refer to skilled nursing, occupational therapists, and physical therapists. Making a shift in the implementation climate, to be more open to trained community health workers conducting the visits, was seen as an area for improvement along with the more general need to effectively communicate which senior services are available and benefits of these services (many of which can be covered by Medicare) to potential referring partners. Practitioners conducting the falls prevention visits reported that, once they were able to get over the hurdle of the referral and connect with community members, their experience coupled with the simplicity and adaptability of the manual and training made the home-based intervention relatively simple to implement. It also could potentially be more cost-effective than a formal PT/OT evaluation.

The implementation climate for the Matter of Balance intervention was particularly high—with strong staff and leadership support—at the community-based organizations in the partnership that reported the most success. While clinicians were slow to buy in and make referrals, support was so strong in these community-based organizations that they developed a reverse referral system (see Systems Building section), and in some cases, Matter of Balance was already being implemented so that PWTF served to increase the reach for existing programming. One Matter of Balance trainer described its simplicity: *There's a structured program. There's a curriculum. There's structured training. It's a lay leader model. So from that aspect it's pretty easy to kind of just get trained and pick up and go.* The challenging complexity of the intervention was about the IT and referral system. Interviews revealed that having the reverse referrals and scheduling coordinated centrally helped address those challenges.

In terms of staffing, one community leader described how nurses who run classes already have great relationships in the community from previous work with senior housing doing flu clinics and blood pressure screening. There was also low turnover and staff with previous experience in the community reported the most success. Furthermore, one YMCA leader described how the train-the-trainer model facilitated increased training and hiring:

> *So I did have to get [boss's] buy in to allow me to go through the Matter of Balance master training so that I could train instructors to come through, and seeing that that was our most popular intervention we very quickly needed a lot of instructors. Yeah I think we've trained I think twenty-… thirty-two instructors just in our partnership.*

There were a number of cross-cutting themes between the different falls interventions. Similar to the STEADI intervention, space was sometimes a scarce resource, especially considering the need for video access and chairs for class participants. In addition to physician buy-in impacting screenings and the home-based interventions, it has been challenging to get buy-in for Matter of Balance referrals from some clinicians who are used to referring into rehab programs which are led by people with physical therapy degrees or more formal medical training. These clinicians have probed about who is teaching Matter of Balance courses, what is the program, and what is their training. The partnership is currently trying to target appropriate people for referral to Matter of Balance by looking at ability and level of physical activity. The positive reviews of the course (plus excellent completion rates) from community members to clinicians has helped increase buy-in and referrals from clinical side.

Few relationships were found between CFIR implementation contextual factors and implementation outcomes for the tobacco and asthma interventions. Looking closely at the qualitative data on resources for school-based asthma in the "high implementation" partnership, participants again expressed the importance of practitioner expertise for leading the work and also for building enthusiasm among others. A school nurse described her experience:

> *I just keep reinforcing how much their job will get better if the asthmatic students are not coming down so often because they're being well taken care of. So you know, that's been a bigger struggle than administration–is getting all the nurses on board to understand the value of it.*

Among the tobacco conditions, we explored the relationship between intervention simplicity and screening implementation, as well as relationships between implementation climate and resources and the smoke-free environments implementation. A clinical coordinator described how the tobacco screening built on an existing e-Referral process that nurses were familiar with, while a CHW described how the complexity of referral from screening to counseling has been managed successfully: *That's the awesome thing about the partnership is we have these services spread throughout the community.* The smoke-free housing intervention built on work and connections that previously existed and was well supported by experienced and dedicated staff. A health department leader said:

> *We already had a good foundation early on before PWTF…Plus, with me leading the other tobacco work most [people] have already known me. So I already have that relationship. So I wasn't someone new…talking about tobacco. I've been doing it for fifteen years. So that was a—that's a positive to keep that—the momentum at least there.*

He went on to describe the personal and other resources that he attributes to success. A new coordinator has dedicated his time to conducting outreach and worked with community health workers to improve the impact of their work. Looking to other cities that have experienced success has also been valuable: *There's so much smoke-free housing going on right now. There's so many resources, and there are so many toolkits at our fingertips. It's a lot easier now.*

Strategies to Promote Health Equity

Community Health Workers

In creating PWTF community-clinical linkages, both MDPH and the community partnerships emphasized utilization of community health workers (CHWs). In Phase 3 interviews with "high implementation" practitioners, we heard the perspectives of five community health workers—one of whom was based at a community-based organization and four of whom were employed by clinical settings. The second set of open-ended interviews included three more CHWs and a half dozen supervisors. These men and women described a wide array of roles CHWs played in the PWTF initiative. Roles included community outreach to engage residents who were not already part of the health system or regularly seeing a primary care provider, generating referrals, providing education linking clinical and community settings, facilitating communication during clinical office visits, and conducting follow up after appointments. Some CHWs played the role of a generalist working across health conditions, while others took on specialized roles leading core intervention activities such as conducting home visits for asthma and falls, coaching Matter of Balance and Chronic Disease Self-Management classes, and providing tobacco cessation counseling. Coordinating Partners, nurses, and the CHWs themselves all described the benefits of having CHWs adopt these specialized roles. One asthma-focused CHW described her multi-faceted role:

> *I go out to the homes, and I do the home assessments, see if there's any triggers or anything that we can help the family with in order to improve the quality of life that their children are having with asthma. And I work very closely with the providers and also other community-based organizations as far as helping the families as well. I'm here at the clinic, but the majority of the time I'm out in the community. I touch base here, but the majority*

of the time I'm going on home visits or at meetings with different portions of the community and just kind of getting the word out.

CHWs brought multilingual, multicultural skills and familiarity with their community to the table to promote health equity—offering interpretation services, clinical screening forms, home visits, and classes in Spanish, Chinese, and Portuguese, depending on the needs of the community. They also created visually appealing educational materials with simple messaging for individuals with low literacy. More than just language skills, the work of CHWs explicitly addressed health equity through the authentic engagement of low-income populations and communities of color. One CHW described his role:

We have a broad range of skills. We're bilingual. We know the community in which we work with, and so…we were able to meet with people, interact, and kind of remove some of the disparities that are involved.

CHWs successfully developed trust and rapport with residents that was helpful for engaging them in clinical and community interventions. Developing these relationships requires humility and flexibility for figuring out how to meet patients' needs in complex home and community environments. CHWs, even those employed by clinical settings, described the importance of physically spending time in settings outside of the health sector in order to reach residents:

A lot of times initially also we were doing more work in the clinical than the community, you know? And so it was difficult to get them to come to us. And it still is. But now we're trying to push–move past that by meeting them more where they're at.

Using community health workers as case workers or case managers is very economical. The patients love them. They're very passionate about the patients. At the health center they're under social workers, and they address all the social barriers and do an amazing job, and so it's so affordable. And it's growing, and it's a lot easier to hire community health workers. We've been having trouble from the beginning hiring nurses, and so with one program we were sort of forced to hire another community health worker instead of a nurse and then support that person as much as we could, and it ended up being a good thing.

Our community health workers… are essential to everything that we do here. And unless there's some way of really incorporating their value into the overall payment package for the work that we do, that's going to be a real problem.

We have found them very valuable, and we would look for a way to give them job security if the grant ends because they add a component that's–we didn't have experience with before but have found to be a real extension of our nursing staff. I think just the home visiting capacity increases which makes it affordable to do that sort of thing, and sometimes that is the real key to helping someone understand better how to make those changes in daily life by actually observing them in the home environment. So our community health workers would do that more often.

Inclusive Partners

Working with community-based organizations outside of the health sector was another strategy described as valuable for promoting health equity in the partnerships. For instance, Volunteers in Medicine in Berkshire County helped the partnership reach immigrant populations in their community, many of whom were migrant farm workers and lacked health insurance. Enhancing Asian Community on Health (EACH) helped the Quincy-Weymouth partnership better reach and serve the needs of their Asian population. Community Legal Aid in Worcester helped to address the social determinants of asthma by working with patients living in substandard housing engage with landlords to improve living conditions. Multiple partnerships worked with their housing authorities and school systems on various conditions.

Tailoring Interventions and Services

The final theme that emerged around health equity in the PWTF interviews was tailoring interventions and services to meet the needs of the most vulnerable patients. These efforts included providing free transportation to appointments and classes; offering Chronic Disease Self-Management classes during times of the day that are most accessible for low income Latino adults; moving Matter of Balance classes to a more central location at a public library instead of the local senior center; and providing free asthma spacers because some insurers do not provide this essential equipment or because children might require multiple spacers if they live in temporary housing or multiple homes.

One CHW coordinator described her success working at food pantries:

> *One place we really find a lot of people who might need services, like an underserved population in the community, are at food pantries. So before I started I never would have thought that. I never would have thought "okay, they're going there for food." What connection does that have to smoking? But they are there. Sometimes they go and sit an hour before to get their bag of food or have their dinner… So why not talk about health and wellness and quitting smoking and things like that? So when I first started I thought: "Why are we there? What are they doing?" But it's turned out to be one of the best places to reach people.*

Similarly, partnerships conducted wellness fairs within housing developments participating in the smoke-free housing initiative. The fairs covered tobacco cessation as well as blood pressure screening. This was seen as an effective strategy for meeting the health needs of those in the community who were most vulnerable.

Summary

Much work had to be done to build the engagement and capacity of clinical and community organizations and develop robust systems to connect them in delivering PWTF interventions. Prior to full scale implementation, it was important to obtain buy-in of clinical staff and align the PWTF work with existing quality measures, EHRs, and workflow in the most uncomplicated ways possible. Innovative strategies were developed to ensure that referrals and new screenings became integrated within current clinical workflows. Teamwork, task-shifting, and cross-training were crucial, and enhancing the knowledge and skills of community health workers and clinical support staff, such as medical assistants, were key precursors to implementing the interventions. The social network analysis showed that, in addition to sending and receiving referrals as the PWTF initiative

required, participating organizations worked with one another by connecting community members with services, sharing best practices, providing technical assistance, providing training or capacity-building, and sharing staff. Establishing a bi-directional e-Referral system proved more difficult than MDPH anticipated. Mechanisms to facilitate community-generated referrals, and sustaining an efficient centralized system for processing referrals and connecting clinical screening with follow up interventions are seen as essential to the PWTF vision.

Of the four priority conditions, falls prevention was certainly the newest focus and probably resulted in the greatest systems change. But virtually all partnerships said that through PWTF, at least one condition, and often multiple conditions, were now receiving the coordinated and effective attention needed in order to improve outcomes and contain costs over time.

> *The needle has really shifted when it came to asthma compared to what they were doing previously is a huge difference. [We had] quality measures and a lot of focus on other chronic diseases like hypertension and diabetes and never really had any measures for asthma, and the grant brought us that and shed light on the fact that asthma is very prevalent in our community, and there are ways that we can improve our asthma care and getting those measures and integrating it and really putting that message out there to providers is a very big deal and very-–has really shifted providers to think about asthma in a more organized way.*

PWTF implementers often spoke about community health workers (CHWs) and almost always said they helped to engage hard to reach populations and were essential in partnerships' efforts to improve health equity. They were seen as key in building and maintaining trust with residents in both clinical and community settings, particularly multilingual populations, those needing interpretation (including sign language), refugee and immigrant communities, and the uninsured. They served in multiple roles, including community outreach, referrals, facilitating communication during clinical office visits, appointment follow up, home visits, and leadership of classes and trainings. Virtually every partnership was enthusiastic about CHWs and what they are capable of contributing to improved health and reduction of health disparities in communities.

Even in the very brief intervention period we examined, we saw indications of sustainable systems change in the integration of PWTF strategies into clinical systems and workflows; the solidification of strong collaborations, especially bi-directional referral, between clinical and community-based entities; and the development of strategies that expand health equity, access, and affordability of improved prevention and chronic disease management.

Section Eight: Discussion of Findings

We did not expect to observe large changes in outcomes, costs, and disparities in the limited time horizon of the study. Nevertheless, in spite of serious shortcomings in available data, we have found results that are encouraging even if we cannot determine that PWTF was the cause of those results. Decreasing prevalence rates for hypertension and asthma in some PWTF communities; increases in screening rates for hypertension and the risk of falls in older adults, and decreases in systolic blood pressure; and potentially high values for cost effectiveness for the PWTF priority interventions are noteworthy. Data suggests that the newer systems changes (e.g., falls screening) are taking root as the interventions mature, and that adding 2016 and some 2017 data to the evaluation may strengthen findings on outcomes and costs.

But another kind of promising result is highlighted when we combine outcomes, CE/ROI, and process evaluation to look at the totality of PWTF implementation on the ground. It appears that the letter of the Chapter 224 legislation, with its charge to evaluate short-term improvements in outcomes and costs, does not quite encompass all of its spirit. That spirit originated with the pioneering health and payment reform process in Massachusetts, the intention to optimize synergy between medicine and public health, and the imperative to improve prevention as well as treatment if costs were to be better controlled. It is that spirit that is reflected in how PWTF was actually conceived, designed, and implemented.

From the time advocacy began, PWTF was intended to stimulate local creativity to test different ways of changing how health promotion and disease prevention are delivered. The key requirements specified in the RFP, and throughout the implementation process, were partnership composition and characteristics, the clinic-community interface, the role of e-Referral and shared electronic health records, and a balance between prescribed evidence-based interventions and each partnership's ability, and necessity, to adapt these interventions to its own context. A reduction in health disparities was a specified aim and the use of community health workers was a specified strategy to achieve that aim. PWTF recognized that the health delivery landscape would be in flux for some time and sought more information and experience about how best to utilize its assets. In the context of the second stage of ground-breaking health and payment reform in Massachusetts, it is appropriate to view PWTF as an experiment in systems development.

PWTF was predicated on the idea that improving results and containing costs for targeted chronic conditions and contributing behaviors, especially among hard-to-reach populations where health disparities are most pronounced, depends on better coordination and collaboration between clinical and community resources. But how would that be brought about, what would it look like, and then, once in place, what results would it achieve? PWTF was asked to answer the final question while the prior questions were far from known and still being asked and tested. Indeed, PWTF was asked to demonstrate results well before its already brief trial was completed. It was an apt example of re-modeling an airplane while flying and then landing it.

These two very different and worthy goals of PWTF, immediate impact on outcomes and costs, on the one hand, and sustainable systems development on the other, were conflated and sometimes at cross purposes in the PWTF implementation. That helps explain why grantees complained about MDPH moving the goalposts and changing what was wanted from the partnerships at various points in time. For example, if the goal is measurably improving chronic disease management for

existing and already diagnosed patients, it may make sense to restrict PWTF interventions to referred health center patients, and to encourage community health workers (CHW) to be deployed as case managers within CHCs and hospitals. Note that this could, and did, reduce the numbers served (or at least counted) by the interventions. On the other hand, if the goal is to increase the enrollment in clinical and community services of populations not currently being seen, and to get undiagnosed clinic patients into treatment (both considered necessary toward reductions in disparities), then interventions must be open to (and actually seek) participants who come through community as well as clinical avenues. In that case, CHWs need to be positioned to prioritize outreach and connection between providers and the underserved community. Partnerships reacted to this uncertainty in different ways, and after some time the project as a whole incorporated an emphasis on undiagnosed hypertensives.

Interviews revealed that partnerships used other innovative strategies beyond CHWs to help community members enter the healthcare system, from identifying smokers and residents with undiagnosed hypertension at wellness days in housing developments as they were going smoke-free, to identifying children with asthma in school settings, to identifying potential participants for Matter of Balance classes among older adults involved with community-based organizations. With sufficient time and resources, these two goals, improving chronic disease management for current patients and expanding the reach of clinical and community-based interventions to those least served and with greatest levels of disparities, can be complementary and not competing. Of the four priority conditions, falls among older adults was a good example of this complementarity of systems change, outcomes, and cost objectives, and perhaps the best example of new infrastructure development. The social network analysis supports the observation that this was a new component for many of the participating organizations. Only about 50% of falls partners were previous collaborators compared with 83% for asthma, 75% for hypertension, and 64% for tobacco.

Evidence-based interventions needed to be housed and maintained in community agencies, and required extensive capacity-building–and programs such as the YMCA and senior centers were eager to participate. Changes required to gain acceptance for routine falls screening and referral as part of clinical workflows and EHR systems were more challenging; partnerships learned how to negotiate them as well as the patience and persistence they require.

> *Our doctors have always done fall evaluations. They've always done the Get Up and Go. They've done the screening, they've always done that. But the form we started out with, there was multiple questions, and that was not going to work. So we had to kind of squish them into two questions that staff do on the way in, and then they would follow-up with the rest of the study. But it was changing what they already had in place. So I think it actually made it easier for them. So they went along with it. But I think if you added something completely new they would have said no…. They're probably more focused on it than they were previously because now the staff is involved also. It's not just the physician. So that makes a difference. Before it was just the physician in the annual exam that would say, you know, if you had any falls and do the Get Up and Go and never really went into it, and if they did there was nothing to do with them. So now they know there's somewhere to go.*

We gathered a great deal of data on what made partnerships effective, and even this early in the intervention and with the limitations of the outcomes data at our disposal, we could see a relationship between partnership self-assessed level of successful implementation and positive

outcomes. The community selected as a high implementer for the hypertension condition was one of the communities with a decrease in prevalence; the community selected as a high implementer for asthma was one of the four with larger drops in rates than the state average; and the community selected for falls implementation was one of two with small reductions in falls injury prevalence.

Quantitative and qualitative data point to important contextual influences on implementation of the PWTF interventions. For instance, an organization's implementation climate, such as a hospital's interest in prevention or the alignment of the PWTF work with the mission and objectives of the YMCA, were seen as supportive to the hypertension interventions. Having sufficient data systems and staffing with expertise to deliver the intervention was a common theme of partnerships that experienced success. It was also important that the PWTF interventions were compatible with the existing way of working in clinical and community organizations and perceived as simple to implement by practitioners. Task-sharing and teamwork was seen as essential, but the process takes time and leadership, and there is still a level of skepticism to overcome among some clinical professionals about the effectiveness of those with less formal training.

Smooth referral and feedback loops between clinical and community resources is helpful in coordinating care, monitoring and reinforcing behaviors, documenting progress that motivates both patients and clinicians, and enabling reimbursement that provides continuity and sustainability. Interviews cited the role provider, and especially patient, feedback on interventions played in increasing buy-in, particularly for falls. It was also noted that for some conditions, such as pediatric asthma, the benefits to the patient are often visible in the short term and feed provider motivation, whereas this is less true for hypertension, smoking, and falls. In its limited time period, PWTF did not successfully develop bi-directional electronic e-Referrals as solidly as was hoped. The reasons were not primarily technological and largely outside of PWTF control; this is an area where much remains to be learned and improved.

For each of the four priority conditions, PWTF presented partnerships with a menu of evidence-based interventions to choose from, rather than a prescribed, synergistic package. Matter of Balance, Tai Chi, the Chronic Disease Self-Management Program, Assisted Home Safety Assessment, Home-Based Multi-Trigger Multi-Component Intervention for Asthma, YDDP, and NDDP had each been shown to improve outcomes for many who participate in them. Indeed, PWTF community partners (especially the YMCA and senior centers) not only found creative ways to make them available, but actually see their future in collaborating with clinicians to provide these and other tested programs to people who will then become staunch members of their community. They used cross-training and other strategies to ensure a secure and sustainable workforce for delivering and continuing many of these interventions. For clinicians, having resources to which diagnosed patients can be reliably referred, with follow-up on how the referral is proceeding, is not just a boon but one of the necessities if screening and diagnosis are to increase. But here's the rub: What most of these interventions require of their participants, only the healthiest, most active, financially stable and motivated patients can manage. Many of those most in need of the interventions are depressed, lack food or safe housing, lack ready transport or are fearful of travelling on ice and snow, or simply have too many other priorities to attend a class with six or ten or twenty sessions. Home visits for asthma and falls modifications proved difficult because many people are reluctant to let officials and strangers into their home and worry about problems with the landlord. For clinicians, who focus on each individual patient, these are good

options and people should be encouraged to take advantage of them. For epidemiologists and public health researchers, they are exceedingly difficult to turn into the kinds of statistical changes in prevalence, cost curves, and disparities sought in PWTF's origins.

PWTF partnerships made important strides in systems linkages between clinical and community strategies for all four conditions. Now the test will be to see if they are sustainable. As developing accountable care organizations (ACOs) and networks of clinical and community partners endeavor to enhance both prevention and effective chronic disease management, while also containing costs, it is likely that significant technical assistance will be needed. It is unclear if market forces will encourage building in such support. PWTF also did not yet explore what the various organizations in such partnerships may gain or lose from any resulting spread of reimbursement.

Important challenges were faced in this evaluation of the PWTF. First and most important, the time frame for measurably affecting any of the four priority health conditions was constrained. Second, the fact that PWTF featured multiple interventions within each of four highly challenging conditions made it that much less likely that a consistent and attributable effect could be demonstrated. Third, fidelity in implementing the interventions was balanced with allowing communities to adapt their interventions to their context and population so that differences between sites in implementing the "same" intervention may exceed similarities. Fourth, the evaluation began well after the communities began to implement, and after the data that could be used for the evaluation was determined; and the evaluation took place well before the implementation was completed. Fifth, the data available to analyze these outcomes has different time frames, limitations, measures, and uses. Each data set is subject to its own interpretations and we were aware that they might prove difficult to align in a coherent story. Finally, there were delays (Case Mix, Medicare) and inconsistencies (MassHealth) in some data sets that precluded their use for this report.

Still, there is a wealth of important data here, and still to be uncovered, in a PWTF evaluation that can benefit a variety of stakeholders and interested observers. Once data from MassHealth is updated through 2016 and its identifier linkages resolved, prevalence estimates will be more generalizable and also more stable (since they will be based on more information). Likewise, APCD for 2016 may be available in mid-2017, and could enable non-identifiable patient linkages to track changes over time. Case Mix (especially emergency department and outpatient data) will also become fully available. MDPHnet and electronic health record data will continue to yield information about interventions contracted to continue through June 2017. The same is true of the implementation insights gathered so far, which other Massachusetts communities and other states may find valuable as they feel their way forward in health reform. Even under these circumstances PWTF will still have had a much shorter intervention period than would normally be expected to impact the four priority conditions. The results of the intervention so far, in terms of outcomes, cost effectiveness and ROI potential, and potentially sustainable systems change, have been promising enough to warrant further investment.

> *I think this clinical community connection is the future of healthcare, and it's really the only way we're going to be able to improve population health, and so I think there's so much work that's done to kind of getting these systems up and going, and we just–it would be a shame for it to just stop here because I think when we're changing people's health it doesn't happen overnight. It happens over years.*

Section Nine: Conclusion

The Prevention and Wellness Trust Fund (PWTF) is an ambitious and intensive test of a coordinated community-based strategy to improve health outcomes and contain costs using evidence-based interventions for four priority conditions in nine complex and diverse communities. It is also an exploration of the systems changes that need to happen in order to affordably marry our public health and clinical resources to achieve better population health and greater equity of access and outcomes. Finally, it is a demonstration, in intent if not yet always in result, of what might be learned when diverse data sets–claims data, discharge data, electronic health records, interviews and surveys, and more–are combined, eventually linked, and analyzed to tell complementary parts of the same overall story. Most of all, it is an experiment conducted out in the open–not under special and highly controlled conditions, but in the messiness and constant change occurring in towns, cities and counties, hospitals, clinics, and community-based organizations that are at once doing their complicated jobs, and at the same time adapting to new needs and opportunities in a highly unsettled health landscape. PWTF was accountable to the Legislature to achieve concrete, measurable objectives, many unrealistic. It was also a gutsy collective impact learning community operating in fairly uncharted waters.

As we have said in numerous places in this report, our data suggests important improvements in outcomes and cost effectiveness, as well as in systems development. Continuing to collect and analyze data to lengthen the intervention period under study would enable us to strengthen our assessments and possibly add to those we have already noted. There is much more to learn.

In our view, one first step is to review the data, and consider its implications, with each of the nine partnerships. At the request of the partnerships at the outset of the evaluation, we have not attached findings to named partnerships. However, we expect communities to request presentations on their own data and progress, and will be prepared to provide them in the coming months. In the process, and also in a joint meeting we will participate in shortly with MDPH and the partnerships, we hope to identify further questions PWTF would like to answer if data, time, and resources permit.

For example, we would like to include analysis of Case Mix Emergency Department data for Fiscal Years 2010 through 2015, and MassHealth data for calendar years 2010 through 2015, not presently included in this report. By June 2017 it is unlikely we will be able to obtain and analyze 2016 APCD and MassHealth data. However, we will have 6–8 months of additional MDPHnet and EHR data, as well as updated data on referrals, enrollments, and completion of community-based interventions–and all of these data effectively extend the intervention period we can study. In terms of the systems changes that are likely to be most relevant to the evolving health reform landscape, obtaining a more detailed picture of how community health workers and other task-sharing strategies worked, and synthesizing lessons learned by the community-clinical partnerships, may be both valuable and feasible. There is also more to learn about health equity as a goal; for example, who benefitted from increases in screening for the priority conditions, and where did that screening lead for different population groups. More information may be useful concerning data systems and the staffing needed to make e-Referral more efficient. Clearly, there will be more questions of interest than there will be data and resources to apply to them, so setting realistic priorities for a research agenda will be critical.

Then there are big questions–the kind we need experienced, knowledgeable people to step back and consider together out of the frenetic tempo of daily workloads. Here are only three of many possible examples:

- Should clinical-community collaborations directly address social determinants of health? And can they do so, if they choose to, effectively and affordably? This may be where public health and medicine continue to see things differently; or it may be that we will be unable to contain medical costs until we find ways to do what data, and lessons learned in global health, increasingly suggest. As one PWTF veteran put it:

  We were at a community health center that focuses on healthcare for the homeless. Impossible–very challenging population–substance abuse, mental health issues. Do they want to go to a six week class about their chronic health–they don't have food on the table, a job, a place to live, a place to sleep. So is the answer like that's not the right health center to be doing PWTF, or is that exactly where we want to be doing PWTF? They are the highest risk, highest cost, highest utilizers. So this particular site has hired two case managers with PWTF, and they focus on housing. They're trying to get these people housed. And you know, this is where the latitude is. Right? We want them to do that work, but I mean you can't do ROI on housing in four years. So that's where this latitude question comes in. Or on paper do they look like they're not doing a good job?

- As Accountable Care Organizations and Patient-Centered Medical Homes develop, what technical assistance will they require in order to achieve the complementarity and synergy required of clinical and community-based strategies? Both MDPH and the partnerships have learned a good deal about the challenges of transformative health care; how do these lessons get transmitted and used by others? Another PWTF leader said:

  It's a statement about what transformation takes, and it's something that I worry about as we move forward in this new world of ACO development and the expectations that are going to be placed on ACO's as they develop to have these relationships with community based partners. Both sides are going to need support in that process, and I don't think that the market is going to drive that support sufficiently.

- There are a great many conversations to be had about sustainability. Assuring task-sharing, with appropriate safeguards and incentives; developing the competencies of CHWs, and their appropriate supervision and remuneration; and building in the cost recovery needs of community-based partners are some of the most obvious. These conversations are not for the faint of heart, and they are also not just for health economists, administrators, clinical providers, or public health advocates. Patients and community members must weigh in and be heard. In PWTF, here in Massachusetts, and across the country the YMCA, senior centers and many other community-based organizations are eager and desperately needed to participate.

  When we first started the YDDP program we were advertising, okay, here's how much it costs. You have to pay for the program. Then Prevention Wellness Trust Fund came along. We stopped advertising totally for the program, and we get nobody who is full pay anymore. So with patients you've got to do both, you know… how we can go about

marketing the program the way that we did before we had the funding because that's potentially going to be our sustainability model.

PWTF raises questions, suggests strategies, and seeks solutions to problems that are, if anything, more perplexing today than they were when PWTF started and health reform in America was stuttering, however painfully, toward a way to achieve agreed-upon goals and values. Again: There is much more to learn.

Section Ten: Response to MDPH and PWAB Comments on Draft Evaluation Report

Introduction

Harvard submitted a draft evaluation report to MDPH and the PWAB on December 1, 2016. As outlined in the MOU, both MDPH and the PWAB then had the opportunity to comment on this draft report, and to provide feedback and suggested edits, which Harvard could either incorporate into the final report or otherwise note if a change was not made. In this section, we have included the comments provided by MDPH and the PWAB via three letters and/or e-mails as well as our response to each item.

PWAB Evaluation Committee Comments: Received on December 6, 2016

PWAB Comment: We feel like the report was framed too negatively around limitations. There are significant constraints in this analysis, but the reminders, especially in the executive summary, diminished the ability to understand that there were some positive findings. The report should note the complexities, but there are no clear messages about lessons learned.
HCAT Response: We have revised the executive summary to both minimize, and place at the end, the discussion of data limitations. The revised version very much focuses on positive findings of the analysis and lessons learned. However, in any study, it is essential to explain data limitations; they are not negative observations. It is important to explain why some data sets are more complete than others and how the various data sources may or may not intersect with each other. We have included details of data limitations and constraints in the report wherever appropriate.

PWAB Comment: We do not feel like there was attention directed towards lessons learned in the qualitative portion of the report.
HCAT Response: In both the executive summary and the report we have added to the qualitative section on lessons learned. We would need to study a longer intervention period and analyze more linked data to deliver "clear messages" (as referenced above) suitable for this evaluation.

PWAB Comment: There is concern around lack of/readability of projections and forecasts in the current report. There are some projections (such as p. 53 has a nice table on hypertension related projections), but this was very buried in the report. On p. 33, the report addresses the inability to tackle combined overall PWTF projection, this also needs to be highlighted and the individual conditions [sic] specific projections called out.
HCAT Response: Our Executive Summary now features a table that clearly outlines 1-year, 5-year, and lifetime projections for each condition at current PWTF implementation success rates observed in the analysis.

PWAB Comment: The qualitative portion did not highlight health equity. While there were significant limitations to the claims data in regard to health equity, we had thought health equity would be addressed in the qualitative portion.
HCAT Response: We have revised this section of the report to include a more robust discussion around strategies used by partnerships to promote health equity, including the deployment of community health workers, and collaboration with community-based organizations outside the health sector. We are, however, constrained by our methods and data. For example, as we state, our qualitative sources often cited the importance of CHWs in delivering PWTF interventions, and were aware that the benefit was intended to be greater equity of access and success of health

services, but none went so far as to claim that they actually achieved greater equity in health outcomes within this time frame.

PWAB Comment: The Committee was most concerned about the Executive Summary. It was very challenging to read, lacked cohesion, and did not highlight clearly the results of this evaluation. The committee requests that Harvard prioritize rewriting the executive summary to be a document that can be understood by lay audiences and be able to stand alone with key conclusion points prior to distributing it to the full PWAB. Some recommendations include leading with the key findings/what was learned; creating graphics that highlight the successes, failures or insufficient evidence for certain PWTF activities (this could include a table that cross-walked outcomes/data/analyses by condition); reducing the methods to a very high level description; and cutting the length to 2-3 pages without figures/tables.
HCAT Response: We have made significant changes to the executive summary based on feedback from both the PWAB and MDPH. We have shortened the length of the summary to approximately three pages (without the table), reduced discussion of methodology, included key findings and conclusions earlier in the text, and added a table that summarizes the observed changes in health outcomes and projections for each condition, as well as projections for 1-year, 5-year, and lifetime terms where possible. At the request of both the PWAB and MDPH, we have rewritten the text to be more accessible to the intended audiences and lay readers.

PWAB Comment: Our biggest concerns with the quantitative analysis are:

- Lack of projections (addressed) above;
- Focusing analysis on intervention impact on prevalence for asthma and hypertension. Prevalence is not a sensitive measure and also not a focus for asthma & hypertension interventions. There are no evidence-based interventions to reduce asthma prevalence. In addition, part of the hypertension effort in PWTF is to identify undiagnosed hypertension, thus potentially increasing the overall prevalence of hypertension. The focus for asthma and hypertension analysis should be [sic] did the interventions improve control of the disease.

HCAT Response: We have included a table in the executive summary that includes 1-year, 5-year, and lifetime projections for each condition at current PWTF implementation success rates observed in the analysis. The legislation specifically requires of the evaluation an analysis of "the extent to which the program impacted the prevalence of preventable health conditions" as set forth in Section 250(i) of the Chapter 165 of the Acts of 2014. However, we have articulated in the report that a strict analysis of prevalence is not, in fact, a wholly accurate assessment of the PWTF's success. Using hypertension as an example, we agree with the PWAB's observation that an increase in screening for hypertension can lead to an increase in prevalence by identifying previously undiagnosed individuals, and that such identification is a positive outcome necessary to begin treating and controlling the condition, which in turn leads to positive health outcomes as well as cost savings.

PWAB Comment: The Committee and Harvard had discussed the tight timeline around data and had come up with some partial solutions, such as trying to look at health equity work in the qualitative data. Harvard did attempt to address some of these limitations in the cost analyses by relying on the literature to input values, but these successes were overshadowed by emphasizing the missing data in the executive summary.

HCAT Response: As articulated above, we have revised the qualitative section of the report to include a more robust discussion around health equity. However, as noted in the report, there were significant limitations with both the APCD and MassHealth data sets in terms of race and ethnicity data (i.e., 75-77% missing R/E data in the APCD baseline set and 46-70% missing R/E data in the MassHealth baseline set), and a defensible quantitative analysis of possible changes in racial/ethnic disparities by condition was not possible. However, we did utilize data from MDPHnet to look for changes in prevalence by race/ethnicity among asthma, hypertension, and tobacco use (MDPHnet does not currently capture data around falls) and have included those observations in the report where appropriate.

PWAB Comment: Proposed action items for Harvard Catalyst Evaluation

- The Committee asks you to prioritize re-writing the Executive Summary in response to the comments above. There were findings in this report (positive, less positive, and inconclusive), but it is hard to find them in the current executive summary and so hard to make conclusions about the progress of the current grantee program. The PWAB understands the legislature will primarily focus on the executive summary and so this needs to be a strong, stand-alone document that can be understood by a lay audience.
- Include information on health disparities and health equity in the report from the qualitative analysis.
- The Committee asks the evaluators to add additional projections and forecast to identify future outcomes and potential savings beyond 2017.
- The Committee asks for Harvard to explain some of their chose outcome measures; there was concern that prevalence was not an appropriate outcome measure for several conditions (i.e., asthma and hypertension).

HCAT Response: All of these comments have been incorporated as revisions and responded to above.

MDPH Initial Comments: December 6, 2016

MDPH Comment: We have reviewed the comments of the Evaluation Committee of the Prevention and Wellness Advisory Board and agree with their assessment. We will not repeat them here for the purposes of brevity.
HCAT Response: We have responded to the PWAB's comments in the section above.

MDPH Comment: We are concerned that the outcomes and cost analysis does not include MassHealth or Medicare data for the APCD, and no Case Mix data (hospitalization, emergency department visits and observation stays). As the majority of the participants in PWTF are on MassHealth and the focus of the PWTF interventions was to improve control or prevent high healthcare utilization, these datasets are essential for understanding the impact of PWTF. We were encouraged to see that Harvard plans to do an updated analysis with these datasets in the January—June 2017 timeframe. However, given that Harvard currently has access to hospitalization Case Mix data for FY15, we were wondering if a preliminary analysis or explanation of future analysis would be possible of just that portion of Case Mix.
HCAT Response: As we have articulated to both MDPH and the PWAB, during our analysis of the MassHealth data, we discovered substantial irregularities between 2012 and 2013. Further investigation by JEN Associates, who prepared the research files on our behalf, determined that there was a significant increase in the number of claims without a linked member ID between 2012

and 2013, resulting in a dramatic drop in prevalence that persisted through 2015. This large number of "orphan claims" made it impossible to accurately calculate the actual prevalence of the conditions for 2013, 2014, and 2015. We explored solutions with MDPH and CHIA, and after an attempted fix by JEN Associates, the discrepancies remain. We made the decision not to include the MassHealth data in our initial report. While we recognize the PWAB's and MDPH's concerns, the nature of the data in question are such that we would not trust conclusions arising from the use of these data. MDPH has reviewed the MassHealth data and concurred with our decision. Lastly, we would note that the MassHealth data is only available through the end of 2015, and given that the overwhelming majority of PWTF interventions did not begin until sometime during 2015, it would be unreasonable to expect to see dramatic changes in such a brief period of time, even if using perfect data.

With respect to the Medicare data, which is made available by CHIA, data were only available through the end of 2014. As the great majority of the PWTF interventions did not begin until sometime in 2015, we did not have sufficient intervention-period Medicare data available. Our models and projections are based on our ability to measure potential intervention effects, and without the data to do so, we had no reason to include Medicare in our analysis.

With respect to the Case Mix data, we have now included a high-level analysis of just the Hospital Inpatient Discharge Database (HIDD) in our final report for both asthma and falls, though we note that this is a limited view of the overall Case Mix set. We have previously discussed our preference for looking at complete data sets for both the inpatient and emergency department databases as they are very much related (i.e., a patient presenting with an asthma episode in the emergency department can potentially lead to a hospital admission), and made the decision not to include just the HIDD in our draft report. However, in response to PWAB and MDPH concerns, we have included these graphs in the final report. Lastly, at the time that we submitted our draft report, we did not yet have the final Emergency Department (ED) database for FY2015, but having recently received a research file for the preliminary data (which still requires verification by payers and CHIA), we hope to analyze the full FY2010–FY2015 ED database in the coming weeks.

MDPH Comment: We expected to see more conclusions on the role of community health workers in this report. We understand that Harvard plans to do more in-depth analysis of CHW in the January—June 2017 timeframe. However in response to DPH's comments on the evaluation plan, Harvard stated that "[w]e have revised our plan for the mixed methods implementation component of the evaluation to explicitly include contributions of community health workers…" and "[o]ur team will collect data with respect to the role/impact of community health workers on intervention delivery, patient engagement, etc." We were hoping to see greater discussion of how to best incorporate CHWs in the qualitative section and a summary of lessons learned from using this important workforce.
HCAT Response: We have revised the qualitative section of the report to enhance the discussion on the roles and contributions of CHWs, including observations by community health workers and their supervisors. Community health workers were well-represented among respondents to our implementation survey and our interviews and focus groups. As noted in our new conclusion, we hope to identify with MDPH and the partnerships what more can be learned in the coming months concerning CHWs in the PWTF.

MDPH Comment: We believe that Harvard's decision to not convene the science team until all the data was available resulted in the team being unable to respond to data challenges as they arose this fall. The report reflects that when certain datasets were unavailable, Harvard did not have a back-up plan for the analyses. Subsequently, analyses that could have filled gaps resulting from data access timing issues were not done. As an example, baseline Case Mix data was available in August 2016. Harvard could have used it to understand the public versus private care in communities and also implemented it in modeling prevented outcomes. While Harvard cannot change this result, we feel it is important to put on record part of the reason we believe this report could have had fuller analyses within the limitations.
HCAT Response: We strongly disagree with this comment. The Harvard science team was convened very early in 2016, after the MOU with MDPH was fully executed on November 2, 2015, and a full-time project manager was hired (per the terms of the MOU), and after the last of the individual contracts with each of the nine PWTF grantees was finalized. The team worked to revise and refine the final evaluation plan submitted to MDPH in January 2016 (and approved by the PWAB and MDPH in February 2016) and began to review preliminary data provided by MDPH. The Harvard team also worked closely with MDPH to finalize and submit applications to CHIA for the APCD, Case Mix, MassHealth, and Medicare data sets, which were submitted in March 2016. However, it took time for CHIA to approve these applications, to provide the raw data to JEN Associates, and for final research files to be assembled. More importantly, claims data for 2015, which covered the actual intervention period, was not made available until late summer/early fall of 2016. The Harvard science team began reviewing Electronic Health Record (EHR) and Community Intervention data as early as March 2016, and our qualitative evaluation team were fully active and interviewing key PWTF stakeholders in April 2016.

To accurately assess the impact of PWTF interventions, more data were required covering a longer period of time in order to fully capture patient records during the intervention period, and our team was somewhat dependent on the delivery of data later in the evaluation period. More importantly, however, as stated earlier, our ability to model and project future outcomes is based on our ability to accurately measure the effects of PWTF interventions. Baseline data (2010—2014) would simply not have been sufficient to do so given that most interventions did not begin until 2015.

MDPH Comment: We were disappointed not to see the inclusion of PWTF STEADI data that was sent to Harvard as part of the clinical data. Starting in April 2016, clinical sites began reporting their STEADI data in Excel sheets, which could have been used to understand the reach of the STEADI clinical intervention work. There has been significant uptake of screening for falls, potentially exceeding national standards, and that could have been highlighted.
HCAT Response: We have included and incorporated the STEADI data in our final report.

MDPH Comment: Regarding the health equity data, we know that the EHR has valuable information in this area and could be used to strengthen the health equity discussion. This data can be a back-up data source for a health disparities analysis.
HCAT Response: In future work, we can potentially stratify the EHR data by race/ethnicity within the PWTF communities and distinguish between baseline and intervention periods. However, our analysis would be limited to only those patients receiving care at participating community health centers and clinics (and would not capture activities related to falls interventions), as opposed to claims data (i.e., APCD and MassHealth), which would give us a full view of the entire population's status.

MDPH Comment: Regarding the tobacco analysis—the CPT codes that were searched for in the EMR data could also be examined in the APCD data.
HCAT Response: CPT codes are designed to be used specifically to capture billable activities and are therefore unlikely to accurately reflect the degree of tobacco cessation activities practitioners engage in with their patients as it is but one of many areas of engagement with patient during visits.

MDPH Detailed Comments: December 15, 2016

MDPH Comment: Regarding the difficulties with getting data that could be used for a health equity analysis – the EHR data has race/ethnicity, and could be used to look at trends throughout the baseline, capacity building, and implementation of PWTF
HCAT Response: In future work, we can potentially stratify the EHR data by race/ethnicity within the PWTF communities, and distinguish between baseline and intervention periods. However, our analysis would be limited to only those patients receiving care at participating clinics (and would not capture activities related to falls interventions), as opposed to claims data (i.e., APCD, Case Mix, and MassHealth), which would give us a full view of the entire population's status.

MDPH Comment: For the tobacco analysis – the CPT codes that were searched for in the EMR data could also be searched for in APCD data.
HCAT Response: CPT codes are designed to be used specifically to capture billable activities and are therefore unlikely to accurately reflect the degree of tobacco cessation activities practitioners engage in with their patients as it is but one of many areas of engagement with patient during visits.

MDPH Comment: A lot of references to ICD 9 codes without mention of ICD 10 codes. Appendix 2 has reference to ICD 10 for MDPHNet but not Appendix 1 or 3. Reference to ICD 10 should be made in the body of the report if referring to ICD 9.
HCAT Response: This change has been made and references to ICD 10 codes have been added where appropriate.

MDPH Comment: In Tobacco Section, there is no mention of the smoke-free housing intervention.
HCAT Response: This change has been made.

MDPH Comment: Table 5 – that first Grantee/Partnership row is Barnstable, and resulting calculation are incorrect because they are likely basing it off that incorrect total Barnstable county population of 215,888 rather than the correct Barnstable Partnership population communities of 110,484 (Barnstable partnership included 4 communities -- Bourne – 19,754, Barnstable – 45,193, Falmouth – 31,352, Mashpee – 14,006 total partnership = 110,305)
HCAT Response: We have updated our calculations to reflect the correct population for Barnstable.

MDPH Comment: We request that at least once you describe e-Referral as the MA State Innovation Model Award e-Referral program (or somehow allude to the funding for the e-Referral infrastructure came from CMMI State Innovation Model Award).
HCAT Response: This change has been made and a reference to the program has been included under the "PWTF Origin" heading of Section Three.

MDPH Comment: (p.27) "Lastly, analyses conducted using data from the EHR were limited to assessments in the intervention communities only, as data for comparison communities were not included." As a general note, clinics not addressing the condition could have been used as a comparison community, as well as comparing clinics pre and post their intervention work
HCAT Response: Our analyses of both the hypertension and tobacco interventions using EHR data did in fact look at patients in the same clinic in a clearly defined pre and post period, as articulated in the relevant sections of the report. With respect to using data from clinics not addressing a particular condition, such a comparative analysis is possible and can be looked at in future work, providing that the numbers are not so small at individual clinics as to preclude meaningful comparisons. However, for a truly neutral comparative analysis, data from clinics outside of the PWTF communities would be required. If we were to limit our analysis to only PWTF clinics for the purposes of comparing one community to another or conducting a pre/post analysis of a given condition, the process would be inconsistent with our efforts to create true control communities outside of PWTF geographic areas, a process that largely included the input of MDPH. However, were we to do so, we would need to ensure that the matching process was consistent in terms of identifying control groups with similar population and health characteristics to the population being evaluated.

MDPH Comment: (p.65) "It does appear that there may have been declines in smoking rates in the PWTF communities but the absence of data for non-intervention sites in the EHR data prevented us from determining if the declines outstripped secular declines that may have been occurring in the non-PWTF communities in the Commonwealth." There are clinics not working on tobacco for PWTF for which there is EHR data; not the same as an external community but still provides for a comparison.
HCAT Response: As articulated above, if we were to limit our analysis to only PWTF clinics for the purposes of comparing one community to another or conducting a pre/post analysis of a given condition, the process would be inconsistent with our efforts to create true control communities, a process that largely included the input of MDPH. However, were we to do so, we would need to ensure that the matching process was consistent in terms of identifying control groups with similar population and health characteristics to the population being evaluated.

MDPH Comment: "If 70% of the 3,295 PWTF enrollments had a person's fear of falling eliminated by the intervention, this would translate to enough QALYs for the intervention to be considered cost-effective." - what about QALYs for patients who may have received multifactorial assessment (which can lead to orthopedic or vision corrections, medication reconciliation, etc.) - wouldn't there be QALYs for those people that aren't being considered here?
HCAT Response: We appreciate the point being made, but we did not have a way to accurately quantify this relationship as we did not have any information on what percent of those who received an assessment then had their vision corrected, and what percent of those whose vision was corrected avoided a fall because of it. We used the fear of falling as a metric because there is information available on the connection between a reduction in the fear of falling and an increase in QALYs. We have added some language in the report noting that there could be a small, residual QALY gain as a result of the multifactorial risk assessment if they led to orthopedic or vision corrections, medication reconciliation, or other modifications, though noting that we were not able to specifically quantify that impact.

MDPH Comment: Different sections seem to be written by different people – tone comes through differently in each section.
HCAT Response: We have updated the draft report in an attempt to unify the tone in the final version.

MDPH Comment: Each figure should have a legend
HCAT Response: This change has been made.

MDPH Comment: Section 2: acknowledgments should be moved much further down in the report. **The introduction** should be Section 2.
HCAT Response: We respectfully disagree with this comment and will leave the Acknowledgments section unchanged. We made this decision, initially and in the revision, primarily because the partnerships themselves were so generous of their time and so important to the evaluation. As such, we wanted to ensure that we recognized them early and prominently.

MDPH Comment: Also, in the introduction section, Michael Powell, PWAB Evaluation Committee member, is from MassHealth NOT CHIA. Also Zi Zhang also represented CHIA for part of the time (since fall 2016) and should be mentioned in the acknowledgement section.
HCAT Response: We have made these corrections and edits.

MDPH Comment: The section on the PWTF evaluation should mention the role of the PWAB.
HCAT Response: This change has been made.

MDPH Comment: Throughout: don't use yellow highlight in case printed black and white (tables 3, 4, 7)
HCAT Response: This change has been made.

MDPH Comment: (p.29) "Unfortunately, resource use among PWTF communities was not tracked systematically for external evaluation beyond that which was required for quarterly financial reporting to MDPH. These reports were submitted regularly from each PWTF community, but did not allocate spending by specific condition(s)." This is also an opportunity to reframe why funding occurred this way – to allow for synergism across conditions. Many PWTF staff work on multiple health conditions.
HCAT Response: This change has been made.

MDPH Comment: (p.34) PREDICT model description could be in appendix or reference
HCAT Response: We respectfully disagree and will keep the CVD-PREDICT model in place so as to provide context around how hypertension and tobacco-related projections were generated.

MDPH Comment: Throughout: It would be helpful to have lines for baseline and intervention to remind audience of implementation time frame in graphs such as those found in the MDPHnet section.
HCAT Response: We understand the intent behind this comment, but as multiple interventions were launched at different times in each community, lines denoting each start date would make graphs unnecessarily busy. We have inserted a single line, where appropriate, noting the "official start date" of the PWTF intervention period in September 2014.

MDPH Comment: (p.90) "having sufficient data systems and staffing with expertise" – This is an important lesson learned and would recommend highlighting this lesson learned in Executive Summary.
HCAT Response: This change has been made.

MDPH Comment: Last paragraph: ("more than a coherent and synergistic package") – unclear what this means.
HCAT Response: We have clarified this language.

MDPH Comment: Patient misspelled as Patience on pg 83
HCAT Response: This change has been made.

MDPH Comment: "...that 3,295 PWTF falls intervention enrollments translates to having effectively reached approximately 2% of the target age population in PWTF communities..." - this is based on referrals and not the number who received clinical screening – there were certainly more than that who were screened. The PWTF falls interventions included a clinical screening – STEADI – and the community interventions. The way this is stated, implies that the only intervention was in the community.
HCAT Response: We have updated our calculations to incorporate the STEADI data.

MDPH Comment: p.6 "We also used electronic health record (EHR) data from 25 CHCs participating in PWTF to…" They aren't all CHCs, we suggest 25 *clinical sites* participating.
HCAT Response: We have modified this description accordingly.

MDPH Comment: p.8 "Of the 6,432 clients enrolled by June 2016, 89% were in Community 7 (2,574) and Community 2 (3,149)." How is enrolled defined? Are they including school data (which is a different process)? This number enrolled in an asthma intervention is greatly above the numbers PWTF reports as enrolled as we only counted the home visit enrollment on the community side.
HCAT Response: For the purposes of estimating the cost per person of each intervention, we took a slightly more liberal approach with respect to asthma and included those individuals who were listed as having participated in and/or completed a school-based intervention. We recognize that the vast majority of asthma intervention participants were included in school-based interventions, but as PWTF funds were allocated for this purpose, we included these figures in our estimates.

MDPH Comment: p.10 Vicki Vanzee is "Vicki Van Zee"
HCAT Response: This change has been made.

MDPH Comment: p.12 The sentence on PWTF in the first paragraph should be amended to say "The PWTF Program was funded by a one-time assessment on acute hospitals and payers for $57 million, of that, $42 million was provided to the PWTF Grantee Program." Or something similar. DPH received total of $57 million and $42 million went to the Grantee Program.
HCAT Response: This change has been made.

MDPH Comment: p. 16 Partnerships had six to nine months for capacity building. Not six to twelve months. (March 2014 – September 2014 or December 2014). The two cohorts were created

because Cohort One was considered to be more "shovel ready" to implement the interventions and program. Not because of size.
HCAT Response: This change has been made.

MDPH Comment: P.9 e-Referral, not e-referral (throughout); e-Referral defines "bi-directional" as allowing for the community organization to provide updates to the medical provider on the status of the referral. NOT to make referrals from the community to the clinical. This should be corrected.
HCAT Response: This change has been made.

MDPH Comment: p.13 "Of the nine partnerships, all selected hypertension, eight selected falls among the elderly, six selected tobacco cessation, and five chose pediatric asthma." This is a typo – it's 5 for tobacco and 6 for asthma. MetroWest is doing DPP as one of their HTN interventions
HCAT Response: This change has been made.

MDPH Comment: p.15, 30, The correct name of APCD is All Payer Claims Database (according to CHIA, no S). Might be in other places as well.
HCAT Response: This change has been made.

MDPH Comment: p.17 For the EHR data section, the type of data should also be expanded to say "and data extracts from other PWTF Clinical Partners". Also, the correct name of DRVS is Azara DRVS, not MLCHC DRVS. "The majority of the data comes from the Azara Data Reporting and Visualization System (DRVS) data network, in partnership with the Mass League. However, there were additional extracts from other PWTF clinical sites not on DRVS. As a result, the data is heterogeneous across different clinics and their respective data systems; there is considerable variation in data availability and quality from site to site."
HCAT Response: This change has been made.

MDPH Comment: p.26 "merged data set containing more than 2.4 million individual clinical encounters and 444,337 unique patient visits across 25" I believe that 444,337 statement is worded incorrectly –unique patients not unique patient visits.
HCAT Response: This change has been made.

MDPH Comment: p.29 As a general note, DRVS data is stripped of all non-primary care CPT codes – so none of the DRVS data has 99406 or 99407.
HCAT Response: This may well be the intent, but there were 110 instances where one of these codes showed up in the variable 'visit_type' in the master EHR data set obtained from MDPH.

MDPH Comment: Where in the data do they pull a "smoking cessation referral order"? DPH was unaware of this field.
HCAT Response: This variable is not listed as part of the EHR contents in the latest codebook from MDPH (PWTF Encounter-level Data Elements FINAL_UPDATED 20141230). However, it does appear in the data and in the data codebook for 156 records in the master EHR data set.

MDPH Comment: p.30 As a note about when they are speaking about Table 3 in the text, they should not be saying to date – they did not include the most recent data which makes their numbers off by over 1,000.

HCAT Response: This change has been made. To clarify, we analyzed Community Intervention data through June 30, 2016 to remain consistent with our intervention cost estimates, which were dependent on fiscal year data available through June 30, 2016.

MDPH Comment: p.31 Around asthma referrals: They must be counting schools to have such high numbers, we don't consider those to be referrals because it's a different process; gets to overall comments.
HCAT Response: We counted everyone reached by an asthma intervention in our figures, including school-based numbers.

MDPH Comment: p.34 "In most cases, the organizational structure of the PWTF program within a community involved a partnership of several community organizations." - All partnerships relied on multiple community organizations.
HCAT Response: This change has been made.

MDPH Comment: p.41 They also were getting ICD 10 codes in the diagnoses fields.
HCAT Response: This change has been made and references to ICD 10 codes have been added where appropriate.

MDPH Comment: Visit type – DRVS data would be stripped of CPT codes around smoking cessation counseling sessions
HCAT Response: This may well be the intent, but there were 110 instances where one of these codes showed up in the variable 'visit_type' in the master EHR data set obtained from DPH.

MDPH Comment: p.44 Eval methodology section: intro: learning collaborative description suggested revision from "where they could compare notes and perspectives" to "where they could share strategies that were successful and troubleshoot barriers, obtain training and review statewide data on progress towards goals"
HCAT Response: We have incorporated this language.

MDPH Comment: Regarding the explanation of the partnership's approach to tweaking the PWTF model? Suggest revising to say "while partnerships had some flexibility to account for unique circumstances there was significant focus on training and fidelity standards for the interventions to ensure standardization and adherence to evidence-based interventions". DPH provided significant TA to align the interventions with the evidence.
HCAT Response: We have incorporated much of this language. Our data affirms there was considerable, and desirable, adaption to context and conditions, and this flexibility was important to partnerships.

MDPH Comment: p.50 1st sentence doesn't mention CDSMP as an intervention which is separate from community or home-based self-monitoring.
HCAT Response: This change has been made.

MDPH Comment: "Interventions in all nine PWTF communities included primarily the adoption of either JNC-7 (Joint National Committee on Hypertension) guidelines that encourage screening and then improved management of those identified with hypertension and/or referral of patients with hypertension to community-based or home-based self-monitoring." - should say that they

adopted either JNC-7 or JNC 8 AND referral of patients to community-based or home-based self-monitoring.
HCAT Response: This change has been made.

MDPH Comment: Pg 57: States "if somewhat less severe" – for lay reader, explain why this might be the case.
HCAT Response: This change has been made.

MDPH Comment: Confusing to make the case for declining and increasing prevalence as both positive outcomes of PWTF – it is the problem with using prevalence as an outcome measure. If Harvard continues to use asthma prevalence as a measure, this will be confusing to the lay audience. Pg 59:
HCAT Response: This change has been made.

MDPH Comment: After "enrolled" (ADD in home visits)
HCAT Response: This change has been made.

MDPH Comment: p.61 CE/ROI: What is the 40% reduction in incidence based on? Further expand on this?
HCAT Response: We have updated the report to reflect the cited source for this figure, which is as follows: Gillespie LD, Robertson MC, Gillespie WJ, Sherrington C, Gates S, Clemson LM, Lamb SE. Interventions for preventing falls in older people living in the community. Cochrane Database of Systematic Reviews 2012, Issue 9. Art. No.: CD007146. DOI: 10.1002/14651858.CD007146.pub3.

MDPH Comment: I think maybe the 65+ number is wrong – I have ~135,000; related to miscounting Barnstable as in other sections
HCAT Response: This change has been made.

MDPH Comment: Pg 62: "In contrast, the PWTF has spent over $2,000 per client enrolled ($6.9 million / 3,295) and has not systematically targeted especially high-risk clients": a significant portion of partnership spending on falls went to clinical screening. Did Harvard remove the clinical costs from this calculation? Disagree that PWTF hasn't targeted high risk clients – STEADI hones in on degree of risk with the questionnaire, TUG and multifactorial assessment, and only high risk and moderate-risk patient can receive Home Safety Assessment. All people 65 + can receive Tai Chi and MOB.
HCAT Response: We have updated our calculations to incorporate the STEADI data.

MDPH Comment: Pg 63: Unclear if this considers all 3 falls interventions (MOB, Tai Chi and home assessments) or only MOB. Please clarify.
HCAT Response: We have updated this section to clarify our projections and their relationship to the full suite of falls interventions, both community and clinical.

MDPH Comment: Sentence about "while it may not be realistic that such a large fraction of participants have a major fear of falling……" this contradicts the section (pg 62) citing Jonathan Howland's research on fear of falling. There is evidence about the % of people with fear of falling.

HCAT Response: The Howland study refers to ROI on fall-related injuries rather than fear of falling. The reference to Iglesias 2009 describes how fear of falling may make up a large proportion of fall-related QALYs. However, this is congruent with the statement that the percent of participants with a fear of falling may nevertheless be low.

MDPH Comment: pg 66 First 3 words are incorrect – referring to smoking rates not smoking cessation
HCAT Response: This change has been made ("cessation" changed to "prevalence").

MDPH Comment: Pg 68: States "physician counseling" but PWTF supported 1:1 and group in the community.
HCAT Response: We are limiting our interpretation to the scenario where increased physician counseling would occur, rather than asserting that only physician counseling occurred in the PWTF program. We have edited the text to clarify this point. There are no data in the EHR to indicate if 1:1 by non-physicians and group counseling was provided to individual patients.

MDPH Comment: p.74 "much EMR data were not available until fall 2016." Harvard had EMR data starting in March 2016
HCAT Response: It is true that Harvard had some EMR data in March 2016, though the last stages of our analysis were dependent on data made available in the late summer and early fall of 2016. However, we have modified the language referenced in this comment so as to avoid presenting the implication that our efforts were hindered due to the availability of certain data later in the evaluation period.

MDPH Comment: Pg 77 Seems to be a typing error in 2nd quote: should it be "we can to use" and "a good buy in"?
HCAT Response: We have made this change.

MDPH Comment: Seems to be a typing error in 3rd quote: "head of STEADI" should be heard
HCAT Response: We have made this change.

MDPH Comment: p.78 "for some months in the intervention period partnerships were told not to count as PWTF exposures intervention participants who were not referred by the clinics, and they were discouraged from seeking such participants" That is not true and was not a DPH. This may have been how the survey respondent understood the requirement but it was not a DPH rule. They were always told that they should count these people – this is reflected in how these numbers are documented in the data back through Jan 2015 (the start of CBO work); there might have been a messaging issue with whomever said that in the survey but Harvard should represent it the respondent's understanding rather than a DPH policy
HCAT Response: As articulated by several PWTF grantees during our interviews with key stakeholders, we believe that, prior to MDPH reorganization of the TA process, there were inconsistencies in messages to partnerships. That conclusion is also consistent with information from our interviews with MDPH. We have, however, changed the language in this section to make it clear this was the partnerships' understanding, and not MDPH's direction.

MDPH Comment: There seems to be a typing error in quote – correct would be "YDPP" and "electronic"

HCAT Response: We have reviewed the audio file from which this quote was transcribed and confirmed that it is reflected accurately.

MDPH Comment: Pg 83: Figure 30: in engaging: partner with CBOs to identify those with undiagnosed HTN – this is inaccurate. Typically clinical sites review their registries to ID undiagnosed
HCAT Response: This change has been made.

MDPH Comment: Pg 87: 2nd paragraph - Partnerships did not adapt the intervention for CHWs b/c of a lack of OT/PTs. The PWTF intervention was the CHW version. Providers did not refer b/c they were unaware of the opportunity. Proposed rewrite: For the falls home safety assessment, challenges included the need for training for CHWs on the intervention as this was a new evidence-informed intervention. Clinical providers were unfamiliar with this and needed education on what it was, who was eligible and how to refer patients. This CHW version of a home safety assessment was designed to reach a larger population of older adults with falls risks in their homes. In addition this intervention could potentially be more cost effective than a formal PT/OT home safety evaluation (which may be covered by insurance for some patients).
HCAT Response: We have made changes to this language.

MDPH Comment: Last paragraph – inaccurate: challenging to get buy-in from some clinicians who are used to referring to rehab programs……. PWTF expects clinics to referring pts to rehab who need it. The CHW home assessment is for those who are not eligible for a PT/OT home safety assessment but have falls risk.
HCAT Response: We have made changes to this paragraph. However, our obligation is to report findings from our data, which addresses how the communities implemented the PWTF (including their perceived success and challenges) and not how MDPH intended it to be implemented.

MDPH Comment: Pg 88: Overall this entire section is not cohesive – it jumps around and does not summarize or transition well.
HCAT Response: We have reorganized and re-written this entire section to make it more cohesive as it seeks to blend the science of our mixed methods process with a cohesive narrative about lessons learned.

MDPH Comment: e-Referral needs a capital R, it's how DPH titled it.
HCAT Response: This change has been made.

MDPH Comment: Correct terminology is Substance Use, not Substance Abuse.
HCAT Response: This change has been made.

MDPH Comment: "older adults" should be used instead of "elderly".
HCAT Response: This change has been made.

MDPH Comment: "elder centers" should be replaced with "senior centers".
HCAT Response: This change has been made.

MDPH Comment: "communities" should not be used to describe partnerships as some partnerships have multiple communities.

HCAT Response: The term "communities" has many definitions, and as such, we do not believe there is any reason to assume that a community is necessarily defined as a political entity such as a town, city, etc. Most, if not all PWTF partnerships are comprised of multiple communities. Moreover, a partnership consists of the organizations within it, which is not the same as the people living in the communities that the partnership seeks to address. As such, we have elected not to make this change in its entirety, but have made certain adjustments for the sake of clarity (i.e., to specifically denote PWTF grantees as consolidated entities where appropriate).

MDPH Comment: Coordinating Partner should be capitalized.
HCAT Response: This change has been made.

MDPH Comment: Replace "shelter" with "housing".
HCAT Response: This change has been made.

MDPH Comment: p.7 "Finally, we used encounter-level data provided by the nine PWTF grantees, via MDPH…" DPH uses the term encounter-level data for the electronic health record data that has detailed information on each visit. In all our documentation we use community-intervention data or aggregate data to describe the data provided by community-based organizations.
HCAT Response: We have made this change and have utilized the term "Community Intervention Data."

MDPH Comment: p.27 Refer to "outpatient" program – replace with "community-based".
HCAT Response: This change has been made.

MDPH Comment: "Two additional community based interventions were employed: referral to tobacco cessation counseling, either via (ADD) in-person individual or group counseling or phone based quit line."
HCAT Response: This change has been made.

MDPH Comment: P. 82 – for clarity 3rd sentence add Asthma.
HCAT Response: This change has been made.

MDPH Comment: Names self-monitored BP as a clinical intervention when also referred to as community intervention elsewhere – needs to be consistent, PWTF allowed self-monitoring of BP to be either in the clinical or community settings.
HCAT Response: This change has been made.

Section Eleven: References and Citations

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Section Twelve: Appendix

Appendix 1: ICD-9-CM Codes for APCD Prevalence Calculations

Diagnosis Definitions for Select Health Outcomes	
Health Outcome	**Definition**
Hypertension	401.0, 401.1, 401.9, 402.00, 402.01, 402.10, 402.11, 402.90, 402.91, 403.00, 403.01, 403.10, 403.11, 403.90, 403.91, 404.00, 404.01, 404.02, 404.03, 404.10, 404.11, 404.12, 404.13, 404.90, 404.91, 404.92, 404.93
IHD/Ischemic Heart Disease	410, 411, 412, 413, 414, 429.7
CVA/Stroke	431, 433.x1, 434, 436
Heart Failure	428
Peripheral Vascular Disease	440, 443.89, 443.9, 249.7X, 250.7X
Falls Among Older Adults	*See table below*
Pediatric Asthma	493.00-493.99
Tobacco (COPD)	496 - 496.99
Diagnosis Definition for Health Outcome: Falls Among Older Adults	
Condition Description	**Definition**
Hip/Pelvic Fracture	733.14, 733.15, 733.96, 733.97, 733.98, 808.0, 808.1, 808.2, 808.3, 808.41, 808.42, 808.43, 808.44, 808.49, 808.51, 808.52, 808.53, 808.54, 808.59, 808.8, 808.9, 820.00, 820.01, 820.02, 820.03, 820.09, 820.10, 820.11, 820.12, 820.13, 820.19, 820.20, 820.21, 820.22, 820.30, 820.31, 820.32, 820.8, 820.9
Other Ankle/Hip/Leg injury	820-829.99, 843-845.99 (excluding ICD-9-CM Diagnosis codes from above)
Wrist Injury	814-814.99, 833-833.99, 842-842.99
Contusions	920-924.99
Spine/Upper Body Injury	805-805.99, 846-847.99
Skull Injury/ Fracture/Concussion	800-804.99
Cause of Fall	E880, E881, E882, E884, E885, E888

Sources for Definition of Falls Among Older Adults

1. Hoffman, Geoffrey J., et al. "Claims-based Identification Methods and the Cost of Fall-related Injuries Among US Older Adults." Medical care (2016)
2. Excerpts from the International Classification of Diseases, Versions 9 and 10. http://www.cippp.org/teleconf/falls-c03.pdf.

Appendix 2: Methodology Used for MDPHnet Data Reports

For each quarter from Jan 1, 2012 through Sept 30, 2016, counts were returned of individuals that meet the criteria specified below for each condition. These counts were stratified by ten-year age group, sex, and race-ethnicity. Counts were then adjusted based on the US Census data (2010) for each community and the state. Age was determined as of the start date of the quarter (i.e. the index date). For example, index date for Q1 2016 is Jan 1, 2016. The conditions used to generate numerator data on for each of the eight PWTF and comparison communities were:

1. Current smoking
2. Asthma
3. Hypertension
4. Average Systolic Blood Pressure
5. Average Diastolic Blood Pressure
6. Hypertension and On-Treatment
7. Blood Pressure Measured
8. Change in Smoking Status (From 'yes' or 'current' as of Jan 1, 2014 to 'former' or 'no' thereafter)
9. Smoking Status Measured

Denominators for Each Condition (i.e. inclusion criteria)
≥1 encounter for any reason in the 2 years preceding the index date (first date of the quarter)

Numerators

Current Smoking
Most recent smoking status prior to index date recorded: 'Current'

Asthma
≥2 ICD-9/10 codes or ≥2 prescriptions for asthma medications within 2 years preceding the index data

- Prescriptions can occur on the same day but must be for different medications
- Diagnoses must occur on different days
- Note: Combination drugs are currently treated as one prescription

Hypertension
Numerator = those meeting the definition below as of the index date for each quarter:

1. Systolic blood pressure ≥140* or diastolic blood pressure ≥90 or both on 2 or more occasions within a one year period, *or*
2. Diagnosis code for hypertension and (prescription or refill) for at least one antihypertensive medication within one year of hypertension diagnosis code
3. Episode duration:
    a. Classification of hypertension persists so long as patient has any of the following indicators:
        i. Measured systolic blood pressure ≥140
        ii. Measured diastolic blood pressure ≥90
        iii. ICD9 or ICD10 code for hypertension
        iv. Prescription for an antihypertensive medication

b. If a patient has none of the above for ≥2 years then at the next encounter reclassify as non-hypertensive (i.e. hypertension end-date is at the next encounter ≥730 days from the last encounter with evidence of ongoing hypertension). Note, however, that if the patient's ONLY hypertension indicators have been high systolic or diastolic blood pressure values but they have NEVER had a hypertension diagnosis or prescription for antihypertensive med then reclassify as non-hypertensive at the next encounter ≥365 days from the last recorded elevated systolic or diastolic blood pressure.

* if patient age ≥80 then the eligible systolic threshold for hypertension is ≥150mmHg

Diagnosis Codes	ICD9	401.x (essential hypertension) 405.x (secondary hypertension)
	ICD10	I10 (essential hypertension) I15 (secondary hypertension)
Medications	Diuretics	Hydrochlorothiazide (hctz, esidrix, oretic, microzide, hydrodiuril), chlorthalidone (thalitone), indapamide (lozol)
	Calcium channel antagonists	amlodipine (norvasc), clevidipine (cleviprex), felodipine (plendil), isradipine (dynacirc), nicardipine (cardene), nifedipine (procardia, adalat), nisoldipine (sular), diltiazem (cardizem, cartia, diltia, diltzac, tiazac, taztia), verapamil (isoptin, calan, covera, verelan)
	Beta-blockers	acebutolol (sectral), atenolol (tenormin), betaxolol (kerlone), bisoprolol (zebeta), carvedilol (coreg), labetolol (trandate), metoprolol (lopressor), nadolol (corgard), nebivolol (bystolic), pindolol (visken), propranolol (inderal)
	ACE inhibitors	benazepril (lotensin), captopril (capoten), enalapril (enalaprilat, vasotec), fosinopril (monopril), lisinopril (prinivil, zestril), moexipril (univasc), perindopril (aceon), quinapril (accupril), ramipril (altace), trandolapril (mavik)
	Angiotensin receptor blockers	candesartan (atacand), eprosartan (teveten), irbesartan (avapro), losartan (cozaar), olmesartan (benicar), telmisartan (micardis), valsartan (diovan)
	Alpha antagonists	clonidine (catapres), doxazosin (cardura), guanfacine (tenex), methyldopa (aldomet), prazosin (minipress), terazosin (hytrin)
	Aldosterone antagonists	eplerenone (inspra), sprinolactone (aldactone)
	Others	aliskiren (tekturna), hydralazine (apresoline),

Average SBP

Mean systolic blood pressure (SBP) per quarter amongst adults age ≥20 with at least one encounter in the two years preceding the index date for each quarter. Use the most recent SBP relative to the index date of the quarter. Carry forward last measured SBP for a maximum of one year. If no SBP measure available then exclude. Take the average SBP amongst all patients with available SBPs.

Average DBP

Mean diastolic blood pressure (DBP) per quarter amongst adults age ≥20 with at least one encounter in the **two years** preceding the index date for each quarter. Use the most recent DBP relative to the index date of the quarter. Carry forward last measured DBP for a maximum of one year. If no DBP measure available then exclude. Take the average DBP amongst all patients with available DBPs.

Hypertension and on treatment

Count of patients age ≥20 with *active hypertension* as of the index date of each quarter who have been prescribed or given a refill for ≥1 anti-hypertensive agent within the year preceding the index date of the quarter.

Blood pressure measured
Count of patients age ≥20 with an encounter within the past 2 years in whom there is a blood pressure value available (any value) within the year preceding the index date of each quarter

Smoking status recorded
Count of patients with an encounter within the past 2 years in whom there is an available smoking status (i.e. current, former, passive or never) as of the index date of each quarter (continue to propagate forward in time any recorded smoking status from first occurrence until present or until a new smoking status is entered)

Smoking cessation amongst known smokers

- Provide count of patients with an encounter within the 2 years preceding Jan 1, 2014 and smoking status of "current smoker" as of Jan 1, 2014 (denominator 1)
    - For every subsequent quarter (April 1, 2014 through to present), provide the count of the subset of the Jan 1, 2014 cohort of current smokers with an encounter within the 2 years preceding the index date of each quarter (denominator 2, a subset of the individuals in denominator 1 who are still being seen at site)
    - For every quarter (April 1, 2014 through to present), provide the count of the subset of the Jan 1, 2014 cohort of current smokers with an encounter within the 2 years preceding the index date of each quarter and a status of "former smoker" or "non-smoker" as of the index date of each quarter (numerator for denominator 2)

Stratifications for all conditions
Note: For average SBP and average DBP, also report the means for all adults >= 20 years

- 10-year Age Group
    - 0-9, 10-19,...,90-99, 100+
    - Age should be calculated based on index date of each query (i.e. start date of the quarter)
    - Count each person once in the numerator and denominator (calculate date as of the index date of the query but ignore whether someone's age would change due to birth date during the quarter)
- Sex
    - Male
    - Female
    - Unknown
- Race-ethnicity
    - Asian
    - Black
    - Hispanic
    - Native American
    - Unknown
    - White

Appendix 3: Diagnosis Codes for Hypertension (MDPH-Provided EHR Data)

ICD-9 Codes	ICD-10 Codes	SNOMED CT Code	SNOMED CT Code
401.0	I10	10725009	65518004
401.1	I11.0	111438007	66610008
401.9	I12.0	1201005	73410007
402.01	I12.9	123799005	78544004
402.11	I13.0	123800009	78975002
402.91	I13.10	14973001	81363003
403.00	I13.11	193003	86234004
403.01	I13.2	194774006	90493000
403.10	I11.9	194783001	169465000
403.11	I15.0	19769006	194785008
403.90	I15.1	23130000	194788005
403.91	I15.2	276789009	194791005
404.00	I15.8	28119000	31992008
404.01	I15.9	32916005	38341003
404.02		371125006	50490005
404.03		38481006	59997006
404.10		39018007	70272006
404.11		397748008	74451002
404.12		427889009	84094009
404.13		428575007	89242004
404.90		429198000	
404.91		429457004	
404.92		46481004	
404.93		48146000	
402.00		49220004	
402.10		52698002	
402.90		56218007	
405.01		57684003	
405.09		59621000	
405.11		59720008	
405.19		62240004	
405.91		62275004	
405.99		65443008	

Appendix 4: Summary of Costs for Acute CVD Events in 2015

Event	Commercial Cost ($USD)
Mean Cost: IHD Events	26,462.91
Mean Cost: CVA Events	15,603.66
CABG Procedure	76,889
PTCA Procedure	36,222

IHD: Ischemic Heart Disease [includes acute and repeat Myocardial Infarction (MI); acute Coronary Artery Bypass Grafting (CABG) for MI and Angina; Angina].

CVA: Cerebrovascular Accident (includes acute and repeat CVA); PCTA: Percutaneous Transluminal Coronary Angioplasty**.**

Appendix 5: IRB Approval: Use of Secondary, Existing Data

HARVARD
Human Research Protection Program

Harvard T.H. Chan School of Public Health
Office of Human Research Administration
90 Smith Street, 3rd Floor
Boston, MA 02120

Notification of Initial Study Exemption Determination

February 11, 2016

Michelle Williams
mawilliams@hsph.harvard.edu

Protocol Title:	Prevention and Wellness Trust Fund Evaluation Using Secondary, Existing Data
Principal Investigator:	Michelle Williams
Protocol #:	IRB16-0084
Funding Source:	Commonwealth of Massachusetts/Department of Public Health-INTF3617HH2500224045 (Active)
IRB Review Date:	2/11/2016
IRB Review Action:	Exempt

On 2/11/2016 it was determined this Initial Study submission meets the criteria for exemption per the regulations found at 45 CFR 46.101(b)(4).

Additional review is not required. However, any changes to the protocol that may alter this determination must be submitted for review via a modification (by selecting the Create Modification activity in the ESTR system) to determine whether the research activity continues to meet the criteria for exemption.

The IRB made the following determinations:

- Research Information Security Level: The research is classified, using Harvard's Data Security Policy, as Level 1 Data.

Please contact me at 617-432-2160 or kturner@hsph.harvard.edu with any questions.

Sincerely,

Keisha Turner
IRB Review Specialist

Appendix 6: IRB Approval: Mixed Methods Implementation Evaluation

HARVARD
Human Research Protection Program

Harvard University Faculty of Medicine
Office of Human Research Administration
90 Smith Street, 3rd Floor
Boston, MA 02120

Notification of Determination - Not Human Subjects Research

March 14, 2016

Charles Deutsch
cdeutsch@hsph.harvard.edu

Protocol Title:	Prevention and Wellness Trust Fund Mixed Methods Implementation Evaluation
Principal Investigator:	Charles Deutsch
Protocol #:	IRB16-0368
Funding Source:	Commonwealth of Massachusetts/Department of Public Health-INTF4250HH2500224018 (Active)
IRB Review Date:	3/14/2016
IRB Review Action:	Not Human Subjects Research [45 CFR 46.102(d)]

On 3/14/2016, it was determined that this submission is not human subjects research as defined by DHHS or FDA regulations.

Additional review is not required. This determination applies only to the activities described in the IRB submission. Any changes that may alter this determination must be submitted via a modification (by selecting the Create Modification activity in the ESTR system) for review.

If you have any questions, please contact me at 617-432-7434 or kserpico@hsph.harvard.edu.

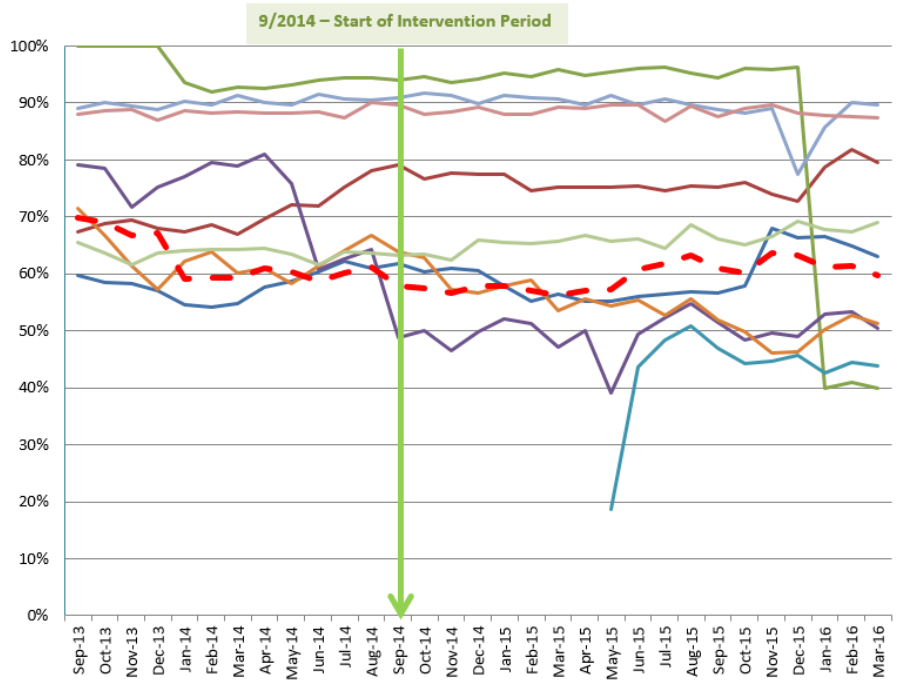
Sincerely,

Kimberley Serpico

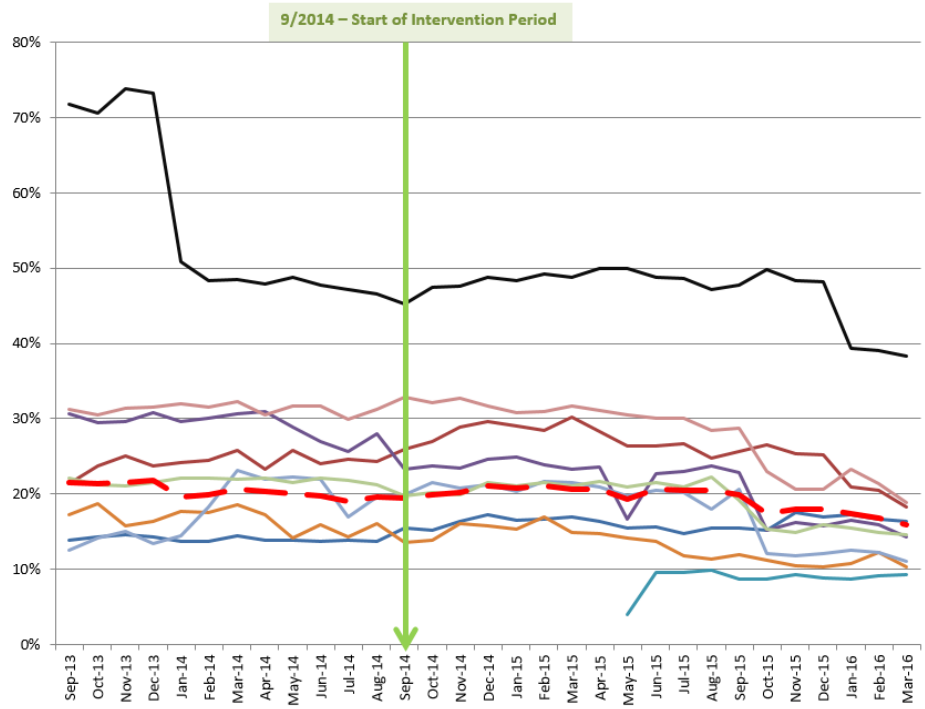
Kimberley Serpico, MEd, CIP
Assistant Director of IRB Operations

Section Thirteen: Additional Tables and Figures

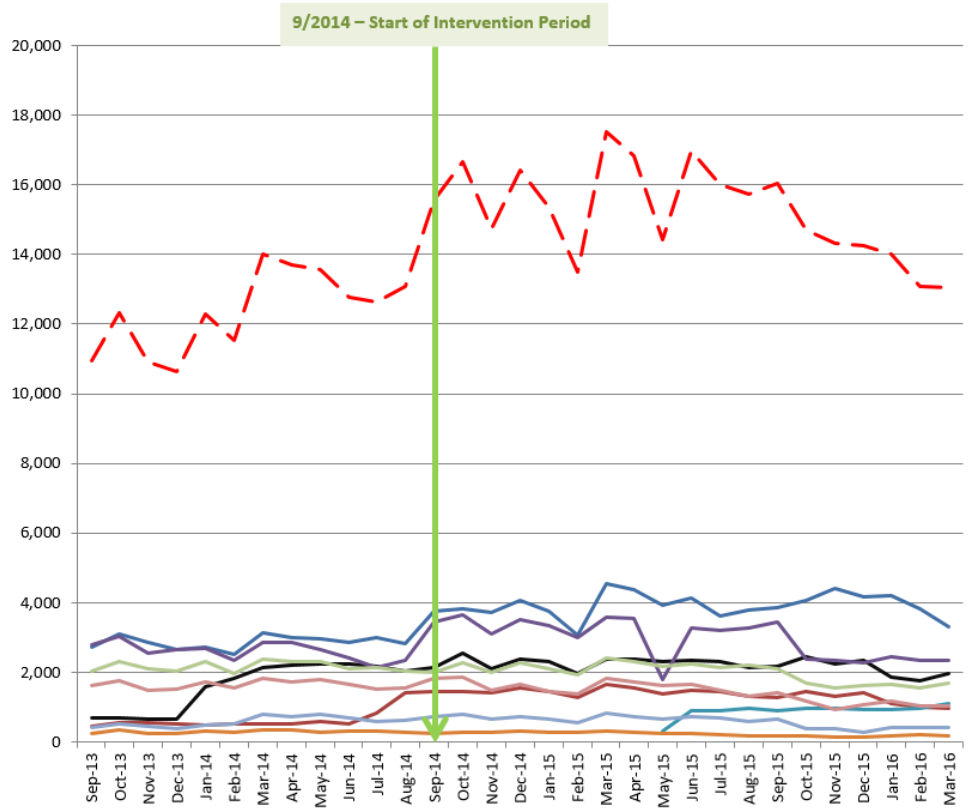
Prevalence of Blood Pressure Measurements: EHR Data (Study Period: 9/2013 - 3/2016)



Hypertension Prevalence: EHR Data (Study Period: 9/2013 - 3/2016)



Number of Hypertensives: EHR Data (Study Period: 8/2013 - 3/2016)



Mean Blood Pressure Changes, Using Last Visit in Baseline Period, Among All Hypertensives, Stratified by Age

PWTF Community	18-25	26-35	36-45	46-55	56-65	66-75	76-85	≥86	Total
Community 1	136	487	736	1,383	1,599	731	266	90	5,428
SBP	-1.29	-0.622	-0.276	-0.754	-1.57	0.319	0.222	-6.1	-0.829
DBP	-0.529	0.0698	-0.608	-1.06	-1.97	-1.02	0.106	0.733	-1.06
Community 2	773	1,742	2,735	3,565	3,210	1,826	670	160	14,681
SBP	-0.289	0.311	0.47	0.146	0.258	0.554	2.51	2.59	0.413
DBP	-0.933	-0.375	-0.92	-1.13	-0.864	-1.17	-0.646	0.625	-0.896
Community 3	478	1,266	1,570	2,277	2,094	1,196	453	121	9,455
SBP	0.703	-0.681	-1.18	-1.31	-1.38	-0.409	-2.04	-1.74	-1.05
DBP	1.05	-0.206	-0.672	-1.16	-2.05	-1.51	-1.68	-4.35	-1.15
Community 4	378	1,097	1,403	2,337	2,565	1,170	450	169	9,569
SBP	0.794	-0.151	-1.64	-1.22	-2.13	-2.46	-3.04	-2.34	-1.58
DBP	0.984	0.0119	-0.752	-0.67	-1.62	-1.8	-1.61	-2.19	-1
Community 5	167	427	694	1,540	2,405	2,321	1,554	839	9,947
SBP	0.24	-0.3	-0.422	-0.119	-0.312	0.892	0.362	-1.23	0.029
DBP	1.26	-0.0304	-0.218	-0.531	-1.04	-0.801	-0.279	-1.12	-0.653
Community 6	1,664	3,475	4,522	6,980	6,726	3,974	1,867	477	29,685
SBP	2.35	1.12	0.415	0.416	0.579	1.22	1.18	-1.96	0.762
DBP	1.45	0.413	-0.265	-0.623	-0.649	-0.304	0.0996	-0.719	-0.25
Community 7	272	632	1,017	1,512	1,326	732	300	61	5,852
SBP	-1.63	-2.58	-1.91	-3.24	-3.49	-4.53	-4.75	-6.25	-3.19
DBP	-1.19	-1.18	-0.938	-1.33	-1.65	-2.43	-1.65	-0.918	-1.46
Community 8	71	257	429	513	415	185	42	11	1,923
SBP	2.99	-0.121	-0.0583	-0.419	1.46	1.68	0.286	0.818	0.457
DBP	0.169	-0.482	-0.462	-0.688	0.414	-1.07	-1.36	-3.18	-0.406
Community 9	1,034	2,154	3,126	4,937	4,862	3,386	1,960	1,021	22,480
SBP	0.651	1.29	0.933	-0.228	-1.09	-1.14	-1.82	-5.06	-0.563
DBP	1.24	0.952	0.235	-0.17	-0.444	-0.706	-0.721	-1.54	-0.193
Total	**4,973**	**11,537**	**16,232**	**25,044**	**25,202**	**15,521**	**7,562**	**2,949**	**109,020**
SBP	**0.931**	**0.355**	**-0.0339**	**-0.394**	**-0.643**	**-0.134**	**-0.364**	**-2.8**	**-0.284**
DBP	**0.739**	**0.149**	**-0.424**	**-0.723**	**-1.01**	**-0.917**	**-0.542**	**-1.25**	**-0.615**

Mean Blood Pressure Changes, Using Last Visit in Baseline Period, Among All Non-Hypertensives, Stratified by Age

PWTF Community	18-25	26-35	36-45	46-55	56-65	66-75	76-85	≥86	Total
Community 1	1,263	2,450	1,467	1,390	990	239	54	5	7,858
SBP	0.29	0.0592	0.761	0.233	0.572	1.29	0.926	3.4	0.368
DBP	0.0872	0.00613	-0.0771	-0.632	-0.442	-0.151	0	-7.2	-0.175
Community 2	3,301	4,164	2,989	1,624	690	217	41	10	13,036
SBP	1.29	0.651	0.809	0.735	1.14	1.23	0.0244	-4.5	0.89
DBP	0.973	0.62	0.373	0.213	-0.307	1.16	0.415	-0.4	0.561
Community 3	2,324	2,932	1,654	1,003	501	103	20	5	8,542
SBP	0.271	-0.412	-0.786	-0.717	-0.363	-0.388	1.5	-0.4	-0.327
DBP	0.0829	0.0065	-0.43	-0.874	-0.54	0.255	-1.7	2.4	-0.193
Community 4	1,403	2,460	1,649	1,365	978	289	83	28	8,255
SBP	0.108	0.312	0.421	0.0637	0.485	-1.18	0.518	-1.11	0.224
DBP	0.332	0.474	0.486	0.283	-0.154	-0.64	-1.04	-1.5	0.285
Community 5	639	886	941	1,292	1,216	586	274	131	5,965
SBP	-0.418	0.921	0.312	0.0921	0.757	0.783	0.591	-0.939	0.399
DBP	0.603	0.787	0.722	-0.335	-0.536	-0.741	-0.328	-1.11	0.00101
Community 6	8,548	9,702	6,605	4,278	2,145	723	182	36	32,219
SBP	0.121	0.363	0.375	0.791	0.39	0.916	0.533	4.94	0.378
DBP	-0.0925	0.102	0.155	0.0702	-0.426	-0.45	0.747	1.67	0.0149
Community 7	2,400	3,200	2,114	1,568	981	419	190	24	10,896
SBP	-0.524	-0.438	-0.956	-0.166	-0.0224	-0.0286	-0.247	-2.08	-0.466
DBP	-0.521	-0.268	-0.377	-0.302	-0.292	-0.778	-0.416	0.792	-0.372
Community 8	486	986	890	456	162	21	6	--	3,007
SBP	-0.44	-0.747	-0.428	0.59	-0.463	-4.52	1	--	-0.408
DBP	0.156	-0.564	-0.206	0.158	-0.385	-1.38	1.5	--	-0.224
Community 9	3,201	4,153	3,011	2,437	1,432	587	224	108	15,153
SBP	0.494	0.228	0.401	0.0226	-0.454	-1.08	-0.0179	-0.815	0.159
DBP	0.53	0.542	0.596	-0.00781	0.102	-0.375	0.402	-1.1	0.371
Total	**23,565**	**30,933**	**21,320**	**15,413**	**9,095**	**3,184**	**1,074**	**347**	**104,931**
SBP	**0.267**	**0.18**	**0.211**	**0.289**	**0.292**	**0.18**	**0.315**	**-0.415**	**0.231**
DBP	**0.174**	**0.204**	**0.169**	**-0.102**	**-0.312**	**-0.402**	**-0.0345**	**-0.738**	**0.0764**

Mean Blood Pressure Changes, Using Mean of All Visits in Baseline Period, Among All Hypertensives, Stratified by Age

PWTF Community	18-25	26-35	36-45	46-55	56-65	66-75	76-85	≥86	Total
Community 1	136	487	736	1,383	1,599	731	266	90	5,428
SBP	-1.490	-1.59	-0.734	-1.54	-2.09	-0.668	-0.488	-4.16	-1.47
DBP	-0.219	-0.23	-0.54	-1.35	-2.35	-1.53	-1.11	-0.425	-1.4
Community 2	773	1,742	2,735	3,565	3,210	1,826	670	160	14,681
SBP	-0.704	-0.176	-0.0935	-0.581	-0.51	-0.589	2.29	2.55	-0.269
DBP	-0.899	-0.697	-1.27	-1.5	-1.41	-1.7	-0.68	.271	-1.28
Community 3	478	1,266	1,570	2,277	2,094	1,196	453	121	9,455
SBP	.583	-1.12	-1.55	-2.25	-2.71	-1.35	-3.07	-2.6	-1.87
DBP	.606	-0.498	-0.952	-1.77	-2.66	-1.99	-1.95	-3.75	-1.6
Community 4	378	1,097	1,403	2,337	2,565	1,170	450	169	9,569
SBP	0.670	-0.159	-1.94	-1.63	-2.55	-2.76	-2.77	-2.43	-1.87
DBP	1.040	-0.0169	-0.888	-0.847	-1.77	-2.04	-1.51	-2.31	-1.13
Community 5	167	427	694	1,540	2,405	2,321	1,554	839	9,947
SBP	-0.477	-0.45	-0.399	-0.735	-0.981	.218	-0.19	-2.09	-0.561
DBP	.928	-0.356	-0.443	-0.876	-1.36	-1.14	-0.587	-1.24	-0.956
Community 6	1,664	3,475	4,522	6,980	6,726	3,974	1,867	477	29,685
SBP	2.05	.852	-0.105	-0.484	-0.372	.00441	.247	-2.06	-0.0163
DBP	1.29	0.371	-0.414	-1.06	-1.03	-0.786	-0.302	-1.03	-0.571
Community 7	272	632	1,017	1,512	1,326	732	300	61	5,852
SBP	-1.630	-2.58	-1.91	-3.24	-3.49	-4.53	-4.75	-6.25	-3.19
DBP	-1.190	-1.18	-0.938	-1.33	-1.65	-2.43	-1.65	-0.918	-1.46
Community 8	71	257	429	513	415	185	42	11	1,923
SBP	2.56	-1.33	-0.891	-1.23	-0.794	.318	-3.78	-1.99	-0.845
DBP	.326	-0.865	-0.965	-1.27	-0.85	-1.39	-4.14	-2.9	-1.08
Community 9	1,034	2,154	3,126	4,937	4,862	3,386	1,960	1,021	22,480
SBP	.783	1.05	.481	-0.48	-1.36	-1.37	-1.82	-5.33	-0.804
DBP	1.33	.835	.055	-0.276	-0.727	-0.981	-0.763	-1.72	-0.363
Total	4,973	11,537	16,232	25,044	25,202	15,521	7,562	2,949	109,020
SBP	.738	.0334	-0.463	-1.02	-1.33	-0.888	-0.822	-3.14	-0.843
DBP	.669	-0.00254	-0.617	-1.04	-1.38	-1.3	-0.787	-1.43	-0.897

Mean Blood Pressure Changes, Using Mean of All Visits in Baseline Period, Among All Non-Hypertensives, Stratified by Age

PWTF Community	18-25	26-35	36-45	46-55	56-65	66-75	76-85	>86	Total
Community 1	1,263	2,450	1,467	1,390	990	239	54	5	7,858
SBP	0.292	0.0637	0.415	0.0995	0.375	0.771	0.995	3.2	0.241
DBP	0.14	0.132	-0.222	-0.549	-0.581	-0.011	-0.497	-8.930	-1.158
Community 2	3,301	4,164	2,989	1,624	690	217	41	10	13,036
SBP	1.11	0.59	0.755	0.541	0.895	0.878	-0.393	-5.180	0.768
DBP	0.908	0.606	0.33	0.161	-0.335	0.852	0.639	-0.533	0.517
Community 3	2,324	2,932	1,654	1,003	501	103	20	5	8,542
SBP	0.0643	-0.465	-1.030	-1.080	-0.903	-0.987	1.2	-0.700	-0.531
DBP	-0.143	-0.189	-0.573	-1.110	-1.100	0.315	-2.100	2.4	-0.409
Community 4	1,403	2,460	1,649	1,365	978	289	83	28	8,255
SBP	0.0587	0.27	0.303	-0.049	0.395	-1.060	0.645	-1.110	0.155
DBP	0.388	0.561	0.474	0.254	-0.010	-0.658	-0.970	-1.500	0.331
Community 5	639	886	941	1,292	1,216	586	274	131	5,965
SBP	-0.434	0.792	0.222	-0.106	0.559	0.429	0.246	-1.050	0.227
DBP	0.534	0.77	0.627	-0.438	-0.604	-0.848	-0.737	-1.430	-0.0961
Community 6	8,548	9,702	6,605	4,278	2,145	723	182	36	32,219
SBP	-0.024	0.187	0.224	0.574	0.113	0.408	0.309	4.1	0 .195
DBP	-0.089	.0672	.0827	-0.055	-0.507	-0.679	0.322	1.63	-0.039
Community 7	2,400	3,200	2,114	1,568	981	419	190	24	10,896
SBP	-0.524	-0.438	-0.956	-0.166	-0.022	-0.029	-0.247	-2.080	-0.466
DBP	-0.521	-0.268	-0.377	-0.302	-0.292	-0.778	-0.416	0.792	-0.372
Community 8	486	986	890	456	162	21	6	0	3,007
SBP	-0.783	-1.060	-0.952	0.015	-0.654	-6.100	0.000	0	-0.832
DBP	0.013	-0.721	-0.564	-0.100	-0.709	-2.930	0.5	0	-0.474
Community 9	3,201	4,153	3,011	2,437	1,432	587	224	108	15,153
SBP	0.516	0.198	0.304	0.0479	-0.558	-1.110	0.0807	-0.877	0.131
DBP	0.487	0.534	0.546	0.0509	-0.104	-0.470	0.397	-1.010	0.336
Total	**23,565**	**30,933**	**21,320**	**15,413**	**9,095**	**3,184**	**1,074**	**347**	**104,931**
SBP	**0.161**	**0.0906**	**0.0659**	**0.133**	**0.101**	**-0.086**	**0.195**	**-0.590**	**0.102**
DBP	**0.139**	**0.183**	**0.0927**	**-0.160**	**-0.411**	**-0.512**	**-0.236**	**-0.858**	**0.0242**

Summary of Screening for Smoking Status in PWTF Communities, by Month

Year-Month	Community 1	Community 5	Community 7	Community 8	Community 9	Total
	N (%)	*N (%)*	*N (%)*	*N (%)*	*N (%)*	*N (%)*
September-13	2868	N/A	N/A	1040	7511	**11419**
	(4.6%)		N/A	(10.6%)	(8.6%)	**(50.9%)**
October-13	3280	N/A	N/A	1481	8437	**13198**
	4.1%	N/A	N/A	10.5%	9.0%	**48.3%**
November-13	2769	N/A	N/A	1200	6945	**10914**
	4.4%	N/A	N/A	9.8%	8.6%	**50.5%**
December-13	2497	N/A	N/A	1096	7062	**10655**
	3.4%	N/A	N/A	8.9%	8.9%	**49.1%**
January-14	2968	1992	5796	1396	7386	**19538**
	4.4%	22.6%	0.0%	9.3%	11.3%	**32.3%**
February-14	2615	2684	5532	1274	6335	**18440**
	4.2%	22.2%	0.0%	11.8%	11.4%	**32.3%**
March-14	3146	3159	6183	1441	7577	**21506**
	5.1%	22.2%	0.0%	9.9%	13.1%	**32.8%**
Apr-14	2929	3271	6147	1575	7652	**21574**
	5.3%	20.7%	0.0%	9.3%	14.6%	**33.1%**
May-14	3131	3233	6227	1515	7475	**21581**
	4.6%	19.9%	0.0%	8.4%	14.1%	**31.9%**
Jun-14	2888	3343	6206	1622	7297	**21356**
	2.8%	20.3%	0.0%	9.6%	10.1%	**30.1%**
Jul-14	3042	3233	6541	1770	6790	**21376**
	2.8%	20.4%	0.0%	10.0%	9.5%	**31.8%**
Aug-14	2726	3055	6246	1473	6843	**20343**
	3.0%	21.7%	0.0%	8.2%	9.7%	**32.4%**
Sep-14	3162	3393	6739	1472	11634	**26400**
	3.9%	21.0%	0.0%	6.4%	11.8%	**29.3%**
Oct-14	3244	3882	7055	1629	12091	**27901**
	3.6%	22.3%	0.0%	6.3%	12.1%	**29.4%**
Nov-14	2779	3217	6082	1329	10354	**23761**
	3.1%	22.1%	0.0%	6.8%	12.2%	**35.1%**
Dec-14	3010	3525	6604	1480	11074	**25693**
	2.9%	20.2%	0.0%	6.1%	12.9%	**34.7%**
Jan-15	2800	3361	6006	1500	10550	**24217**
	3.5%	21.3%	0.0%	2.7%	12.5%	**34.0%**
Feb-15	2251	2730	5088	1263	9776	**21108**
	3.2%	20.9%	0.0%	2.7%	12.6%	**34.3%**
Mar-15	3347	3453	6609	1524	11836	**26769**
	4.5%	20.0%	0.0%	2.0%	12.0%	**35.4%**
Apr-15	3033	3401	6087	1359	11727	**25607**
	4.1%	20.1%	0.0%	2.4%	13.6%	**36.8%**
May-15	3021	3282	6072	1288	7912	**21575**
	4.3%	19.4%	1.5%	2.1%	13.2%	**39.5%**

Jun-15	3049	3386	6998	1384	11203	**26020**
	4.8%	18.8%	2.7%	2.3%	13.3%	**35.7%**
Jul-15	3146	3365	7343	1277	11348	**63747**
	4.7%	19.6%	2.6%	2.1%	14.1%	**14.3%**
Aug-15	2818	3092	7607	1059	11213	**61706**
	4.2%	18.7%	2.6%	2.6%	14.6%	**15.3%**
Sep-15	2854	3137	7740	1163	11784	**62951**
	4.6%	19.4%	3.5%	7.1%	13.9%	**15.0%**
Oct-15	2661	3462	7835	1210	12181	**65898**
	4.3%	20.4%	2.1%	8.0%	13.0%	**16.3%**
Nov-15	2769	3338	7624	1028	11250	**62324**
	3.5%	19.8%	0.9%	5.4%	13.5%	**16.2%**
Dec-15	1931	3456	7638	959	11182	**61801**
	4.1%	18.8%	1.6%	4.5%	14.0%	**16.8%**
Jan-16	3021	3289	7770	1168	11619	**63148**
	3.3%	21.2%	1.6%	7.7%	13.7%	**16.0%**
Feb-16	2934	3289	7828	1175	11525	**61331**
	3.7%	21.3%	1.0%	7.4%	13.7%	**15.9%**
Mar-16	3389	3638	8665	1303	12784	**64061**
	3.2%	20.5%	1.5%	7.1%	12.6%	**16.4%**
Apr-16	3144	3232	8237	1074	12013	**58288**
	3.2%	19.7%	2.1%	5.7%	13.2%	**17.2%**
May-16	2910	3367	8675	1060	12253	**58898**
	2.5%	19.5%	2.3%	4.2%	13.0%	**17.8%**
Jun-16	2586	3561	8629	1050	12609	**57995**
	2.6%	19.7%	1.7%	5.9%	14.0%	**18.1%**
Total	98718	97826	207809	44637	337228	**786218**
	3.9%	20.5%	1.0%	6.7%	12.5%	**9.1%**

APPENDIX B:

UMASS AND MASS MEDICAL EVALUATION OF WORKING ON WELLNESS

University of Massachusetts Medical School

UMASS Lowell

Report to MA Department of Public Health

PWTF Worksite Wellness Data Management and Evaluation



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Interim Evaluation Report for MA Legislature (1/10/2017)

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Executive Summary

Overview

In Massachusetts, as well as in the rest of the country, worksite wellness programs are most often offered by larger employers and accessed by healthier, more educated workers. The Massachusetts "Working on Wellness" (WoW) program (www.mawow.org), funded by the Prevention and Wellness Trust Fund (PWTF), is an initiative specifically designed to expand access to worksite health promotion activities for smaller employers in the Commonwealth. This report describes the preliminary results for the participating organizations, as per steps completed and evaluation data received by November, 2016.

Working on Wellness provides training, technical assistance, and seed funding to Massachusetts organizations to initiate new health-promoting policies, environmental supports, awareness and education programs, and other activities directed to health behavior improvements among their employees. The program is designed on the basis of current best practices, in particular emphasizing the influence of the physical work environment as well as the organizational and social climate on individual behaviors.

The WoW program has successfully reached and delivered services to organizations that previously had no formal wellness program and few wellness policies or supportive environments. In particular, this program has reached a large number of small and moderate-size employer organizations, and a substantial number of low-wage, non-college-educated, and racial/ethnic minority workers. A substantial proportion of these employees had moderate to high health risks, especially being overweight or obese and not consuming the recommended amount of fresh produce per day. This highlights the high relevance of the WoW program to the needs of the Commonwealth's citizens.

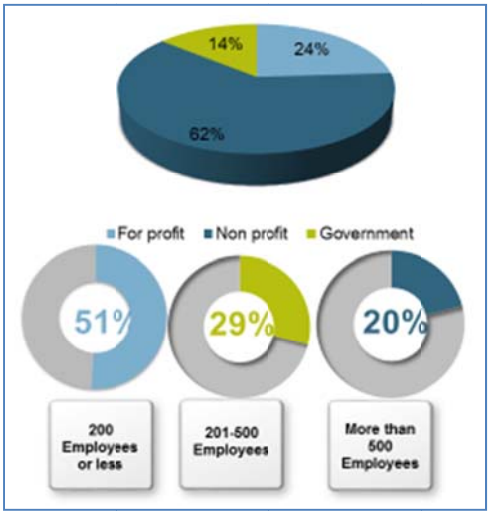
The program was delivered with high fidelity to its original design, with multi-level program activities in most organizations. Most employers complied with program instructions to implement changes in organizational policy and the work environment to support healthier behaviors by employees. This is an important strength of the WoW program design, and it is very much to the credit of the program delivery personnel that they were able to provide technical information and support sufficient to achieve this.

Numerous community partnerships were developed with local organizations to provide services. The program champions of participating employers were enthusiastic about the overall quality of the program and the usefulness of the educational materials and supports that they received.

The effectiveness of the interventions is yet to be fully evaluated, as the follow-up employee survey data are still being collected. Substantial health benefits and healthcare cost savings are anticipated over a longer period of time, as the program progresses. However, it is evident already that the program has helped increase the supports for employers and from them to their employees. A high proportion of employees are ready to make positive changes that will likely reduce their morbidity, healthcare utilization and costs.

Key Results

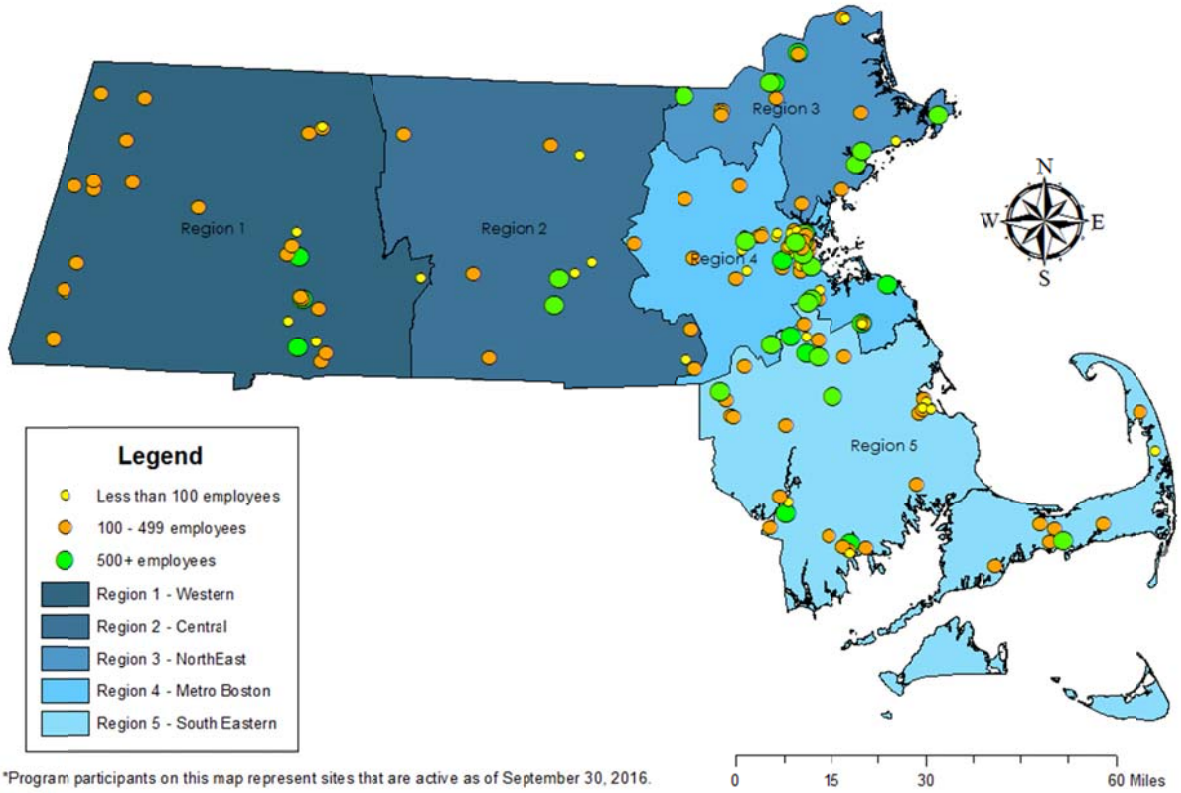
As of November 2016, 205 employer organizations in four cohorts were accepted into the program, distributed throughout Massachusetts. The first 3 cohorts comprised 144 employers, of which 110 have provided the first set of baseline measures to date and 108 have returned their surveys from individual employees.



Participating organizations are predominantly non-profit (61%) and highly represented by the healthcare and social assistance sector (33%).

About one-half of participating organizations have 200 or fewer employees, a priority for this program. Two-thirds of the participating organizations indicated that at least some of their employees were low-wage workers.

Massachusetts Working on Wellness Program Participants by Organization Size, Cohorts 1-4

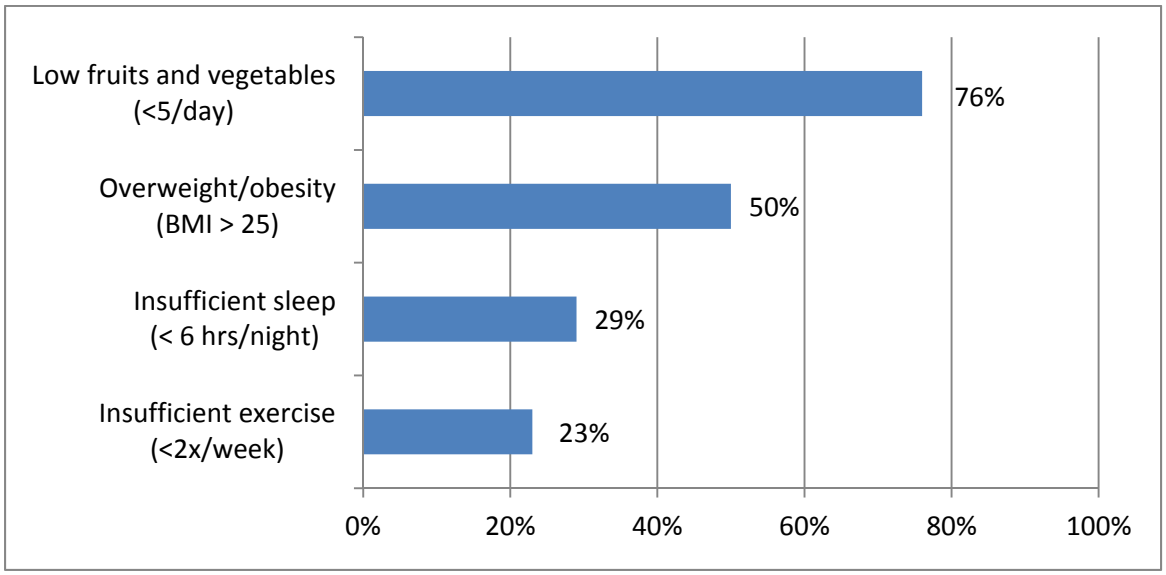


*Program participants on this map represent sites that are active as of September 30, 2016.

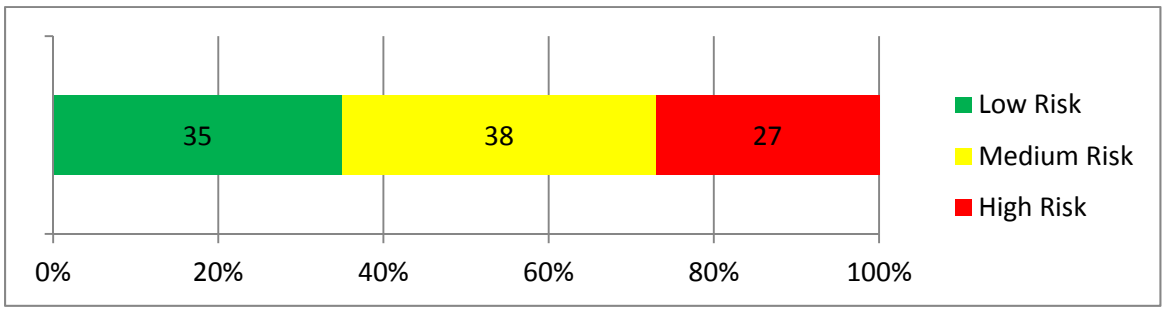
As reported by employers, the pooled workforce includes 63% women, about 60% non-Hispanic Whites, and 60% hourly wage (non-salary) workers. About one-quarter have only a high school education or GED or less and 17% work evening, night or rotating shifts.

At the beginning of the program, about half of the participating organizations offered no formal wellness program, and they had few policy/environmental supports to encourage employee physical activity, nutrition, or tobacco-free lifestyle, or to support work/life balance.

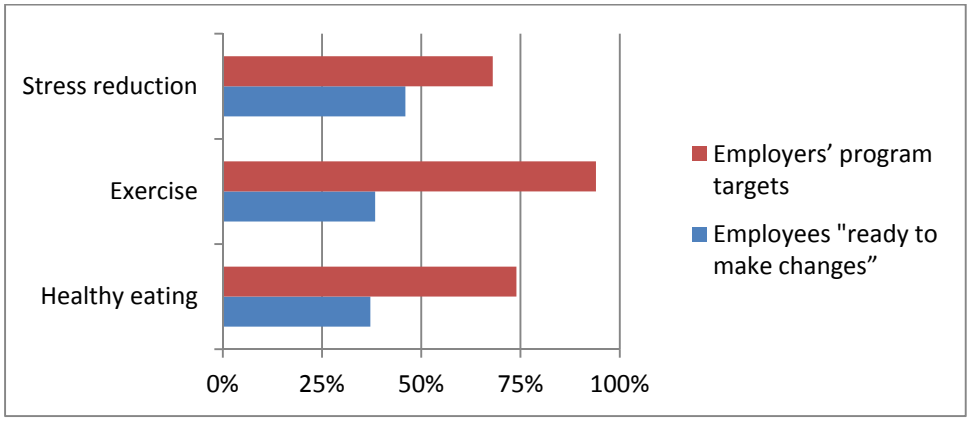
The employees of participating organizations were ready to make positive changes to improve their health behaviors, specifically to become more physically active, eat healthier diets, manage their weight, and control their stress levels. These goals were highly appropriate in light of the fact that most of them did not eat the recommended 5 servings of fruit and vegetables per day, and over one-half were overweight or obese (figure below). Employees also expressed a great interest in obtaining services and supports to make these changes.



Based on a score of nine self-reported health risk indicators, about two-thirds of all employees in Cohorts 1-3 were designated as being at either medium or high risk at the beginning of the program (figure below).



Participating employers received specific feedback about the priorities indicated collectively by their workers, as well as information about timing and other logistical features that would make program activities more accessible. Employers' baseline program goals were predominantly to improve nutrition, increase leisure-time physical activity, and reduce stress; these were also the top three health goals endorsed by their employees (figure below).



Guided by this information, WoW participant employers are successfully implementing their programs. The most commonly planned intervention activities to increase exercise were on-site fitness or yoga classes, walking clubs, and personal health coaching or educational seminars. To improve employees' dietary behaviors, the most commonly planned activities were educational workshops, organizational policies to provide healthier food at meetings, and healthier options in vending machines. To reduce or help manage stress, the most common activities planned were yoga classes, demonstrations and practice of stress management and coping skills, and meditation or mindfulness classes.

The program delivery elements were revised after Cohort 1 was enrolled, in particular to reduce the number of required goals from three to one. This change appears to have facilitated a substantial increase in the number of participating employers in the later cohorts.

Each participating organization had an internal Wellness Champion responsible for participating in training, carrying out WoW program activities, and submitting data for evaluation. All Champions identified prospective partners that could serve as resources to their employees. Many of these were local small businesses providing wellness-related services (e.g., fitness, yoga, massage, health coaching). Non-profit organizations and health insurers (combined with healthcare provider organizations) were also cited frequently. Town or municipal wellness partners referred to city or town offices, many representing programs specifically supported by the Massachusetts Department of Public Health (e.g., Mass in Motion).

The program education and technical support provided were of high quality and were enthusiastically endorsed by participating employers. Despite seed funding, which was greatly welcomed by the participating organizations, staffing resources to implement in-house programs remain a challenge for small employers.

With regard to the specific goals stated by the state legislature in establishing this program, there has not yet been sufficient length of follow-up of the covered workforce to document specific changes in preventable health conditions or their costs. Nonetheless, it was possible to estimate predicted reductions in chronic disease and in health care expenditures, given the types of program activities being carried out by WoW employers and the prevalence of specific conditions and unhealthy behaviors in the workforce.

As required by the legislation, we have calculated the expected benefits of this program in terms of predicted reductions in the prevalence of chronic health conditions and associated healthcare cost savings. We have reviewed the existing literature for evidence of the effectiveness of workplace wellness activities similar to those carried out by the employers participating in the WoW program. We then compiled the data from those studies in terms of reductions in chronic disease and key risk factors for those conditions.

Our summary of these potential impacts has been used to predict improvements in daily consumption of fresh fruits and vegetables, regular (weekly) exercise, weight loss, and reductions in stress that interferes with health. Our estimates show that each area targeted by employers in the program is expected to benefit thousands of their employees. Further, employers may expect to achieve savings in medical expenditures by improving health for workers who are unhealthy and thus reducing service utilization. Potential reduction in medical care expenditures has been estimated for the WoW combined workforces, based on the actual prevalence of risk factors reported in this population and the plausible range of success rates for risk mitigation for the activities carried out by these employers. The estimated cost savings for medical care for the combined workforces range from $0.76 million to $4.07 million for the top three Action Plan targets together (diet and nutrition, leisure-time exercise, and stress reduction).

Therefore, the initial estimate based on the medical cost reduction through health improvement alone indicates that the WoW program may potentially yield $0.38 to $2.04 in direct medical care cost reduction from these three target areas for every $1 PWTF investment on the WoW program ($2 million as of December 2016). The magnitude of cost saving could be greater if savings from other target areas are considered, including keeping healthy people stay healthy, preventing chronic disease complications, synergistic effects when targeting multiple areas simultaneously, increased productivity, and reduced absenteeism. Additionally, further expansion of the WoW program could yield higher returns since a solid foundation of program delivery and data processing infrastructure has been developed and such upfront developmental costs are likely non-recurrent in the future. Nevertheless, the estimates for overall cost reductions will be provided when the data on program cost to employers become available.

Methods

The program design, recruitment, and engagement of employers are described elsewhere. This report covers data collection, analysis, and interpretation for evaluation of the WoW program and its benefits to date. Relevant data elements are summarized in Table 1 (below).

Evaluation Instruments and Measures

1. Baseline Assessments

Program Application: The initial application, completed on-line, obtained the information necessary to determine employer eligibility for the WoW program.

On-Boarding Survey: Once an employer organization was accepted and provided a signed Memorandum of Understanding, an on-line follow-up survey was requested for more detailed demographics and descriptive information about the workforce.

Employee Needs and Interest Survey: A survey was distributed to individual employees through their employers and returned online or via postal mail directly to the WoW program evaluation team. The survey was administered anonymously in order to protect employee privacy. The survey gathered data on employee health behaviors and indicators, as well as their interest in specific types of programs which their employers might offer. Items were extracted from previously validated instruments to the extent possible. The baseline survey was distributed approximately two months into the program, for the most part. The survey was provided on-line, and supplemented with paper surveys as needed. A Spanish-language survey was also available upon request.

Environmental Scan: Employers were also asked for information on the physical attributes of the workplace, as well as existing programs and policies related to employee health. This questionnaire was provided in hard copy for the wellness committee or Champion to use in needs assessment. The data were compiled and submitted in electronic format to the evaluation team.

Organizations with multiple physical locations were not instructed or required to provide Environmental Scans for every physical facility, due to the potential paperwork burden. However, some multi-site organizations chose to do so, voluntarily, in order to report separately the physical features of each site.

Action Plan: All participating employers are required to submit a Worksite Wellness Action Plan (WWAP). The WWAP sections correspond to the steps in the WoW Program Development Cycle. The WWAP documents the intended program priorities, goals, objectives and intervention activities planned by each employer. It is used to determine the level of funding to be provided to each employer. For each goal selected for action, employers were explicitly instructed to include activities to promote behavior change at three levels: organizational policy and/or environmental supports, individual behavioral skill-building, and awareness-raising.

2. Follow-up Assessments

Process Evaluation Interviews with HRiA/AW: Two group interviews were conducted with Health Resources in Action (HRiA) and AdvancingWellness (AW) staff during the program delivery period. Data collected focused on successes, challenges, and recommendations related to planning, recruitment, survey administration, project management, communication and collaboration.

Interview/Survey with Wellness Champions: At the end of the formal program activities (September-October 2016), Cohort 1 worksite wellness coordinators (or "Wellness Champions") completed a written survey or were interviewed to gather feedback about the WoW program. The questions asked about the usefulness and value of the program, levels of employee involvement and satisfaction, any challenges with implementation, and recommendations for program improvement. Additionally, they were queried about the likelihood that their own program would continue once the WoW support ends.

Worksite Wellness Evaluation Report (WWER): Near the end of the program, participating employers are asked to submit a report to document and summarize their actual program implementation. After these are received, the evaluation team will be able to compare each WWER with the action plan (WWAP) that was submitted at baseline by the same organization.

Employee Needs and Interest Survey: The follow-up survey is distributed by employers to their employees eleven months after enrolling into the program, following the same procedures as used for the baseline survey. Submission of the received questionnaires is required in order for the employer to obtain the final seed funding allocation. (These data have only been collected from employees in cohort 1 participating organizations to date; they are not yet formatted or ready for analysis.)

Table 1. Overview of data collection instruments for "Working on Wellness" program

Instrument	Source of information	Time of administration	Key measures
Program application	Employer representative	Baseline	Economic sector; workforce size and turnover; proportion low-wage employees; employer readiness to participate in WoW
On-boarding survey	Employer representative	Baseline	Workforce demographics; conditions of work; current wellness activities
Non-Participant survey	Employer representative	Post-enrollment deadline	Top reasons for not participating; opinions of the program; recommendations for the future
Needs and& interests survey	Employee self-administration	Baseline; End of program	Health/disease conditions; health behaviors; overall health risk; wellness topics and activities of interest
Environmental scan	Employer representative	Baseline; End of program	Employee health, safety, and wellbeing policies and programs in the workplace
Action plan	Employer representative	During program	Program assessment and planning: objectives, interventions, community partners, and resources
Group interviews with program delivery staff	HRiA and AW Staff	End of program	Process evaluation: Programmatic successes, challenges, recommendations for changes
Worksite wellness evaluation reports	Employer representative	End of program	Values/benefits, community collaborations, reach, program goals met, costs, evaluation metrics
Interview or survey of Wellness Champions	Employer representative	End of program	Usefulness, value, involvement, and satisfaction levels, recommendations for improvements, challenges, sustainability

Data Management and Analysis

Each participating employer's Employee Identification Number (EIN), or Federal Tax Identification Number (Federal Tax ID), was used to match records across the various instruments. Industry sector was categorized using North American Industry Classification System **(**NAICS) codes, which were assigned based upon information provided by each employer on the on-boarding survey. In cases where the information was not available, was

insufficient, or seemed questionable, a search was performed in the InfoUSA database using employer name and location; the resulting organization's NAICS code was assigned as the primary code. In a few cases the evaluation team further re-classified employers based on additional information obtained from the employer's own on-line description.

Data on employer organizations and employee characteristics (as reported by the Wellness Champions or other employer representatives) were summarized across the first four cohorts. (Cohort 4 employers are still submitting initial information.) Data on employer policies, programs, and physical facilities at baseline were summarized to describe needs and areas for potential improvement which could benefit employee health.

Preliminary information about existing wellness activities and programs was obtained in the Application. Ten items were scored (1=None, 2=Partial or limited, 3=Already in place) and then added to give a total "Existing Program" score that could range from 10 to 30. A similar score of "Program Readiness" was computed by adding 7 items (each scored 0=Don't Know, 1=Strongly Disagree, 2= Disagree, 3=Agree, 4= Strongly Agree), constructing a scale that could range from 0 to 28.

More detailed information about the employer's existing policies, programs and facilities relevant to employee health was obtained in the Environmental Scan (ES). Similar to the preceding two scores, the ES information was compiled and scored, in this case within seven categories: physical activity, nutrition, tobacco and substance abuse, supports for parents/families, stress and mental health, supports for those with specific medical conditions, and occupational health and safety. The total number of possible points varied within category, according to the number of possible policies or facilities.

The Application and On-Boarding Survey collected information about the entire employer organization, regardless of how many physical worksites it was comprised of. In contrast, the Environmental Scan covered many features of the physical environment and facilities and these could obviously vary among sites within an organization. For Cohort 1, individual employees could only be identified with respect to the entire organization. For later cohorts, the Needs and Interests Survey included an item to identify the site where the employee worked, customized for each multi-site organization, to facilitate matching individuals to their specific location and hence the specific characteristics reported on the Environmental Scan.

Data reported by employees through the Needs and Interest survey were aggregated at the employer organization level, as well as pooled across employers and cohorts. These summaries include the prevalence of chronic health conditions, unhealthy behaviors, and working conditions among respondents that might pose obstacles to their health.

We constructed a summary risk score for each individual employee, reflecting their responses to nine risk factors specified in the Needs and Interests Survey. These nine risk factors were high blood pressure, cholesterol, diabetes, body mass index (BMI), physical activity, nutrition, smoking, stress, and insufficient sleep. Individuals were classified into three levels based on their number of risk factors: Low (0-1 high risk measure), Medium (2-4 high risk measures), and High (5 or more high risk measures).

The overall health risk for each participating organization is represented by the proportion of employees in each of the three risk levels. The literature has shown that similar sets of scored health risk indicators are associated with increased morbidity, absenteeism, presenteeism, and health care expenditures [e.g., Edington, 2001; Burton, 2006; Henke, 2011; White, 2015].

The distribution of employees' risk level, along with employees' interest in and needs for specific types of wellness activities, were reported back to their employers, to summarize the overall health risk for each participating organization and to guide decision-making about what program activities to offer.

Planned program activities from the Worksite Wellness Action Plans in Cohorts 1 and 2 (the data available as of October, 2016) were coded manually by at least two members of the evaluation team (to verify agreement) to assign each activity to a specific intervention type. For each program priority area (e.g. increase physical activity, improve healthy eating, and reduce stress), organizations planned a range of activities (awareness, behavior change, policy/environment supports) to meeting their stated goals. Once activity codes were assigned, overall wellness activity frequencies were computed across all organizations to determine the overall distribution.

To address the goals set by the Massachusetts state legislature, we conducted extensive literature reviews to facilitate calculation of the expected long-term benefits that could be obtained from the types of wellness activities that participating employers carried out. The literature reviews separately addressed the three primary goals which virtually all employers targeted: healthier diets, increased physical activity, and stress reduction. For each goal, we extracted data from published scientific studies, as much as possible for programs with similar design. Data were compiled for the typical or expected success rate (achievement of desired behavioral goals, e.g., increasing exercise to a recommended level), and reductions in chronic disease and in related costs (if reported). These were used to estimate the expected longer-term benefits for employees and for the Commonwealth.

To evaluate the WoW program itself, qualitative data (open-ended responses) have been collected from MA WoW program staff and from organizations' Wellness Champions, through the data collection instruments described above such as the Employee Needs and Interests survey, process and program evaluation interviews with program staff and Wellness Champions, and the Employer Worksite Wellness Evaluation Report instrument. These data have been examined, coded, organized, and reported on here by main themes, in order to assess contextual factors related to program delivery and health. Interview data from HRiA and AW staff during and after Cohort 1 suggested midcourse adjustments that were made to increase efficiency, uptake, and effectiveness for the subsequent cohorts. Employer qualitative data have been used to document program implementation, goals and expectations that were met, as well as ways to improve the overall program experience for subsequent cohorts and for those who might wish to replicate the program elsewhere.

Results

Employers participating in the program

Across all four cohorts of employer organizations, 205 were eligible and accepted into the program. Data from the first 187 organizations were available for this report. Of the 144 employers in the first 3 cohorts, 110 have completed the on-boarding survey to date. Three-quarters were non-profit or public sector agencies and thus not eligible for the Massachusetts Small Business Wellness Tax Credit. Of the participating sites that were eligible, two applied for the tax credit in calendar year 2016. The number of applicants is expected to increase as eligible participating sites complete the program.

Most of the participating organizations were in the sectors of Healthcare and social assistance, Education, and Other services (Table 2, next page). This is generally consistent with Massachusetts' predominant areas of economic activity. Notably, under-represented sectors among program participants were Construction (comprising about 10% of small Massachusetts establishments), Wholesale trade (about 5%), Retail trade (14%), and Professional and technical services (13%). These omissions are not surprising in light of work process characteristics in these sectors. For example, construction work by definition does not have a fixed workplace or a stable workforce, so the physical conditions would not support provision of new facilities or group activities, and the incentive for investing in employees' long-term health would be low. Wholesale and retail trade companies, to some extent, feature a high degree of night shift work in shipping and receiving, which similarly would limit access to facilities and to trainers or coaches who might lead exercise or yoga classes.

Across all four cohorts, 52 percent of participating organizations were small organizations with 200 or fewer employees (Table 2, next page), a priority for this program. The median workforce size was 195 employees (full-time and part-time combined). There was some evidence of a trend in the later cohorts toward larger organizations and a higher proportion of salaried employees. The organizations that completed the first three steps in the process - application, onboarding survey and Needs and Interests survey - represented over 74,000 employees. The average annual turnover rate was estimated by these employers at about 40%, of which three-quarters was voluntary leaving of employment.

It should be noted that these employee counts are very unlikely to include contract workers. Use of contract workers is an increasing trend, especially with regard to certain types of jobs such as housekeeping, maintenance, and food service workers, and it is particularly widespread in some sectors, such as hospitality. Specific attention to recruiting temporary staffing agencies might be necessary to cover these workers.

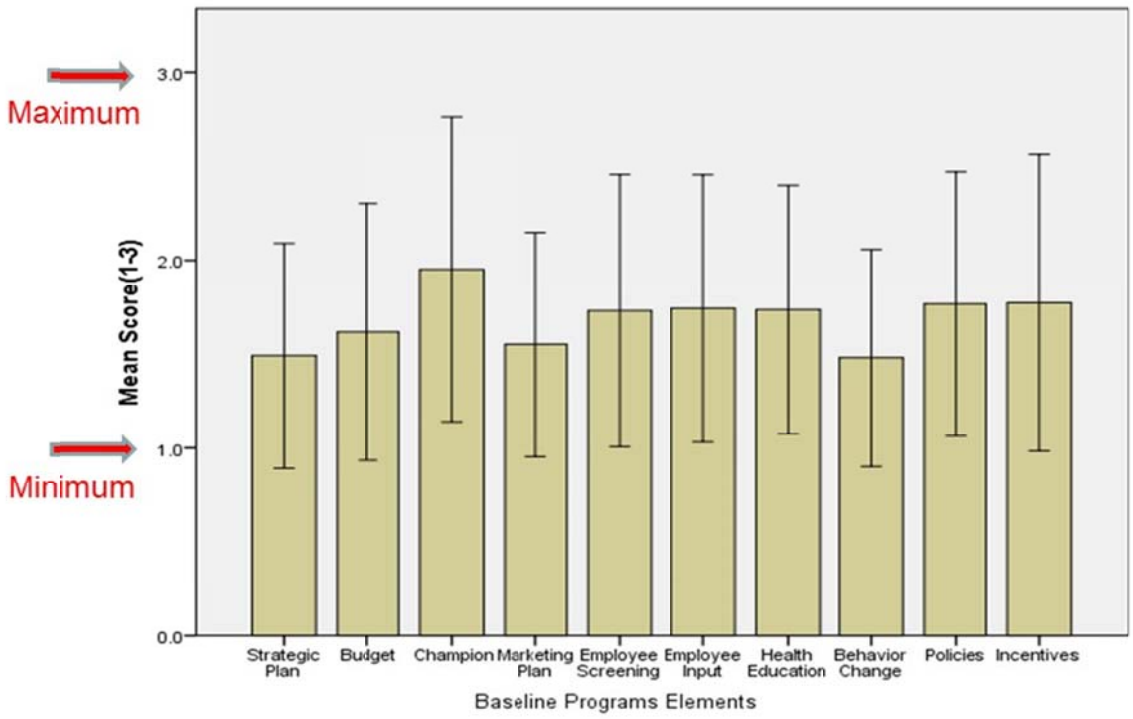
Table 2. Organizational characteristics of the first 187 employers accepted into WoW, Cohorts 1-4, based on data from the program application)

Industry sector	% of employers (n)
Agriculture, forestry, and fishing	0.5% (1)
Arts, entertainment, and recreation	1.6% (3)
Construction	3.2% (6)
Education	12.8% (24)
Finance and insurance	3.2% (6)
Health care and social assistance	16.6% (31)
Information	0.5% (1)
Manufacturing	3.7% (7)
Other services	25.7% (48)
Professional services	5.9% (11)
Public administration	6.4% (12)
Real estate, rental, and leasing	1.6% (3)
Retail trade	1.1% (2)
Transportation and warehousing	1.1% (2)
Type of organization	
For-profit	25% (47)
Non-profit	61% (114)
Public sector (government)	14% (26)
Workforce size	
Small: 200 or fewer workers	52% (97)
Medium: 201 - 500 workers	28% (53)
Large: over 500 workers	19% (36)
Estimated turnover rate (%): avg (SD*)	40% (± 41%)
Existing program score (10-30): avg (SD)	16.8 (± 4.4)
Program readiness score (0-28): avg (SD)	14.2 (± 7.7)

** SD = Standard deviation*

At the time that they enrolled in the WoW program, 48% of these employers offered no formal wellness program, and they had few policy or environmental supports to encourage employee physical activity, nutrition, or tobacco-free lifestyle, or to support work/life balance (Figure 1). The total "Existing Program" score averaged 16.8, or well below the mid-point on a scale from 10 to 30 (Table 2, above). These scores confirm that the organizations accepted into the program had very few supports already in place for offering worksite wellness program activities and thus were good candidates for program assistance. Their "Program Readiness" scores were slightly more favorable, averaging about 14 on a scale from 0 to 28 (Table 2). This demonstrated that organizational leaders were willing to allocate staff time and other resources to initiate and sustain an employee wellness program.

Figure 1. Baseline scores for existing wellness program elements, as reported in employers' program applications (Cohorts 1 – 4).



According to the demographic information provided by employers, the total workforce included 63% women, about 60% non-Hispanic Whites, and 26% with only a high school education or GED or lower (Table 3, next page). Nearly one-half were age 45 or older. Languages spoken by workers at any of these organizations, other than English, included Spanish, Haitian Creole, Portuguese, French, Mandarin Chinese, Japanese, Laotian, and Vietnamese (in descending order of frequency).

About three-fifths of the total workforce comprised hourly wage workers. Of particular note, in light of the program goals, is the fact that two-thirds of the participating employers indicated that they had at least some low-wage workers, meaning hourly wage of not more than $13.50 per hour. About two-thirds of employers reported no workers with union representation, while nearly 40% had at least some employees covered by collective bargaining agreements. Only two organizations in Cohort 1 indicated that their employees were compensated on any type of incentive system (about one-fourth of the workforce in each case).

Most employees worked standard day-time shifts, but about 17% had evening, night or rotating shift assignments. These schedules would potentially make it more difficult for workers to participate in scheduled wellness activities, whether on or off-site.

Table 3. Workforce demographics of WoW participating organizations, as reported by employers in the on-boarding surveys.

Workforce characteristics	Mean (± SD)*
Age:	
Under 18 y.o. (%)	2% (±10%)
18-34 y.o. (%)	34% (±18%)
35-44 y.o. (%)	20% (± 9%)
45-54 y.o. (%)	22% (±8%)
55-64 y.o. (%)	18% (±12%)
65+ y.o. (%)	6% (±5%)
Gender (% female)	63% (±24%)
Race/ethnicity:	
Hispanic or Latino (%)	12% (±15%)
Black or African American (%)	15% (±20%)
Asian (%)	3% (± 7%)
White (%)	61% (±30%)
Education:	
Less than high school (%)	2% (± 9%)
High school or GED (%)	24% (±27%)
Some college or technical school (%)	20% (±17%)
College (4 years) (%)	37% (±21%)
Post-graduate/advanced degree (%)	20% (±20%)
Workforce levels:	
Hourly wage workers (non-exempt) (%)	60% (±27%)
Salaried, non-managerial (exempt) (%)	25% (±24%)
Salaried managers (exempt) (%)	18% (±19%)
Employees on day shift (%): avg (±SD)	83% (±24%)
Employees routinely working > 40 hours/week (%): avg (±SD)	18% (±24%)
Employees covered by union collective bargaining agreement (% of employers)	63.6%
Workforce with use of computer for survey completion and/or access to wellness program resources (%): avg (±SD)	60% (±27%)
Proportion of low-wage employees (earning ≤ $13.50/hr) **among participating organizations**:	% (number of organizations)
None	34% (63)
1% - 25%	41% (76)
26% - 50%	13% (24)
51% - 75%	6% (12)
76% - 100%	5% (9)
** Mean and standard deviation (SD) show the distribution of reported percentages from each of 187 participating organizations.*	

Baseline employer programs and policies

The Environmental Scans have been completed by 99 organizations to date in Cohorts 1, 2 and 3. Collection of these questionnaires has not yet been initiated for Cohort 4.

Among employers who have provided this information, most had at least some baseline policies and facilities in each of the seven domains or content areas (Table 4, below). However, the status quo before beginning the program was rather low compared to the number of items that were covered in the ES instrument. Except for occupational health and safety, which is covered by legal requirements for most employers, the average scores were below one-third of the possible maximum values. Thus there was substantial opportunity for improvement in all of these areas. There were only negligible differences between the scores of these three cohorts.

Table 4. Descriptive data on employers' workplace health, safety, and wellbeing policies and facilities: Cohorts 1 (n=22 employers), Cohort 2 (n= 46 employers) and Cohort 3 (n=32 employers).

Domain (total possible number of points)	Mean (± Standard Deviation)			Range (Minimum – Maximum)		
	Cohort 1	Cohort 2	Cohort 3	Cohort 1	Cohort 2	Cohort 3
Physical activity (42)	9.91 (± 4.97)	10.29 (± 5.67)	10.83 (± 6.66)	2-21	1-27	1-31
Nutrition (46)	12.73 (± 4.13)	12.23 (± 4.10)	11.71 (± 53.82)	6-25	6-23	6-23
Tobacco and substance abuse (21)	6.91 (± 2.79)	6.89 (± 3.39)	6.74 (± 3.05)	3-15	0-15	1-12.5
Supports for parents/families (16)	3.98 (± 3.99)	3.91 (± 3.04)	4.14 (± 3.19)	0-15	0-11	0-13
Stress and mental health (15)	6.20 (± 2.15)	5.98 (± 2.24)	6.72 (± 2.82)	2.5-10	2-11	2-13
Medical and chronic conditions (7)	1.34 (± 1.19)	1.36 (± 1.23)	1.38 (± 1.47)	0-4	0-5	0-5
Occupational health and safety (11)	5.16 (± 3.11)	5.35 (± 3.64)	4.94 (± 3.12)	0-11	0-11	0-11

Employees' baseline health needs and interests

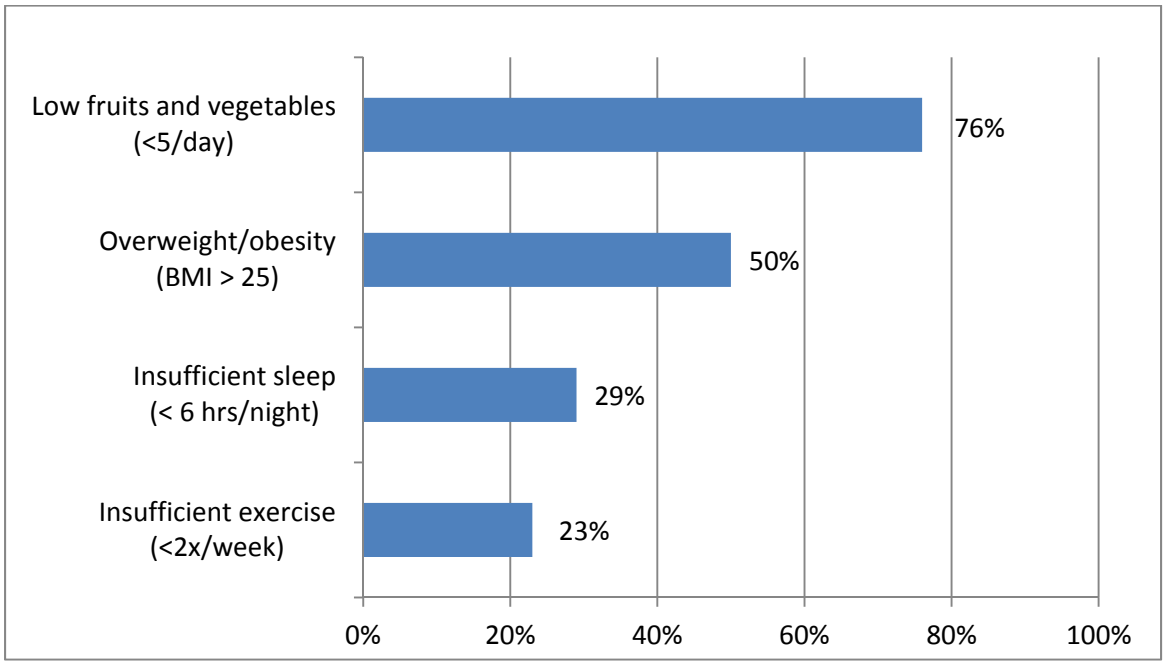
In Cohorts 1-3, 108 organizations distributed and collected the Needs and Interests survey of their employees. A total of 11,010 employees at these workplaces completed and returned the Needs and Interests survey.

Employee health:

Nine health risk factors were used to compute health risk profile for employees: high

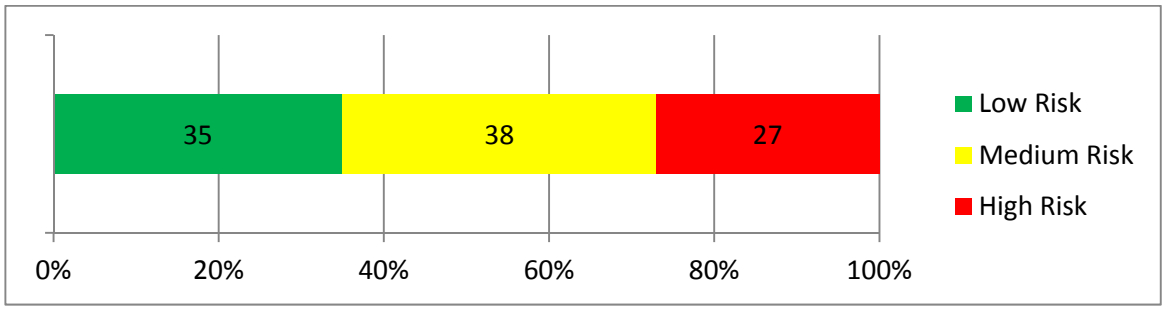
blood pressure, cholesterol, diabetes, body mass index, physical activity, nutrition, smoking, stress, and insufficient sleep Of these nine health risk indicators listed above, the most prevalent risks reported by employees were low fruits and vegetables, overweight, insufficient exercise, and insufficient sleep (Figure 2, below). Substantially fewer numbers reported stress interfering with health (19% of respondents) or notable depression or anxiety (8%), which are indicators of stress selected to represent more severe potential outcomes.

Figure 2. Top health risk factors reported by WoW employees through the individual Needs and Interests surveys (Cohorts 1-3).



When the nine health risk indicators were summed to generate the overall risk score, the respondents were categorized in roughly equal proportions as low risk (0-1 factors), medium (2-4 factors), and high (5 or more factors). Thus about two-thirds of employees were designated as being at either medium or high risk (Figure 3).

Figure 3. Distribution of health risk scores, based on WoW employees completing the individual Needs and Interests surveys (Cohorts 1-3).



Workplace opportunities for healthy lifestyles:

Eighty percent of employees who responded to the survey stated that their employers already provided them with a tobacco-free workplace. The majority of employees also stated that their employers offer them the opportunity to be physically active, eat a healthy diet, and manage stress (68%, 64% and 53%, respectively).

Employees further expressed interest in new wellness activities that their organizations might offer through the WoW program. They indicated that they were most likely to participate in activities to become more physically active, eat healthier diets, manage stress, and prevent injuries through ergonomics (Table 5, below).

Regarding specific policy or environmental supports for healthier behaviors, employees were most interested in tobacco-free grounds (70%), extending the current MA smoke-free workplace law to include exterior grounds. They were also interested in discounted gym memberships (67%), flexible work schedule (67%), and paid time for physical activity (61%).

Employees also expressed readiness to change their behaviors to become healthier (Table 5). The area with the most endorsements was in being ready to make changes to reduce stress (46%). Other areas in which employees were especially ready to change were to lose weight or maintain a healthy weight (50%), to be physically active, and to eat a healthy diet.

If a program was offered that was of interest to them, 63% of respondents said they would be willing to participate during personal time, with 46% indicating they would prefer to participate after work. Smaller proportions indicated that the best time for them to participate would be at lunch time, before work and on weekends (28%, 24%, and 21% respectively).

Table 5. Alignment of employer WoW activities with employee health needs and interests.

A-C: Employee interest in possible wellness activities, policy and environmental supports and readiness to make health behavior changes (n=11,010 individual responses to Needs and Interests survey, from 108 organizations in Cohorts 1-3).

D: Planned employer activity targets (n=50 organizations submitting Action Plans, in Cohorts 1-2).

	A. Types of activities "I am likely to participate in…."		B. Types of policies and environmental supports "I am very interested in…."		C. "I am ready to make changes"		D. Employers' selected program targets	
	n	%	n	%	n	%	n	%
Healthy eating	4,919	44.7%	6,377	57.9%	4,094	37.2%	37	74%
Exercise	6,948	63.1%	7,456	67.7%	4,227	38.4%	47	94%
Stress reduction	6,296	57.2%	6,677	60.6%	5,068	46.0%	34	68%
Workplace ergonomics	3,545	32.2%	-----*	-----	-----*	-----	8	16%

* Question not asked for ergonomics.

Planned WoW Employer Wellness Programs and Policies

A total of 53 Action Plans have been submitted to date from Cohorts 1 and 2. In Cohort 1, organizations were asked to name 3 health targets, and to undertake one activity or other change for each of the targets. However, selecting three turned out to be somewhat ambitious for new trainee Wellness Champions. It was too complex to plan interventions in 3 areas simultaneously, and some organizations had too few resources available to implement 3 interventions in the same short time period. Therefore, in Cohorts 2-4, participating organizations were asked to select 1 health target for their programs, which was more in line with the available resources. This allowed organizations to focus more deeply, using a range of strategies to make an impact on the selected topic. It seems likely that this change was also responsible for the higher employer enrollment in the later cohorts.

In all cohorts, employers' selected program targets were predominantly to increase physical activity, improve nutrition, and reduce or manage stress. These goals were well aligned with the health needs and program interests that were identified from the surveys of individual employees at the same organizations (Table 5, above). Certain specific activities were designated by large numbers of employers in Cohorts 1 and 2 (Table 6 below).

Table 6. Most frequently submitted employer activities from their submitted Action Plans, in rank order: Cohorts 1 and 2.

Most frequent interventions	**Physical Activity**		**Nutrition**		**Stress Reduction**	
	Freq	**Intervention**	**Freq**	**Intervention**	**Freq**	**Intervention**
1	25	On-site yoga/general fitness classes	21	Workshop on nutrition and healthy eating	20	Yoga classes
2	21	Walking Club	15	Meeting food policy	13	Stress management and coping skills trainings, demos, and/or practice
3	19	Personal health coaching, fitness education, seminars	12	Healthier options in vending machines	11	Meditation/mind-fulness classes

Overall, employers complied with program guidance by developing activity mixes focused on establishing long-lasting organizational policies and environmental supports for adopting healthy behaviors, and on providing skill-building opportunities either on-site during the work day or in the local vicinity. Activities to encourage social connections between employees as they engage in health and wellness activities were also commonly reported. Examples included walking clubs, fitness classes and challenges, farm shares, community

gardens, and yoga classes (Tables 7-9 below). Of note, the Department of Public Health explicitly dis-allowed employers from financial penalties for workers who opted not to participate in organized activities.

Environmental change was most frequently achieved toward the goal of dietary improvement, as many organizations introduced meeting food policies and provision of healthier food options on campus (Table 8). To address the goal of stress reduction, several organizations committed to addressing work organization factors such as work overload and social support in the workplace, although few specifics were provided. These factors related to job stress are important contributors to chronic disease, and represent a progressive "Total Worker Health" approach to improving workplace health through primary prevention, according to the Centers for Disease Control and Prevention.

Table 7. Physical Activity interventions submitted in Action Plans from Cohorts 1 and 2.

Type of intervention	Sample of most common activities	Frequency of interventions
Physical access	On-site yoga (with or without meditation), on-site aerobic/strength class	53
Financial access	Discount gym membership	29
Information	Promotion of nearby walking paths/routes	43
Point-of-decision prompts	Motivational signs to encourage use of stairs, reminders to move	15
Incentives/rewards	Pedometer/fitness challenges with potential rewards	9
Individual or group workshop, counseling, training, etc.	Learning opportunities such as health coaching and seminars	24
Staff competitions/ challenges	Team pedometer/fitness challenges	32
Social support	Walking clubs/sports leagues	24
Policy support	Incorporating physical activity breaks at meetings; paid time for physical activity	35

Table 8. Nutrition interventions submitted in Action Plans from Cohorts 1 and 2.

Type of intervention	Sample of most common activities	Frequency of interventions
Information	Posters, newsletters, recipe sharing	21
Physical access	Meeting food policy; healthier options in vending machines	56
Financial access	Cost-sharing of healthier food	6
Financial incentives, rewards, challenges	Weight Watchers program	10
Individual or group counseling, training, workshop (face-to-face, internet etc.)	Workshops on nutrition and healthy eating, cooking demos	30

Table 9. Stress reduction/coping interventions submitted in Action Plans from Cohorts 1 and 2.

Type of intervention	Sample of most common activities	Frequency of interventions
Onsite classes and activities (seminars) for stress reduction	Yoga classes*, mindfulness or other stress management training	44
Physical access to stress reduction spaces or activities (indiv., group)	Designated space for quiet stress reduction activities	8
Policy supports	Reducing work organization stressors (breaks, work pace, decision authority)	8
Information/communication	Wellness fair, awareness communications	6
Team building and social support	Planned social activities, work team building	5
Individual counseling, coaching, etc. (face-to-face, internet etc.)	Coaching	4

Community Partnerships

All WoW employers named community partners that they could engage to provide resources (either in-kind contributions or for purchase by employees) for specific wellness activities for their employees. Specific potential partners named frequently in Cohorts 1 and 2 included organizations providing fitness facilities, such as YMCA (mentioned specifically 14 times) or other privately owned gyms, and farms to promote access to fresh produce. Local businesses and non-profit organizations were the types of partners mentioned most often (Table 10 below); many of these were small businesses providing wellness-related services (fitness, yoga, massage, health coaching, etc.). Health insurers (combined with healthcare provider organizations) were also commonly cited. Town or municipal wellness partners referred to city or town offices, many representing programs specifically supported by the Massachusetts Department of Public Health (e.g., Mass in Motion).

Several employers initiated unusual partnerships with local businesses and retailers to promote health in the workplace. A community health center established a partnership with "Fresh Truck" (a mobile produce stand) to bring fresh produce onsite weekly for employees to shop. This organization is planning to expand service hours to make the produce available to their health center clients as well. Other employers connected employees with existing resources such as websites that locate restaurants with healthy food choices and walking route maps in nearby areas.

Table 10. Community Partner organization types submitted in Action Plans for Cohort 1 and Cohort 2.

Organization type	Examples	Number
Business	Gyms, food retailers, yoga studios, Weight Watchers, Nutrition Center, Charles River Canoe and Kayak	69
Non-profit organization	YMCA, farms, farmers markets, HubWay Bikes	50
Healthcare insurer	Blue Cross Blue Shield, Harvard Vanguard, Tufts, Massachusetts Interlocal Insurance Agency	39
Town or government	Town departments, parks, vocational technical schools	16
College or university	Gordon College, Roxbury Community College, Smith College, UMass	16
Healthcare provider organization	Berkshire Health Systems, Lowell General Hospital	8
Associations/coalitions	Coastal Rail Trail Coalition, Southcoast Worksite Health Collaborative	4
Other		20

Program Implementation: Curriculum, Facilitators, and Challenges

Worksite Champions from Cohort 1 organizations were surveyed (7) or interviewed (11) to gather feedback about the Working on Wellness program during September and October 2016. Three additional Champions did not respond to the interview/survey request (missing).

Quality of Working on Wellness curriculum:

Cohort 1 organizations were highly satisfied with the quality of the WoW training program (Table 11 below). Nearly all (89%) of the Champions said that they would recommend the Working on Wellness program to other MA employers. Although some participants noted the time commitment was greater than expected, ratings and remarks were highly favorable.

Nearly all (95%) of the participating organizations reported that opportunities for peer learning were excellent or good. Overall, participants preferred the format of group technical assistance calls with a technical advisor, over the online learning portals. Technical assistance calls were reported to be the most useful for the topics of gaining management buy in, program planning/implementation, and evaluation. Participants stated a desire for more face-to-face interactions in the future, if MA WoW program resources permit.

Some Wellness Champions found the guidance on Community Partnerships less useful than the other learning topics, either because they already had strong community partnerships, or there was a lack of relevant community partner organizations in their immediate vicinity.

Table 11. Quality of "Working on Wellness" curriculum and technical support, as reported by participating employers.

Quality Indicator	**% rated "Agree" or "Strongly Agree"**
Online curriculum organized and presented clearly	95%
Instructions for accessing assignments and tools were clear	83%
Instructions for completing and submitting assignments were clear	83%
Tools were useful for creating organization's program	100%
WoW program met expectations	95%
	% rated "Good" or "Excellent"
Overall value of WoW online curriculum rated	100%
WoW Expert Series quality (reported by the 64% that attended)	100%
Opportunities for peer learning	95%
Online discussion portal	37%
	%
Respondents that used the online discussion forum	60%
Technical assistance calls rated very useful	67%

Participant recommendations for improving Working on Wellness:

When asked how the Working on Wellness program could be improved, these were some of the suggestions offered:

- Six organizations suggested specifying a work plan/timeline prior to starting the program, to identify the required time commitment and resources required for the program.
- Four organizations suggested improving clarity and simplicity of materials and tailoring parts of the program to meet organizational needs, such as providing opportunities to customize the questions in the Needs and Interests survey.
- Tailoring the guidance on developing community partnerships was recommended to make the program content more relevant to a) agencies with strong existing community partnerships, and b) organizations located in areas with few potential partner organizations.
- Increasing face-to-face collaboration was another common theme. Three employers suggested opportunities for onsite meetings with technical advisors, and two suggested having a kick-off or quarterly meeting to share ideas with other organizations about the program.

Champion appraisal of wellness program implementation and support within their organizations:

WoW organizations were required to assign a key upper-level leader within the organization to lead and support the new wellness initiative. Wellness Program "Sponsor" was the term used to refer to this leader. The majority of respondents were pleased and satisfied with their Sponsor's support (and management support generally) of the wellness program (Table 12, next page). Most Sponsors met regularly with the Champion and/or wellness committee to review progress of the wellness initiative, and WoW materials such as the Worksite Wellness Action Plan and Worksite Wellness Evaluation Report were cited as useful in this process. A recurring theme was the importance of encouragement, support, and engagement from the Wellness Program Sponsor and top management generally, and how this can make a difference for the program outcomes.

"It has helped changed the mindset of the organization." -- WoW Champion

Table 12. Program support and engagement in WoW Cohort 1 organizations (18)

Wellness Program Sponsor Support	**% rated "Agree" and "Strongly Agree"**
Sponsor communicated regularly with organization about health, safety, and wellbeing	94%
Sponsor participated in wellness activities	89%
Sponsor generally could be seen practicing or modeling positive health behaviors	100%
Sponsor encouraged employee participation in wellness activities	89%
Sponsor met with the Champion and/or wellness committee to review progress of the wellness initiative	89%

Employee involvement:

Most Wellness Champions reported high engagement levels among employees and attributed the success of their programs to high employee involvement (Table 13 below). Four specifically stated that they observed increased employee involvement and excitement among employees about the wellness program. At three organizations, there was some difficulty with participation due to the nature of people's job responsibilities or outside work commitments.

"It has been great and really exciting to see employees excited and engaged in the wellness program. Our program success has been due to high employee engagement. We have had more people want to join the wellness committee and it is expanding." -- Wellness Champion

Table 13. Employee wellness involvement in 18 WoW Cohort 1 organizations

Employee Involvement	**% of Champions reporting**
Employees are participating in wellness policies and programs	94%
Wellness committee members are actively engaged in leading the wellness program	80%
Some non-wellness committee members are taking action to initiate wellness policies and programs in the workplace	66%

Program implementation challenges:

When asked about the most challenging aspects of implementing a worksite wellness program, the Wellness Champions most frequently cited the steps of gaining buy-in (6 participants) and implementing activities (7 participants) as the most challenging aspects. Four organizations reported challenges with obtaining employee participation. Three Champions stated that their greatest challenges were assessing employee needs and interests and developing community partnerships. The reasons were primarily related to resource and time

limitations. These concerns (resources and time) were the single most common reason given when some employers left the program after enrolling. This trend is consistent with issues that have been described generally in the worksite health promotion research literature.

When asked what they would have done differently to make their program more successful, seven of the Champions said that they would have involved the wellness committee members, Sponsors, and other managers much sooner at the start of the program. Two said that they would organize and disperse tasks differently to reach deadlines and save time.

Program sustainability:

Nearly all Wellness Champions (84%) reported that it was very likely that their wellness initiative would continue once the Working on Wellness program ends. Almost one-half (45%) reported it very likely that their organization would allocate resources to support their wellness initiative after the end of Working on Wellness seed funding. All organizations said that they would welcome continued seed funding, if available.

If WoW resources continue to be available in the future, nearly two-thirds of the Champions said that these resources would be the most useful:

- Annual in-person networking meetings with peers
- Continued electronic resource sharing
- Continued access to technical advisors

Evaluator recommendations for quality improvement and future program delivery:

Time and complexity of the online process were concerns raised by some participants. These concerns were addressed by the HRiA program delivery team as Cohort 2 was enrolled by shortening the length of the online learning modules, removing some training content (and providing it as optional material), and narrowing the focus of wellness program implementation from three health topics to one in order to deepen the program impact. Beyond these adaptations, the program delivery team could enhance the experience for future program participants by adopting one or more of the following recommendations:

1. Provide a clearer time estimate for the individual in the role of the Wellness Champion. This would allow prospective applicants to understand whether they are making a feasible commitment.
2. Provide an easy-to-follow graphical timeline for implementation of each program step. This would make it easier for participants to track and report their progress to the wellness program Sponsor (top leadership).
3. Encourage Wellness Champions to engage their wellness program Sponsor and committee immediately in the program implementation activities.

Although the quality of peer learning opportunities was rated high, participants expressed a desire to have more face-to-face interactions with technical advisors and other program participants. The program delivery team could provide additional opportunities, as

budget allows, by adopting one or more of the following recommendations:

1. Technical advisors visit each participating site once during the start-up phase of the program (or before wellness plans have been created and implemented).
2. Host an annual sharing meeting for program participants.
3. Host quarterly or semi-annual networking/sharing/education meetings in various regions of the state.

Projected Benefits of WoW Program Activities

We sought published scientific studies that documented the effects of similar programs on health behaviors, health status, and/or costs related to health conditions. We used data from these studies to project likely health and financial benefits of the WoW program, given the prevalence of unhealthy behaviors in the workforce (Figures 2-3) and the numbers of employers planning related activities or policies (Table 7-9). For this report, the published program benefits have all been expressed as percentages of baseline values from the employee population. The results have been tabulated separately for the three major intervention targets, i.e., healthier diets, physical exercise, and stress reduction (Table 14).

The benefits shown in these published studies range from as high as 20% or more of baseline value in individual items, down to as low as zero (i.e., no change), depending on the study and the outcome. (This range of effects may be due to differences in the specific intervention activities, workforce demographics and baseline health status, length of follow-up, and other factors.) There is ample evidence here that an improvement of 10%, 20%, or even higher is plausible from a well-conducted intervention. The expected success rate in risk mitigation is shown over a range for each measure that is consistent with the evidence summarized above, to allow transparency in the estimations.

Most of the outcomes reported in these studies are expressed in terms of average units for the entire population, which does not translate directly into change in the number of people with (or without) a specific risk factor. However, it can reasonably be assumed that in a population with an average reduction in BMI over the follow-up period, some individuals moved from “obese” to “overweight” or from “overweight” to normal weight. For purposes of calculating expected health benefits, we assumed that a 5% change in a measured outcome was roughly equivalent to 5% of the population changing risk category. Nevertheless, the improvement of BMI could also have subsequent/secondary benefits on employee’s health, e.g., preventing complications from diabetes or high cholesterol. The combination of exercise, healthy diet, and stress reduction could also have positive interactions among them and lead to greater benefits beyond each individual activity alone. The calculation that is presented in this report only includes the direct cost saving on medical care from each individual target area without considering potential secondary benefits and possible synergistic effects of multiple concurrent intervention approaches.

As shown in Table 15, the Action Plan activities can be predicted to lead to improvements in daily consumption of fresh fruits and vegetables, regular (weekly) exercise, weight loss, and reductions in stress that interferes with health. The biggest likely area of

impact is represented by as many as 12,485 employees increasing their daily intake of fresh produce, in the combined workforces of about 74,000 individuals. The planned exercise activities would likely lead to both increases (up to 4,800 employees) in regular weekly exercise, which has a wide range of health benefits, as well as a predicted reduction of up to 6,956 people in obesity prevalence. The lowest predicted impact is in the area of stress reduction, which follows from the low baseline prevalence of stress reported to interfere with health.

Since these outcomes represent items in the summary risk factor score, we could, if desired, estimate their impact on that total score. Thus, a 10% improvement in one of the 9 items could be assumed to represent an average improvement of about 1% in the total score, and a 20% improvement in one item would shift the entire score by about 2%. As noted above, the summary score used here is similar to other sets of scored health risk indicators that have been associated with increased morbidity, absenteeism, presenteeism, and health care expenditures [e.g., Burton et al. 2006; Eddington 2001; Henke et al. 2011; White et al. 2015; Caretto et al. 2016].

Such shifts in risk categories have also been associated with monetary savings to the employer; for example, DiBonaventura et al. [2015] estimated that a normal-weight employee cost an employer about $600 less per year in indirect costs (e.g., presenteeism), compared to an overweight employee. Caretto et al. [2016] found that increased exercise was associated with reduced medical and prescription expenditures, particularly medical expenditures for endocrine diseases and prescription expenditures for gastrointestinal drugs. An evaluation of a worksite health promotion program in a large company by Henke et al. [2011] showed an average annual per employee savings for $565. The authors concluded that the return on investment is at the range of $1.88 to $3.92 for every dollar spent on the program.

Of particular interest is a recent study of a relatively small organization (172 employees), evaluating an educational program in combination with a health risk screening [Allen 2012]. The authors documented a reduction of about 13% in low-density lipoprotein cholesterol in the entire population after 12 months, and an average reduction of 0.3 points in their disease risk score (6 items) relative to the intervention group. The program represented a financial investment of $454.23 per one-point reduction in the composite score, which is similar to investment amounts reported by much larger companies.

Financial savings to an employer who implements a workplace health promotion program are achievable in two ways. One is “cost reduction,” which is achieved by improving health for individuals who are unhealthy. The other is “cost avoidance,” which is realized by maintaining healthy people at the same level, i.e., by deterring healthy employees from engaging in new unhealthy behaviors which, in turn, would lead to new medical care expenses. Most published intervention trials have not explicitly attempted to quantify these two phenomena separately. The published data generally represent cost reduction, although they may include cost avoidance as well without explicit acknowledgement. Thus, the savings estimated for this report represent the combination of both program effects but may be under-estimated.

We estimated the potential saving in medical expenditures due to the WoW program by considering the total number of employees in participating organizations, the number of employers targeting the specific risk factor, and the proportion of employees with the specific risk factors, the expected success rate in risk mitigation, and the average annual decrease in medical expenditure. We set the annual average cost reduction per unit decrease in risk score at $150 based on findings from Edington [2001]. (Note that this is an underestimate, as the dollar value has not been inflation-adjusted to 2015 dollars.) For the employees who do not eat sufficient fruits and vegetables at the start of the program, the predicted annual reduction in medical expenditures ranges from $312,000 for a 5% success rate in healthy eating to $1,873,000 for a 30% success rate (Table 15). Based on the same expected success rates (5% and 30%), we can anticipate a cost reduction in the range of $120,000 to $1,043,000 for employees not getting sufficient exercise, and $72,000 to $430,000 for employees whose stress interferes with their health.

In sum, given the actual prevalence of risk factors reported in this population and the plausible range of success rates for the activities carried out by these employers, the estimated savings for medical care expenditures alone range from $0.76 million (assuming 5% success rate for each of the target areas) to $4.07 million (assuming 30% success rate for each of the target areas) for the top three Action Plan targets together (diet and nutrition, leisure-time exercise, and stress reduction). For the $2 million that the PWTF invested in the WoW program as of December 2016, it potentially yielded $0.38 to $2.04 in medical care cost reduction from these three target areas for every $1 that PWTF invested. However, the magnitude of cost saving was likely underestimated because we have not included potential cost avoidance of deterring healthy people from engaging in new unhealthy behaviors, probable prevention of disease complications as subsequent/secondary benefits from each target area, potential synergistic benefits among multiple target areas, and possible gains from increased productivity or reduced absenteeism. Furthermore, the cost saving is expected to be even greater for future expansion of the WoW program. With the previous PWTF investments, the intervention methods and instruments, and infrastructure for program delivery, data collection and processing have been well developed, tested and refined; intervention and evaluation staff are trained and adapted to the settings. These efforts have paved a solid foundation for the continued operation of the WoW program with greater cost-effectiveness in the future. Nevertheless, the current cost saving estimate is solely from the PWTF's perspective. Future analysis should also include the cost to employers as data become available.

Table 14. Expected health benefits, among employees at risk, from published studies of employer wellness programs; change computed as percentage of baseline value, relative to control group where possible.

A. Healthier diets

Types of activities	No. of activities proposed by employers	Examples of published interventions	Behavior change; Change in health condition prevalence
Information (only)	21	Geaney [2016]: One study arm = nutrition education only	Change at 7-9 months follow-up: -0.7% in mean BMI -5.9% in systolic BP -4.1% in diastolic BP
		Gans [2015]: 3 groups for nutritional information: NT (Non-tailored written information); TW (Tailored written information); TW+TV (Tailored written + Tailored video information)	Changes at 8 months: -0.3% dietary fat for TW -0.5% dietary fat for TW+TV Fruit & vegetable intake 1.33 times higher in TW+TV
Physical access	56	(see "multi-component programs," below)	(see "multi-component programs," below)
Financial access/support	6	French [2003]: Prices lowered by 50%.	+93% purchases of lower-fat snacks; increased intake of fresh fruit (4-fold) and baby carrots (2-fold).
		Alinia [2010]: Free fruit (one per person per day).	Change in food intake at 5 months: +38.8% fruit +12.3% dietary fiber -14.3% sugar +10.7% vegetables
Financial incentives, rewards, staff competitions, challenges	10	Racette [2009]: on-site Weight Watchers program, team competitions, participation rewards, incentives (& other components)	Change at 12 months: +30% fruit/vegetable intake +25% of participants in lowest risk group

Individual or group counseling, workshop, etc.	30	(see "multi-component programs," below)	(see "multi-component programs," below)
Point-of-purchase labeling	0	(see "multi-component programs," below)	(see "multi-component programs," below)
Multi-component programs (at least 2 of the components above)		Bandoni [2010]: menu planning, food presentation, motivational strategies.	Increased intake of fruits and vegetables after 6 months: +17.3% crude estimate, +11.2% adjusted
		Geaney [2016]: One arm = combined education and environmental changes in cafeteria, lower prices for fresh fruit.	Changes at 7-9 months follow-up: Lower intake of fats, salt, sugar, total energy. -1% in mean BMI -0.7% in waist circumference
		Johnson [2016]: Educational resources on physical activity and eating (print materials, weekly toolbox, tips, tracking posters, team logbooks); 6-week competition among employees and worksites	No difference after 6 months in daily intake of fruits and vegetables
		Da Silva Franco [2013]: workshop with nutritionists; group talks held at company events; environmental supports	Change at 9 months: +38% in intake of fruits and vegetables
		Salinardi [2013]: Education by nutritionist; "lifestyle modification;" program for structured maintenance of weight-loss	Change at 6 months: -9.5% body weight / BMI -10.8% systolic BP -9.5% diastolic BP -7.6% total cholesterol intake -11.5% sugar intake
		French et al. [2010a]: Increased proportion of healthier foods available; price reduction for healthy items	After 18 months: + 10-42% sales of healthy food items

		French et al. [2010b]: Nutritional information; healthier items in vending machine items; reduced prices for healthy items; fruit & vegetable intake competitions; daily weigh-ins, farmers market; behavioral improvement programs; etc.	Changes at 18 months: -17% energy intake +5% fruit & vegetable intake 0% BMI
		Morgan [2011]: printed handbook; face-to face weight loss information session; encouragement to monitor weight, food intake & exercise	Change at 6 months: 1.8% weight loss +15% more participants lost >5% of initial body weight

B. Exercise

Types of activities	No. of activities proposed by employers	Examples of published interventions	Behavior change; Change in health condition prevalence
Information	42	(see "multi-component programs" below)	(see "multi-component programs" below)
Physical access	53	Taylor [2010]: 15-min exercise classes led by facilitator	+8% in daily steps +12% in HDL lipids (i.e., -12% high cholesterol)
		Pedersen [2009]: classes for specific resistance training (SRT), or all-around physical exercise (APE)	+10% in VO2 max -2.2% in body fat (similar results for both intervention types)
		Rebold [2015]: 12 week on-site exercise class program, 3x/week for one hour, certified instructor	-1.56% in average BMI
Financial access or support	29	----------	
Incentives, rewards, competitions, challenges	41	Shaw [2007]: Wear pedometer for 3 months; eligible for prize if submit all logs	+8.6% in daily step count
		Macniven [2015]: team pedometer-based program to reach 10,000 steps/day.	+6% in # taking 10,000 steps/day +18.5% in #steps/day
Individual or group counseling, training, workshop, etc.	24	Osteras [2006]: individualized exercise planning.	+11.1% in # of days/week with high-intensity activity > 10 min. +16% in # of days/week with mod-intensity activity > 10 min. +3.9% in VO_2max
Point-of-decision prompts	15	Swartz [2014]: hourly prompts to get out of chair, or to get out of chair and walk around	Stand-only: +14% in total stepping time; no change in # of steps/day. Stand and walk prompts: +29% in total stepping time; +35% in for stand and walk

			prompts.
Policy supports	35	(see “multi-component programs” below)	(see “multi-component programs” below)
Team-building, social supports	24	(see “multi-component programs” below)	(see “multi-component programs” below)
Multi-component programs		Haines [2007]: Information via computer-based educational programs; log daily steps via pedometer.	+4.8% participants with "normal" BMI -1.03% in mean BMI -3.4% in number with stage 1 or 2 hypertension. - 5.45% in average blood glucose. - 3.18% in average total serum cholesterol.
		Johnson [2016]: Print materials on physical activity and eating behaviors; implementation resources (weekly toolbox, tips, tracking posters, team logbooks); 6-week “friendly competition” among employees and worksites	At 6-months follow-up: +58.98 minutes/week vigorous physical activity; +53.30 minutes/week moderate physical activity. +14% men meeting recommended levels of moderate to vigorous physical activity (150 min./ week), versus baseline.

C. Stress reduction

Types of activities	No. of activities proposed by employers	Examples of published interventions	Behavior change; Change in health condition prevalence*
Information	6	Cook [2007]: web/print materials on stress, nutrition, and physical activity	Change at 3 months: -4.5% in mean perceived stress -4.4% in mean symptoms of distress
Physical access	8	Engen [2012]: weekly 15-min. chair massages for 10 weeks	Change at 10 weeks: -16.4% in mean perceived stress -17.2% in mean anxiety
Individual or group counseling, training, workshops, etc.	46	Allexandre [2016]: 8-week online stress reduction materials plus expert-led group (weekly 1-hour meetings)	Change at 1 year: -29.1% in mean perceived stress
		Hartfiel [2012]: 8-week DruYoga (50-min. 1x / week), plus DVD for home use	Change at 8 weeks: -11.3% in mean perceived stress
		Wolever [2012]: 12-week Viniyoga stress reduction program or Mindfulness at Work stress management program	Change at 12 weeks: -34.4% in mean perceived stress -27.4% in mean productivity loss
		Bazarko [2013]: 8-week mindfulness classroom/telephonic program	Change at 4 months: -39.4% mean perceived stress +10.4% mean general health +35.1% mean mental health
Policy supports *	12		
Team-building, social supports	5		
Financial access/support	1		

* Percentages represent change in measurement tool mean scores

Table 15. Expected health benefits, among employees at risk, from employers' WHP programs.
(Total number of employees in participating organizations = approximately 74,000.)

Baseline at-risk behavior (%)	Cost Reduction		
	Expected success rate (%)	Expected number of employees to benefit	Annual savings ($150 per unit risk score decrease)
1. Diet	5%	2,081	$312,132
76% Employees not eating sufficient fruits/vegetables	10%	4,162	$624,264
74% Employers including this target in their Action Plans	20%	8,324	$1,248,528
	30%	12,485	$1,872,792
2. Exercise (I)	5%	800	$119,991
23% Employees not getting sufficient exercise	10%	1,600	$239,982
94% Employers including this target in their Action Plans	20%	3,200	$479,964
	30%	4,800	$719,946
2. Exercise (II)	5%	1,739	$260,850
50% Employees overweight or obese	10%	3,478	$521,700
94% Employers including this target in their Action Plans	20%	5,217	$782,550
	30%	6,956	$1,043,400
3. Stress	5%	478	$71,706
19% Employees with stress interfering with health	10%	956	$143,412
68% Employers including this target in their Action Plans	20%	1,912	$286,824
	30%	2,868	$430,236

Discussion and Conclusions

Key findings with respect to the enabling legislation

Although the effectiveness of the interventions is yet to be fully evaluated, as the follow-up employee survey data are still being collected, substantial health benefits and healthcare cost savings are anticipated over a longer period of time. The predicted benefits provided in this report are based on the combination of baseline data collected from the combined WoW workforces and our summary of potential impacts from the existing literature.

Legislative goal (i): the extent to which the program impacted the prevalence of preventable health conditions

The published literature shows that multiple health risk factors, e.g., diets, exercise, and stress, can be mitigated by a healthier life style which is associated with low prevalence of preventable health conditions, e.g., diabetes, high cholesterol, and high blood pressure. Through the Massachusetts WoW program, employers have increased the offering of wellness programs with policy and environmental supports. Employees expressed a great interest in obtaining such services and supports. Additionally, employees were ready to make positive changes in their health behaviors.

In light of published effectiveness data, the activities planned by WoW employers are predicted to lead to improvements in daily consumption of fresh fruits and vegetables, regular (weekly) exercise, weight loss, and reductions in stress that interferes with health. The biggest likely area of impact is represented by as many as 12,485 employees increasing their daily intake of fresh produce, in the combined workforces of about 74,000 individuals. The planned exercise activities would likely lead to both increases (up to 4,800 employees) in regular weekly exercise, which has a wide range of health benefits, as well as a predicted reduction in up to 6,956 people of obesity prevalence. The lowest predicted impact is in the area of stress reduction, which follows from the low baseline prevalence of stress reported to interfere with health.

The effectiveness of the interventions is yet to be fully evaluated, as the follow-up employee survey data are still being collected and relevant cost data will not be available for some time. We anticipate that, over time, the supports at the employer level and the readiness at the employee level will lead to sustained healthy behaviors which, in turn, will impact the prevalence of chronic health conditions. As the programs continue, we anticipate decreases in the average number of risk factors, such as unhealthy eating or physical inactivity, and in the proportion of employees having 5 or more risk factors (high risk level). We also anticipate measureable decreases in the prevalence of chronic conditions such as uncontrolled high blood pressure, diabetes, and metabolic syndrome.

Legislative goal (ii): the extent to which the program reduced health care costs or the growth in health care cost trends

Cost reductions are achievable by improving health for individuals at the high risk level and cost avoidance can be realized by maintaining health for those at the low risk level. Most of the literature addressing cost savings has not differentiated these two components but it appears that most of the quantified savings represents cost reduction. The high proportion of people with certain risk factors, e.g., 76% with low vegetable and fruit consumption, indicates the substantial opportunity for savings by reducing these risks. The amount of total savings from cost reduction varies among the risk factors, because of their prevalence rates as well as the differing expected success rates of risk mitigation or health maintenance activities. The estimated reduction in medical care expenditures ranges from $0.3 to $1.9 million for health eating, $0.1 to $1.0 million for exercise, and $0.07 to $0.4 million for low stress at work. Although savings can also be realized through cost avoidance by deterring healthy people from engaging unhealthy behaviors, evidence has not been well established and further investigation is needed.

For the top three Action Plan targets together (diet and nutrition, leisure-time exercise, and stress reduction), the estimated savings for the reduction of medical care expenditures alone range from $0.76 million (assuming a 5% success rate for each target area) to $4.07 million (assuming a 30% success rate for each target area). Potentially, the WoW program could yield $0.38 to $2.04 in medical care cost reduction from these three target areas for every $1 that PWTF invested on the WoW program ($2 million as of December, 2016). This likely underestimates the cost saving due to the lack of consideration of potential savings gained from cost avoidance by deterring healthy people from engaging in new unhealthy behaviors, prevention of disease complications from subsequent/secondary benefits in each target area, synergistic benefits from interactions among multiple target areas, and possible gains from increased productivity or reduced absenteeism. If the WoW program is expanded, the cost saving ratio is expected to be greater and the cost-effectiveness of the program substantially better, since a solid foundation for program delivery and data processing has been established. We will update the cost analysis when data on program cost and benefits to employers become available.

Legislative goal (iii): whether health care costs were reduced and who (populations, not payers) benefited from the reduction

The WoW program addresses prevention of chronic conditions, and thus immediate reduction in healthcare costs cannot be anticipated within a brief period of time. However, if the program effects are sustained over a longer period of time, reductions in health care costs can be projected (see above) based on changes in the prevalence of risk factors leading to those chronic conditions. Available data do not permit us to predict at this time which specific sub-groups of the workforce might be more likely to benefit than others.

Legislative goal (iv): the extent to which workplace based wellness or health management

programs were expanded and whether those programs improved employee health, productivity and recidivism

To date, the Working on Wellness program has enabled 50 Massachusetts employer organizations to plan and implement comprehensive worksite wellness programs in the first two cohorts of the employer participants. Up to 155 more employers have committed themselves to do the same. Prior to the WoW program, these employers had low or no activities related to promoting employee health, with the exception of legally-mandated occupational safety and health activities.

Nearly 100% of participating employers that completed the WoW program have established their own wellness program with a staffing structure and budget, assessed employee needs and interests, and developed action plans targeting key preventive lifestyle factors (nutrition, physical activity, stress management, weight control) which are important to delay or avoid chronic diseases. To date, over 74,000 Massachusetts employees have the potential to benefit from these programs.

As the programs are still in the early phase, data on productivity and recidivism are yet to be collected and analyzed. This issue will be addressed in subsequent program evaluations.

Legislative goal (vii): recommendations for whether the funding mechanism for the fund should be extended beyond 2016 or whether an alternative funding mechanism should be established

The goal of the PWTF funding is to invest in primary prevention initiatives that would help achieve the health care cost containment goals of *Chapter 224 of the Massachusetts Acts of 2012.* The Working on Wellness program has successfully recruited organizations since November, 2015, and helped them initiate health promotion activities to improve workplace wellness. In collaboration with MA Department of Public Health and the program delivery team (HRiA/AW), the evaluation team has developed survey instruments, interview guides, and analytical approaches, as well as analyzed and reported on baseline characteristics and summarized success and challenges in implementation. At only 18 months into the WoW initiative, there is evidence that the program is being successfully operationalized within participating businesses, which sets the stage for improved employee health and future cost savings. However, there has not been enough time to collect follow-up data from employers either in the short term or the longer term to track WoW program outcomes.

Extending the fund (PWTF) beyond 2016 will allow us to conduct more in-depth analysis by utilizing the follow-up data which are being collected to investigate changes for organizations and employees after participating in WoW. Continued and in-depth analysis of the follow-up data is necessary for estimating the program impact on employee health, productivity and cost saving, providing the legislation with quantitative evidence for data-driving, evidence-based policy-making about the program.

Specifically, following up on the initial success of increased wellness policies and activities in participating organizations, an extended period of data collection and analysis

would provide valuable information about the effect of WoW on organizations and employees, as well as the sustainability of these efforts. However, ramp-up time is needed for organizations to prepare for changes in policies and organize specific activities, and then to implement new policies and make activities available to employees. Except for changes in policies and activities, effects of WoW are anticipated to emerge beyond the current PWTF funding period. Extending the PWTF will allow us to leverage the foundation and baseline that we have established for a comprehensive evaluation. Additionally, potential future cohorts could be recruited to expand the efforts and provide more longitudinal data for program monitoring and evaluation.

It should be noted that 84% of Wellness Champions reported that it was very likely that their wellness initiative would continue after the WoW program ends, and 45% reported it very likely that their organization would allocate resources to support their wellness initiative after the end of Working on Wellness seed funding. Considering these, the potential return on investment of the PWTF seed funding is very high, and the WoW program is likely a cost-effective investment in the Commonwealth's healthy and productive workforce.

As more recent years of data in the state's All Payer Claims Database (APCD) become available, we plan to evaluate the effects of WoW on health care utilization and expenditures for employer-sponsored insurance. The APCD is the primary data source for comprehensive health care utilization and expenditures for employer-sponsored health insurance. We will utilize APCD data for calendar years 2014 and 2015 to establish the baseline characteristics for the current cohort of WoW participants and to develop an analytical framework for continued monitoring and statistical analysis. However, the claim lag is usually at least one year, and we will not have claims data for 2016 and beyond when the current PWTF funding ends. Extending the PWTF beyond 2016 would allow us to examine APCD for the years after WoW implementation for all four cohorts (and potential future cohorts) to fully evaluate changes in health care utilization and expenditures.

Finally, employers were strongly encouraged – but not required – to link to local health resources and services in the community, and the program delivery team gave them tools to do so. The "community partnerships" curriculum provides information on how investing beyond the employer affects the community, which in turn can improve their business. There is variability in the number and intensity of linkages. Employers with high versus low community engagement can be identified and compared as to health and economic outcomes, their motivations for establishing community engagement, and their perceived benefits and drawbacks.

In summary, the independent evaluation team recommends extended funding for Working on Wellness in these areas:

- Continued delivery of WoW training and technical assistance services to employers in the current WoW program.
- Continued data collection and program evaluation for Cohorts 3 and 4.
- Delivery of an ongoing employer training program for future WoW participants beyond those participating in Cohorts 1-4.

- Development of new strategies/program design for reaching underserved workers (smaller employers, community-work partnerships, etc.) beyond Cohorts 1-4 of the program.
- Evaluation of employee and employer program impacts (Cohorts 1-4 pre-post analysis), at 1 and 2 years following program initiation/implementation.
- Evaluation of changes in health care utilization (Cohorts 1-4 pre-post analysis) using both self-report and All Payer Claims Data.
- Evaluation of employer adoption, maintenance, sustainability after "graduation" from WoW.

Program strengths and limitations

The WoW program delivery team (HRiA) has designed a thoughtful, evidence-based program and has conducted it in a rigorous manner to provide strong support of employer efforts to enhance the wellbeing of their workers. The program delivery team has also been closely engaged in the design of the evaluation instruments and in collection of employer, employee, and intervention data supporting this evaluation. The ongoing evaluation efforts provided timely and evaluable data to support intervention efforts. The Massachusetts Department of Public Health, as the sponsor of the project, has collaborated closely with the program delivery and evaluation teams, providing valuable guidance and administrative support. Due to this strong, interactive, government-community-academic partnership, the program has efficiently and effectively delivered high-quality interventions to participating employer organizations.

The WoW program delivery team provided extensive technical assistance to participating employers; rather than a "one size fits all" program, employers were educated to use information about their own workforces to provide an appropriate set of activities.

Although employers were educated to consider the physical environment of the workplace, as well as its social and organizational features, they did not succeed in developing primary prevention activities for all program goals. In particular, psychosocial stress was addressed mostly through enhancing individual coping skills rather than through re-design strategies addressing root causes, such as hiring more staff, involving workers in job scheduling, providing better quality supervision, or improving job safety in order to reduce worker fear of injury. In general, primary prevention of stress requires an organization to consider structural changes that create a more health-promoting workplace. However, this is not usually achievable in the short-term, so continued support of these employers might be necessary to move toward such system changes.

While it was not explicitly a requirement of the program, it would have been desirable to engage more employers with a larger proportion of low-wage workers. Their under-representation is not viewed as a failure in recruitment, but rather inherent in the question of which workers employers choose to invest in for the long-term. Lower-wage and -status workers tend to be viewed as more replaceable by their employers and, in turn, they often

have higher turnover rates. This economic reality is not something that WoW or the Department of Public Health would be able to influence through a workplace wellness program.

The program would also be stronger with more emphasis on occupational ergonomics and safety. One webinar was offered on ergonomics, but in general, neither of these areas was emphasized in the technical assistance that employers received. Although these might not seem to belong under the heading of "workplace wellness," the Centers for Disease Control and Prevention (CDC) and National Institute for Occupational Safety and Health (NIOSH) concept of Total Worker Health® calls for integrated attention to improving working conditions along with individual behaviors, and there is increasing evidence regarding these interactions [e.g., Miranda 2015]. The availability of safe, stable, quality, well-compensated work is fundamentally health-promoting; this is a program area that deserves to be expanded in the future, especially given the high level of interest documented among employees (Table 5).

Furthermore, there is increasing anecdotal evidence, at the least, that on-the-job injuries represent a common pathway to opioid prescriptions and subsequently to off-prescription opioid use and abuse. The possible prevention of future opiate abuse is another area of potential cost avoidance that could not be quantified in this report.

Evaluation methodology strengths and limitations

The evaluation team developed a series of instruments and interviews to collect comprehensive quantitative and qualitative information to assist organizations in developing their worksite wellness programs. Based on these needs assessment tools, participating organizations have received actionable information regarding areas of the wellness-related needs and interests of their employees to guide organizations' planning for wellness policies and activities.

The information collected is also essential for the program evaluation, which uses a combination of quantitative and qualitative approaches. In addition to providing summary statistics of collected information, the study design and analytical framework include plans for a longitudinal analysis to monitor the program implementation and investigate the effectiveness of WoW. The approach can be easily adopted for future cohorts of participating organizations and adapted for multiple waves of follow-up data collection and analysis.

The findings in this report are based on the baseline information from the first two to three cohorts of participating organizations and their employees. Baseline data are being collected for four cohorts in all and will be eventually available for analysis. The program has only been in existence for one year, which is far too short of a time period to permit us to observe future possible long-term improvements in health risks and chronic diseases [White et al., 2015]. As more data become available, the results will be updated and any significant differences among cohorts will be noted. Follow-up information is being collected so that we can examine pre- and post-intervention changes for the effects associated with WoW. Future goals include examining program delivery and impact by economic sector, workplace size, and other workplace characteristics. Analysis of follow-up employee-level data could examine

health benefits by occupational factors (e.g., wage level, sector-level injury rates) and by demographics (e.g., race). These results are planned for future program evaluations, subsequent legislative reports, and eventual publication in the scientific literature.

Several issues warrant attention in interpreting the findings presented here, as well as in consideration for the next phase of the program. First, this is an observational study and organizations have participated in WoW voluntarily without random assignments. Thus, there is an issue of potential selection bias, or of limited generalizability to organizations that chose not to participate. To evaluate this, in 2017 the evaluation team will identify non-WoW participating organizations from the Massachusetts All-Payers Claims Database to form a comparison group for the evaluation. Changes from pre- to post- intervention in participating organizations will be compared to changes in the comparison group for the same time period.

Second, the focus of this evaluation is at the employer (organization) level. Group-level follow-up is available but could differ from individual employee-level analysis, especially to the extent that employee turnover from participating organizations is high and/or is related to employee health status. Of note, the average turnover rate was estimated by these employers at about 40 percent. This level of turnover may not be unusual, but it has the potential to impact employer interest in investing in employee health promotion measures. It would also interfere with our ability to conduct long-term follow-up of individuals to assess the extent to which their health benefited from interventions undertaken at these workplaces.

The external literature used to estimate future program benefits includes many different outcomes assessed in intervention studies with the same targets as the WoW program, making it challenging to summarize this literature for our purposes. A related consideration is that in tabulating the expected benefits from wellness activities documented in those studies, it is necessary to assume that each activity had an independent effect from any others carried out by the same employer. However, the WoW participating employers have committed to implementing activities on multiple levels. The literature demonstrates that multi-component programs are more effective, which was the rationale for this program decision. At the same time, the evidence of stronger benefits cannot easily be transferred to the specific combinations of activities carried out at WoW employers, as we cannot partition estimated effectiveness among the separate components in published studies. Thus, rather than trying to select exact numbers from individual studies to represent expected benefits, we bracketed the plausible range of benefits (see Table 14). This assumption (intentionally) errs on the side of being conservative, as it is not possible to incorporate the potentially interactive effect of multiple, simultaneous activities. Beyond the benefit that each individual activity alone can bring to employees, a combination of these wellness activities can also enhance their respective benefit and reflect on the overall health.

As noted above (see Results), the estimate financial savings resulting from the WoW program was also likely underestimated for two additional reasons. One is simply that the dollar value of cost reduction has not been inflation-adjusted from 2001 (Edington's data) to 2015 dollars. The other is that ideally we would have been able to predict expected savings from both "cost reduction" and "cost avoidance." However, most published intervention trials have not explicitly attempted to quantify these two phenomena separately. The available data

generally represent cost reduction, although it is possible that they include cost avoidance as well without explicit acknowledgement. A few studies have specifically described potential savings from cost avoidance, but these generally are based on pre- and post-comparisons within the intervention group alone [Burton, 2014; Edington, 2001; Musich, 2014]. It is known that some individuals transition from lower to higher risk levels over time, e.g., by gaining weight as they age. However, without an adequate comparison group, we cannot ascertain the true level of the cost avoidance (if any) resulting from the effectiveness of a wellness program to reduce this probability. If the PWTF WoW program could further investigate the potential savings from cost avoidance, this would provide a more complete picture of total cost savings and return on investment of the program, and might better address the legislature's mandate.

Lessons Learned

From the first phase of the PWTF WoW program included, we learned important lessons in several areas that are important to the continuation and future expansion of the WoW program, including program delivery, outreach, development of community partnerships and evaluation methods.

- Program delivery

Technical assistance, with respect to interventions as well as data collection for evaluation, is well received by the participating organizations, and thus important to the success of WoW programs. The infrastructure developed in the first phase of PWTF WoW programs should be maintained; strategies and approaches should be developed to sustain ongoing wellness policy/program training to Massachusetts employers for new participating organizations. Additional data-gathering to select the critical core elements of the WoW program is needed for effective policy/program implementation by employers.

The WoW training curriculum could be strengthened with information about primary prevention of workplace determinants of chronic disease and injuries—such a job stressors and ergonomics. Employers did not receive technical assistance in these areas. Availability of safe, stable, quality, well-compensated work is fundamentally health promoting and is not addressed by the WoW program. Addressing these topics in the WoW training would be a step toward aligning with national, Centers for Disease Control and Prevention (CDC) and National Institute for Occupational Safety and Health (NIOSH) concepts of Total Worker Health® programs (https://www.cdc.gov/niosh/twh/default.html) —programs that integrate health promotion with occupational health and safety.

- Program outreach

The participating employer organizations of the first waves were largely from government agencies and non-profit organizations. Future program design can consider the uniqueness of industries which are underrepresented in the current WoW. These industries might have a large proportion of low-wage employees, contract workers, or off-site staff. New strategies and approaches are needed to enroll organizations in these underrepresented industry sectors. The effort will help expand the reach and realize greater potential of the WoW

programs.

WoW employer workforce demographics show that organizations that enrolled trended toward pay scales that were above the low-wage level. This may be because employer motivation to focus on employee health and well-being may be contingent on a stable workforce for whom the employer is paying health care premiums. For instance, employers are not likely to be motivated to invest in long-term benefits for low-wage workers, who often have higher turnover rates. On the population level, this points to the need for new strategies for reaching workers on the lower end of the wage scale. The WoW program or the Department of Public Health could explore community-based models to reach low-wage workers through communities, or another outreach strategy tied to individual health insurance plans.

Employee counts are very unlikely to include contract workers. There is an increasing general trend toward outsourcing support services to temporary agency contracts – a growing source of employment for low-wage workers in several industries, e.g., cleaning, food service, laundry. These contract works are less likely to be invited to or eligible for wellness activities at their assigned worksites. Specific attention to recruiting their parent companies, i.e., temporary staffing agencies, and linking these contract workers with their assigned worksites is necessary to provide services to these workers. There is also an increasing trend that more employees work from home or off site. Dissemination of information and the wellness activity design could consider these new trends, either contract worker or people working from home, to improve outreach and engagement through easy-access tools.

- Community partnership

New strategies and approaches can be further developed to effectively reach underserved workers (e.g., people employed by smaller employers, temporary agencies, industries employing high numbers of low-wage workers, as well as those work offsite or at home). Integration of the WoW worksite, community/neighborhood-based interventions, and health care settings should be explored in the future waves of PWTF interventions, to maximize the impact of PWTF programs by covering all steps of work-life cycle.

Strategies and approaches should also be developed to ensure that the effects of work site interventions could be sustained beyond working environment. Knowledges and skills of healthy living and safe working learned from the programs can be translated into daily healthy living for the employees and their families, such that WoW programs are a critical component of the culture of health in communities at large.

- Program Evaluation

Continued evaluation and monitoring of enrolled WoW employer participants is needed to assess the health and business impacts of the program. A two year project period is not long enough to evaluate the results of new policies and programs that were implemented in Cohorts 1-4 organizations. The true effects will not be known without longer term follow-up study.

A time frame of 3-10 years is a realistic timeline for evaluating a primary prevention program. The reason is that there is a latency period for observable changes in health behaviors and health outcomes. People take time to adopt new behaviors, and sustain them. Disease risk

factors such as smoking, high blood pressure, overweight can act on physiology over time before markers or symptoms of disease can be discovered clinically. Short term (1-2 years) pre-post measurement of health outcomes may be long enough to detect changes in behavior for a portion of the population. However, longer term monitoring would be needed to capture changes in clinical indicators and diagnosed conditions over time.

The potential saving of medical care costs as a result of the WoW programs should be further explored. Results should inform health insurance plans. Supported by evidence, effectively maintenance of a healthy workforce should be rewarded with lower premium of health insurance.

In addition to the value of reducing medical care costs, maintaining a healthy workforce, and improved productivity, the societal value of the WoW could be further explored, such as its impact neighborhood/community health promotion, culture of health, and extended benefits to participating employees' families and communities.

Concluding Remarks

The Working on Wellness program has succeeded in reaching and recruiting hundreds of employers who previously offered no formal wellness program and, in general, had few policy or environmental supports at baseline to encourage employee physical activity, nutrition, or tobacco-free lifestyle, or to support work/life balance or other stress reduction measures.

In particular, this program has reached a large number of small and moderate-size employer organizations, and a substantial number of low-wage, non-college-educated, and racial/ethnic minority workers. A substantial proportion of these employees had moderate to high health risks, especially being overweight or obese and not consuming the recommended amount of fresh produce per day.

Participating employers received specific feedback about the priorities indicated collectively by their workers, as well as information about timing and other logistical features that would make program activities more accessible. Employers' baseline program goals were predominantly to increase physical activity, reduce stress, and improve nutrition; these were generally consistent with the health goals stated by their employees. Further, employees expressed a great interest in obtaining such services and supports, and overall they were individually ready to make positive changes in their health behaviors.

Most employers complied with program instructions to implement changes in organizational policy and the work environment to support healthier behaviors by employees. This is an important strength of the WoW program design, and it is very much to the credit of the program delivery personnel that they were able to provide technical information and support sufficient to achieve this.

The program delivery elements were revised after Cohort 1 was enrolled; these changes appear to have facilitated a substantial increase in the number of participating employers. The program education and technical support provided were of high quality and were enthusiastically endorsed by participating employers. Despite seed funding, which was greatly

welcomed by the participating organizations, staffing resources to implement in-house programs remain a challenge for small employers.

The effectiveness of the interventions is yet to be fully evaluated, as the follow-up employee survey data are still being collected and the APCD data are not available yet. Substantial health benefits and healthcare cost savings are anticipated over a longer period of time, as the program progresses. However, it is evident already that the program has helped increase the supports for employers and from them to their employees. Clearly it has high relevance for the needs of the Commonwealth's citizens.

Overall, the Working on Wellness program was very well received by the participating organizations. A majority reported positive experiences and nearly all of Wellness Champions reported that employees were participating in wellness policies and programs. The vast majority of the Champions thought it very likely that their wellness activities would continue after the end of formal WoW program support. The Working on Wellness program serves as a catalyst for a substantial number of organizations to change both employees' and employers' perspectives on the importance of worksite wellness and health promotion and how to conduct an effective program.

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