

# PREVENTING CHRONIC DISEASE

PUBLIC HEALTH RESEARCH, PRACTICE, AND POLICY



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STATE AND LOCAL PUBLIC HEALTH  
ACTIONS TO PREVENT AND  
CONTROL CHRONIC DISEASES

# ABOUT THE JOURNAL

*Preventing Chronic Disease* (PCD) is a peer-reviewed public health journal sponsored by the Centers for Disease Control and Prevention and authored by experts worldwide. PCD was established in 2004 by the National Center for Chronic Disease Prevention and Health Promotion with a mission to promote dialogue among researchers, practitioners, and policy makers worldwide on the integration and application of research findings and practical experience to improve population health.

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# TABLE OF CONTENTS

## State and Local Public Health Actions to Prevent and Control Chronic Diseases

- 1. Coordinated Approaches to Strengthen State and Local Public Health Actions to Prevent Obesity, Diabetes, and Heart Disease and Stroke**  
Gia E. Rutledge, MPH; Kimberly Lane, PhD, RDN; Caitlin Merlo, MPH, RDN; Joanna Elmi, MPH
- 2. State Public Health Actions to Prevent and Control Diabetes, Heart Disease, Obesity and Associated Risk Factors, and Promote School Health**  
Barbara Z. Park, RDH, MPH; Letitia Cantrell, PhD; Holly Hunt, MA; Rosanne P. Farris, PhD; Patricia Schumacher, MS, RD; Ursula E. Bauer, PhD
- 3. Evaluating Cross-Cutting Approaches to Chronic Disease Prevention and Management: Developing a Comprehensive Evaluation**  
Marla Vaughan, MPH; Jan Jernigan, PhD; Seraphine Pitt Barnes, PhD, MPH, CHES; Pat Shea, MPH, MA; Rachel Davis, MPH; Stephanie Rutledge, PhD, MA
- 4. Using Health Information Technology and Data to Improve Chronic Disease Outcomes in Federally Qualified Health Centers in Maryland**  
Erica A. Smith, MS; Judy Lapinski, PharmD; Judy Lichty-Hess, MPH; Kristi Pier, MHS
- 5. Pharmacist-Driven Strategies for Hypertension Management in Los Angeles: A Community and Stakeholder Needs Assessment, 2014–2015**  
Noel C. Barragan, MPH; Amelia R. DeFosset, MPH; Jennifer Torres, MSSW, MPH, PhD; Tony Kuo, MD, MSHS
- 6. A Framework for Implementing the National Diabetes Prevention Program in Los Angeles County**  
Jennifer T. Mosst, PhD, MSSW, PScPH; Amelia R. DeFosset, MPH; Lauren Gase, PhD, MPH; Laura Baetscher, MPH, MA; Tony Kuo, MD, MSHS
- 7. Using a Community Workshop Model to Initiate Policy, Systems, and Environmental Change That Support Active Living in Indiana, 2014–2015**  
Peter J. Fritz; Kim Irwin, MPH; Lindsey Bouza, MPH
- 8. A Project to Promote Adherence to Blood Pressure Medication Among People Who Use Community Pharmacies in Rural Montana, 2014–2016**  
Carrie S. Oser, MPH; Crystelle C. Fogle, MBA, MS, RD; James A. Bennett, RPh, CDM, CDE
- 9. Implementation of Best Practices in Obesity Prevention in Child Care Facilities: The Arizona Empower Program, 2013–2015**  
Jillian Papa, MPH; Joan Agostinelli, MA; Gertrudes Rodriguez, MBA, RD; Deborah Robinson, MPH, RD
- 10. Implementing Key Drivers for Diabetes Self-Management Education and Support Programs: Early Outcomes, Activities, Facilitators, and Barriers**  
Jennifer Murphy Morgan, MSPH; Yvonne Mensa-Wilmot, PhD, MPH; Shelly-Ann Bowen, PhD, MS; Monica Murphy, MPH; Timethia Bonner, DPM, PhD; Stephanie Rutledge, PhD, MA; Gia Rutledge, MPH
- 11. Early Results of States' Efforts to Support, Scale, and Sustain the National Diabetes Prevention Program**  
Yvonne Mensa-Wilmot, PhD, MPH; Shelly-Ann Bowen, PhD, MS; Stephanie Rutledge, PhD, MA; Jennifer Murphy Morgan, MSPH; Timethia Bonner, DPM, PhD; Kimberly Farris, PhD, MPH, MSW; Rachel Blacher, MPH; Gia Rutledge, MPH
- 12. Supporting Obesity Prevention in Statewide Quality Rating and Improvement Systems: A Review of State Standards**  
Nora Ann Geary, MPH, MSW; Carrie Ann Dooyema, MSN, MPH, RN; Meredith Ann Reynolds, PhD
- 13. Early Outcomes of State Public Health Actions' School Nutrition Strategies**  
Seraphine Pitt Barnes, PhD, MPH, CHES; Syreeta Skelton-Wilson, MPA; Adina Cooper, MA, MEd; Caitlin Merlo, MPH, RD; Sarah Lee, PhD

ESSAY

## Coordinated Approaches to Strengthen State and Local Public Health Actions to Prevent Obesity, Diabetes, and Heart Disease and Stroke

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Chronic diseases, including heart disease, stroke, cancer, diabetes, and obesity, are the leading causes of death in the United States and account for most of the nation's health care costs (1). Heart disease is the leading cause of death among men and women in the United States, accounting for 1 of every 4 deaths (1). Approximately 140,000 Americans die each year from stroke, and it is a leading cause of long-term disability (2,3). It is estimated that more than 9% of the US population has diabetes, which is the leading cause of kidney failure, lower-limb amputations other than those caused by injury, and new cases of blindness among adults (4). Additionally, more than one-third of US adults have obesity, which is associated with several chronic conditions (5,6).

Chronic diseases are common and costly, but many are preventable. Although it is important to address the underlying risk factors for chronic diseases at the individual level, it is also critical to implement population-based interventions, including health-promoting policies and environments that affect where we work, live, play, and receive health care. This requires a multifaceted approach and the collective efforts of federal, state, local, private, and community-based organizations along with national partners.

The Centers for Disease Control and Prevention's (CDC's) mission is to prevent or control all diseases that affect Americans (7). CDC puts science into action by tracking diseases and determining their causes and by identifying the most effective ways to pre-

vent and control them (7). This work entails tackling the major health problems that cause death and disability for Americans and promoting healthy and safe behaviors, communities, and environments (7).

The mission of CDC's National Center for Chronic Disease Prevention and Health Promotion (NCCDPHP) is to "help people and communities prevent chronic diseases and promote health and wellness for all" (8). NCCDPHP supports disease control efforts through 5-year term funding mechanisms called cooperative agreements that are awarded to state and local public health agencies to strengthen partnerships to improve health at the community level (9). In 2013, NCCDPHP developed the State Public Health Actions to Prevent Obesity, Diabetes, and Heart Disease and Stroke (State Public Health Actions [SPHA]-1305), a cooperative agreement that combined the efforts of 4 CDC divisions: the Division for Heart Disease and Stroke Prevention (DHDSP); the Division of Diabetes Translation (DDT); the Division of Nutrition, Physical Activity, and Obesity (DNPAO); and the Division of Population Health's School Health Branch (SHB). The agreement funded 50 state health departments and the District of Columbia to implement strategies in health systems and communities to prevent chronic disease and reduce complications associated with them (10). State Public Health Actions provides examples of how mutually reinforcing strategies are implemented. Two tiers of strategies were recommended, basic and enhanced (Box 1).



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**Box 1. Strategies of State Public Health Actions to Prevent and Control Diabetes, Heart Disease, Obesity, and Associated Risk Factors and Promote School Health (SPHA-1305)**

<b>BASIC STRATEGIES</b>
Promote the adoption of food service guidelines/nutrition standards, which include sodium
Promote the adoption of physical education/physical activity in schools
Promote adoption of physical activity in early care and education and worksites
Promote reporting of blood pressure and hemoglobin A1c measures; and as able, initiate activities that promote clinical innovations, team-based care, and self-monitoring of blood pressure
Promote awareness of high blood pressure among patients
Promote awareness of prediabetes among people at high risk for type 2 diabetes
Promote participation in diabetes self-management education programs
<b>ENHANCED STRATEGIES</b>
<b>Environmental approaches to promote health and support and reinforce healthful behaviors</b>
Access to healthy food and beverages
Food service guidelines/nutrition standards where foods and beverages are available. Guidelines and standards should address sodium
Supportive nutrition environments in schools
Physical activity access and outreach
Physical activity in early childhood education
Quality physical education and physical activity in kindergarten through 12th grade in schools
Access to breastfeeding-friendly environments
<b>Health system interventions to improve the effective delivery and use of clinical and other preventive services</b>
Quality improvement processes in health systems
Use of team-based care in health systems
<b>Community-clinical linkages to support cardiovascular disease and diabetes prevention and control efforts</b>
Use of diabetes self-management education programs in community settings
Use of CDC-recognized lifestyle intervention programs in community settings for the primary prevention of type 2 diabetes
Use of health-care extenders in the community in support of self-management of high blood pressure and diabetes
Use of chronic disease self-management programs in community settings
Placement of policies, processes, and protocols in schools to meet the management care needs of students with chronic conditions

Each of the 4 divisions focuses on a specific area of chronic disease. DHDSP provides public health leadership to improve cardiovascular health for all Americans and to reduce the burden and

end disparities related to heart disease and stroke ([www.cdc.gov/dhdsp/index.htm](http://www.cdc.gov/dhdsp/index.htm)). DDT supports programs and activities to prevent or delay the onset of type 2 diabetes and to improve health outcomes for people diagnosed with diabetes ([www.cdc.gov/diabetes/home/index.html](http://www.cdc.gov/diabetes/home/index.html)). DNPAO focuses on decreasing obesity in the United States by encouraging regular physical activity and good nutrition at every stage of life. DNPAO supports healthy eating, active living, and obesity prevention by creating healthy child care centers, hospitals, schools, and worksites; building the capacity of state health departments and national organizations; and conducting research, surveillance, and evaluation studies ([www.cdc.gov/nccdphp/dnpao/index.html](http://www.cdc.gov/nccdphp/dnpao/index.html)). SHB's aims are to improve the well-being of youth through healthy eating, physical education, and physical activity; to reduce risk factors associated with childhood obesity; and to manage chronic health conditions in schools ([www.cdc.gov/healthyschools/stateprograms.htm](http://www.cdc.gov/healthyschools/stateprograms.htm)).

The primary purpose of SPHA-1305 is to support state-level and statewide implementation of cross-cutting, evidence-based strategies to promote health and prevent and control chronic diseases and their risk factors (11). SPHA-1305 uses a collective approach to 1) improve environments in worksites, schools, early childhood education services, state and local government agencies, and community settings to promote healthy behaviors and expand access to healthy choices for people of all ages related to diabetes, cardiovascular health, physical activity, healthy foods and beverages, obesity, and breastfeeding; 2) improve the delivery and use of quality clinical and other health services aimed at preventing and managing high blood pressure and diabetes; and 3) increase links between community and clinical organizations to support prevention, self-management, and control of diabetes, high blood pressure, and obesity (10). The ultimate goal of SPHA-1305 is to make healthy living easier for all Americans. The following are primary outcomes of SPHA-1305:

- Increased consumption of a healthy diet
- Increased physical activity across the life span
- Improved medication adherence for adults with high blood pressure or diabetes
- Increased self-monitoring of high blood pressure tied to clinical support
- Increased access to and participation in diabetes self-management programs and type 2 diabetes prevention programs
- Increased breastfeeding

In 2014, CDC developed a second cooperative agreement, State and Local Public Health Actions to Prevent Obesity, Diabetes, and Heart Disease and Stroke (SLPHA-1422), a program designed for states and large cities to implement strategies to control and prevent chronic disease through a dual approach — targeting both the

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overall population and priority populations (groups of people who are at high risk of chronic disease, are experiencing a disproportionate incidence of chronic diseases and conditions, or are experiencing racial/ethnic or socioeconomic disparities). This competitive cooperative agreement combined the efforts of 3 NCCDPHP divisions (DDT, DNPAO, and DHDSP), and was awarded to 17 states and 4 large cities to implement additional evidence-based strategies to expand the reach and impact of SPHA-1305 with the aim of reducing health disparities and improving health equity among adults. SLPHA-1422 supports interventions to prevent obesity, type 2 diabetes, heart disease, and stroke (through control of high blood pressure) and to reduce health disparities in the prevalence of these among adults in the population overall and in priority populations (12). SLPHA-1422 awardees used the dual approach and mutually reinforcing strategies to maximize the impact of strategies implemented in SPHA-1305 by working with partners and funding subawardees at the local level. By applying the dual approach, states and large cities implemented strategies to improve the health of the whole population and of priority populations (12). The strategies are described as mutually reinforcing because they are implemented simultaneously and synergistically to address multiple risk factors and chronic diseases (12).

Three tiers of strategies make up SLPHA-1422, environmental strategies, health system strategies, and community–clinical linkage strategies. The purpose of SPHA-1422 environmental strategies is to “support environmental and system approaches to promote health, support and reinforce healthful behaviors, and build support for lifestyle improvements for the general population and particularly for those with uncontrolled high blood pressure and those at high risk for developing type 2 diabetes” (12). The purpose of community–clinical linkage strategies is to “support health system interventions and community–clinical linkages that focus on the general population and priority populations” (Box 2) (12). Environmental strategies were implemented in the same communities and jurisdictions as health system strategies and community–clinical linkage strategies, with local improvements supported by statewide efforts funded by this cooperative agreement as well as those supported by SPHA-1305. The following are primary outcomes of SLPHA-1422:

- Increased consumption of nutritious food and beverages and increased physical activity
- Increased engagement in lifestyle change to prevent type 2 diabetes
- Improved medication adherence for adults with high blood pressure

- Increased self-monitoring of high blood pressure tied to clinical support
- Increased referrals to and enrollment in CDC-recognized lifestyle change programs to prevent type 2 diabetes

**Box 2. State and Local Public Health Actions to Prevent Obesity, Diabetes, and Heart Disease and Stroke (SLPHA-1422) Strategies**

**COMPONENT 1**

**Environmental strategies to promote health and support and reinforce healthful behaviors**

Implement food and beverage guidelines including sodium standards (ie, food service guidelines for cafeterias and vending machines) in public institutions, worksites, and other key locations, such as hospitals

Strengthen access to and sales of healthy foods (eg, fruit and vegetables, more low/no sodium options) in retail venues (eg, grocery stores, supermarkets, chain restaurants, markets) and community venues (eg, food banks) through increased availability and improved pricing, placement, and promotion

Strengthen community promotion of physical activity through signage, worksite policies, social support, and joint-use agreements

Develop and/or implement transportation and community plans that promote walking

**Strategies to build support for lifestyle change, particularly for those at high risk, to support diabetes, heart disease, and stroke prevention efforts**

Plan and execute strategic data-driven actions through a network of partners and local organizations to build support for lifestyle change. Implement evidence-based engagement strategies (eg, tailored communications, incentives) to build support for lifestyle change

Increase coverage for evidence-based supports for lifestyle change by working with network partners

**COMPONENT 2**

**Health system interventions to improve the quality of health care delivery to populations with the highest hypertension and prediabetes disparities**

Increase the adoption of electronic health records and the use of health information technology to improve performance (eg, implement advanced Meaningful Use data strategies to identify patient populations who experience cardiovascular disease–related disparities)

Increase the institutionalization and monitoring of aggregated/standardized quality measures at the provider level (eg, use dashboard measures to monitor health care disparities, implement activities to eliminate health care disparities)

Increase engagement of nonphysician team members (ie, nurses, pharmacists, dietitians, physical therapists and patient navigators/community health workers) in hypertension management in community health care systems

Increase use of self-measured blood pressure monitoring tied with clinical support

Implement systems to facilitate identification of patients with undiagnosed hypertension and people with prediabetes

**Community–clinical linkage strategies to support heart disease, stroke, and type 2 diabetes prevention efforts**

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Increase engagement of community health workers to promote linkages between health systems and community resources for adults with high blood pressure and adults with prediabetes or at high risk for type 2 diabetes

Increase engagement of community pharmacists in the provision of medication self-management for adults with high blood pressure

Implement systems to facilitate bi-directional referral between community resources and health systems, including lifestyle change programs (eg, electronic health records, 800 numbers, 211 referral systems)

This special collection of articles in *Preventing Chronic Disease* describes how SPHA-1305 and SLPHA-1422 use a coordinated approach to chronic disease prevention and control. The collection describes an evaluation approach that was designed for state and local health departments with differing levels of evaluation capacity and highlights early outcomes at the national, state, and local levels. This special collection contains 12 articles: 4 by state health departments, 2 by one large city, and 6 authored by CDC staff members. Articles highlight a range of SPHA-1305 and SLPHA-1422 strategies. An article by Park et al describes in detail the foundations for SPHA-1305, the strategies recommended by each NCCDPHP division, the administrative and management structure, and the model for providing cross-division program and evaluation technical assistance (13). Given this complex approach to implementing a national chronic disease prevention initiative, it was imperative that the evaluation design use a robust, multi-tiered approach to accountability and learning. This comprehensive evaluation approach is described by Vaughan et al (14).

Smith et al summarize Maryland's approach to improving implementation of quality improvement processes in Federally Qualified Health Centers through the use of health information technology and standardized reporting of clinical quality measures (15). Other states interested in learning how to harness the potential of electronic health records and how to use population health data to drive improvements in quality of care will appreciate this step-by-step explanation of how to gain the buy-in of health centers and how to build the operational structure of a data warehouse. The article also discusses challenges encountered in the process and plans for scaling up these efforts.

Oser et al describe how the Montana Department of Public Health and Human Services used SPHA-1305 funding to conduct an evaluation of a 3-year intervention among 25 community pharmacies in rural areas to improve adherence to blood pressure medication (16). In addition to patient-level data, Montana also implemented a statewide survey of pharmacists and identified barriers perceived from the pharmacy point of view. Results indicate that the intervention was successful with promising improvements in patient medication adherence.

Barragan et al focus on pharmacy-led strategies that the Los Angeles County Department of Public Health implemented with SLPHA-1422 funding (17). Authors report results from a community and stakeholder needs assessment for pharmacist services for management of hypertension medication therapy. The needs assessment included 3 components: 1) a policy context scan, 2) a survey of participants in a pharmacy leadership symposium, and 3) an internet public opinion survey of a final sample of more than 1,000 English- and Spanish-speaking Los Angeles County residents. A synthesis of results from these 3 assessments produced a list of needs and assets for scaling up and spreading pharmacy-led patient care services in Los Angeles County.

Mosst et al describe a practice-grounded framework used by the Los Angeles County Health Department to scale and sustain the National Diabetes Prevention Program (National DPP) by using a diverse partner network (18). By developing a 3-pronged framework (expanding outreach and education, improving health care referral systems and protocols, and increasing access to insurance coverage for the National DPP), Los Angeles County took an approach that other large jurisdictions can use to identify people with prediabetes and expand access to and use of CDC-recognized type 2 diabetes prevention programs.

Mensa-Wilmot et al use a mixed-method evaluation approach to describe preliminary findings of a collaborative effort between CDC and state health departments designed to scale and sustain the National DPP (19). Grantees reported reimbursement availability, practice and provider referral policies, and having standard curricula as facilitators to implementing the National DPP lifestyle change program. Understanding activities implemented by grantees and the barriers and facilitators they identify is critical for developing relevant and timely technical assistance and for understanding the impact of the program.

Morgan et al describe activities state health departments implemented to increase referrals to, coverage for, and availability of diabetes self-management education and support (DSMES) programs (20). By year 3 of SPHA-1305, more than 3,000 DSME programs had been established in 41 states. State health departments contributed to these increases by assisting organizations in establishing new DSME programs, providing technical assistance to providers, convening stakeholders to address gaps in DSME insurance coverage, and using marketing strategies to educate patients about the importance of DSME. Conducting early assessments of the activities implemented by state health departments and analyzing progress in performance measures associated with them provides early outcome results that can be used to develop technical assistance to help grantees identify where more focus is needed to further improve results by the end of the 5-year cooperative agreement.

An article by Fritz et al examines the SPHA-1305 strategy of increasing physical activity through community design (21). In this community case study, the authors describe how the Indiana State Department of Health used a workshop model to support communities with implementation of active-living opportunities in their communities to improve or increase access to physical activity. The authors report that providing a workshop model with follow-up support to the community resulted in policy adoption, the creation of new advisory committees, and new local funding allocations for active-living projects. These findings may inform efforts of other state health agencies as they collaborate with communities to improve physical access.

Geary et al describe the extent to which 38 states' Quality Rating and Improvement Systems (QRIS) include obesity prevention content (22). States can use QRIS to set standards that define high-quality care and to award child care programs with a quality rating designation based on how well they meet these standards (eg, a star rating). The authors reviewed each state's QRIS standards and compared them with the 47 "high impact" obesity prevention standards contained in *Caring for Our Children: National Health and Safety Performance Standards; Guidelines for Early Care and Education Programs, 3rd Ed (Caring for Our Children)* (23). The authors found that of 38 states with publically available standards, 20 included at least one standard with obesity prevention content; however, most had fewer than 5, suggesting room for states to embed additional obesity prevention standards into QRIS.

The article by Papa et al examines 5 of the child care standards of the Arizona Department of Health Services related to obesity prevention that are part of the Arizona Empower Program, a program that promotes healthy environments for children in Arizona's licensed child care facilities (24). The authors examined 2 years of statewide data, tracked progress in implementing these 5 Empower standards, and identified areas in which facilities needed additional support to fully implement the standards. The results indicate that 1 in 5 facilities fully implemented all 5 standards, with the staff training standard having the highest level of implementation across facilities (77%) and the breastfeeding standard having the lowest implementation (44%). These findings can inform training and technical assistance efforts to further support the implementation of these standards in Arizona's licensed child care facilities.

An article by Pitt Barnes et al examines performance measures and reported evaluation data from all 51 awardees to assess progress in improving the school nutrition environment and services over the first 4 years of the program (24). Findings indicated that, compared with year 2, by year 4 awardees made significant progress, especially related to providing professional development on strategies to improve the school nutrition environment, adopting

and implementing policies to establish standards (including standards for sodium) for all competitive foods available during the school day, not selling unhealthy foods and beverages during the school day, placing fruits and vegetables near the cafeteria cashier where they are easy to access, and providing information to students or families on the nutrition, calorie, and sodium content of foods available. However, the data also show that only 33.5% of local education agencies adopted and implemented policies that prohibit all forms of advertising and promotion of unhealthy foods and beverages. Because the federal requirement for local school wellness policies now includes addressing the marketing of unhealthy foods, additional training, technical assistance, and guidance is likely needed to help districts adopt marketing policies.

This special collection describes overarching approaches and examples of interventions implemented by state and local health departments to prevent and manage obesity, diabetes, heart disease, and stroke. Readers should note that these articles represent early evaluation results of both SPHA-1305 and SLPHA-1422 and demonstrate promise that the implemented strategies are reaching populations in need and are beginning to have a population-wide impact. As of 2016, the 2 national programs are in the final year of funding. With ongoing analysis of performance-measure data, the impact of these programs will continue to be examined and reported.

Collectively, the work of SPHA-1305 and SLPHA-1422 demonstrates the barriers and facilitators that affect state and local program development, implementation, and evaluation of chronic disease prevention initiatives and describes a coordinated approach to implementing programs. This information will inform other state and local programs and further the potential reach of these approaches. The findings presented in this special collection contribute practice-based knowledge to the field of chronic disease prevention and management, evidence of combining different disease-specific funding streams to achieve early outcomes with greater efficiency, and lessons learned for future coordinated national chronic disease programs.

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## References

- Centers for Disease Control and Prevention, National Center for Health Statistics. CDC WONDER online database. Underlying cause of death, multiple cause of death, 1999–2013. Atlanta (GA): Centers for Disease Control and Prevention. <https://wonder.cdc.gov/mcd.html>. Accessed November 22, 2017.
- Yang Q, Tong X, Schieb L, Vaughan A, Gillespie C, Wiltz JL, et al. Vital signs: recent trends in stroke death rates — United States, 2000–2015. *MMWR Morb Mortal Wkly Rep* 2017; 66(35):933–9.
- Benjamin EJ, Blaha MJ, Chiuve SE, Cushman M, Das SR, Deo R, et al.; American Heart Association Statistics Committee and Stroke Statistics Subcommittee. Heart disease and stroke statistics — 2017 update: a report from the American Heart Association. *Circulation* 2017;135(10):e146–603. Errata in *Circulation* 2017; 135(10):e646 and *Circulation* 2017; 136(10):e196.PubMed
- Centers for Disease Control and Prevention. National Diabetes Statistic Report, 2017. <https://www.cdc.gov/diabetes/pdfs/data/statistics/national-diabetes-statistics-report.pdf>. Accessed November 22, 2017.
- Ogden CL, Carroll MD, Fryar CD, Flegal KM. Prevalence of obesity among adults and youth: United States, 2011–2014. *NCHS data brief*, no 219. <https://www.cdc.gov/nchs/data/databriefs/db219.pdf>. Accessed November 22, 2017.
- National Institutes of Health. Clinical guidelines on the identification, evaluation, and treatment of overweight and obesity in adults: the evidence report. NIH Publication no. 98-4083; September 1998. [https://www.nhlbi.nih.gov/files/docs/guidelines/obesity\\_guidelines\\_archive.pdf](https://www.nhlbi.nih.gov/files/docs/guidelines/obesity_guidelines_archive.pdf). Accessed November 22, 2017.
- Centers for Disease Control and Prevention. Mission, Role, and Pledge Web site. <https://www.cdc.gov/about/organization/mission.htm>. Accessed November 22, 2017.
- Centers for Disease Control and Prevention. About the Center website. <https://www.cdc.gov/chronicdisease/about/index.htm>. Accessed November 22, 2017.
- Federal Grant and Cooperative Agreement Act. Pub. L. No. 95–224. 92 Stat. 3 (February 3, 1978).
- Centers for Disease Control and Prevention. State public health actions to prevent and control diabetes, heart disease, obesity and associated risk factors and promote school health (DP13-1305). <https://www.cdc.gov/chronicdisease/about/state-public-health-actions.htm>. Accessed November 22, 2017.
- US Department of Health and Human Services, Centers for Disease Control and Prevention. Placeholder for 1305 FOA. <https://www.grants.gov/web/grants/search-grants.html?keywords=CDC-RFA-DP13-1305>. Accessed November 22, 2017.
- US Department of Health and Human Services, Centers for Disease Control and Prevention. CDC-RFA-DP14-1422PPHF14 PPHF 2014: Heart disease & stroke prevention program and diabetes prevention. <https://www.grants.gov/view-opportunity.html?oppId=255893>. Accessed November 22, 2017.
- Park BZ, Cantrell L, Hunt H, Farris RP, Schumacher P, Bauer UE. State Public Health Actions to Prevent and Control Diabetes, Heart Disease, Obesity and Associated Risk Factors, and Promote School Health. *Prev Chronic Dis* 2017;14:E127.
- Vaughan M, Davis R, Pitt Barnes S, Jernigan J, Shea P, Rutledge S. Evaluating cross-cutting approaches to chronic disease prevention and management: developing a comprehensive evaluation. *Prev Chronic Dis* 2017;14:E131.
- Smith EA, Lapinski J, Lichty-Hess J, Pier K. Using health information technology and data to improve chronic disease outcomes in Federally Qualified Health Centers in Maryland. *Prev Chronic Dis* 2016;13:E178.
- Oser CS, Fogle CC, Bennett JA. A project to promote adherence to blood pressure medication among people who use community pharmacies in rural Montana, 2014–2016. *Prev Chronic Dis* 2017;14:E52.
- Barragan NC, DeFosset AR, Torres J, Kuo T. Pharmacist-driven strategies for hypertension management in los angeles: a community and stakeholder needs assessment, 2014–2015. *Prev Chronic Dis* 2017;14:E54.

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18. Mosst JT, DeFosset A, Gase L, Baetscher L, Kuo T. A framework for implementing the National Diabetes Prevention Program in Los Angeles County. *Prev Chronic Dis* 2017;14:E69.
19. Mensa-Wilmot Y, Bowen SA, Rutledge S, Morgan JM, Bonner T, Farris K, et al. Early results of states' efforts to support, scale, and sustain the National Diabetes Prevention Program. *Prev Chronic Dis* 2017;14:E130.
20. Morgan JM, Mensa-Wilmot Y, Bowen SA, Murphy M, Bonner T, Rutledge S, et al. Implementing key drivers for diabetes self-management education and support programs: early outcomes, activities, facilitators, and barriers. *Prev Chronic Dis* 2018;15:E15.
21. Fritz PJ, Irwin K, Bouza L. Using a community workshop model to initiate policy, systems, and environmental change that support active living in Indiana, 2014–2015. *Prev Chronic Dis* 2017;14:E74.
22. Geary NA, Dooyema CA, Reynolds MA. Supporting obesity prevention in statewide quality rating and improvement systems: a review of state standards. *Prev Chronic Dis* 2017;14:E129. <https://doi.org/10.5888/pcd14.160518>
23. American Academy of Pediatrics, American Public Health Association, National Resource Center for Health and Safety in Child Care and Early Education. *Caring for our children: national health and safety performance standards; guidelines for early care and education programs*. 3rd edition. Elk Grove Village (IL): American Academy of Pediatrics; Washington (DC): American Public Health Association; 2011.
24. Papa J, Agostinelli J, Rodriguez G, Robinson D. Implementation of best practices in obesity prevention in child care facilities: the Arizona Empower Program, 2013-2015. *Prev Chronic Dis* 2017;14:E75.
25. Pitt Barnes S, Skelton-Wilson S, Cooper A, Merlo C, Lee S. Early outcomes of State Public Health Actions' school nutrition strategies. *Prev Chronic Dis* 2017;14:E128.

SPECIAL TOPIC

# State Public Health Actions to Prevent and Control Diabetes, Heart Disease, Obesity and Associated Risk Factors, and Promote School Health

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## Abstract

The National Center for Chronic Disease Prevention and Health Promotion at the Centers for Disease Control and Prevention funds a program to boost progress in reducing the prevalence and incidence of multiple chronic diseases and their associated risk factors. This article describes the program, State Public Health Actions to Prevent and Control Diabetes, Heart Disease, Obesity and Associated Risk Factors, and Promote School Health, and the program's action model, design, and administration and management structure. This program is based on 4 domains of public health action: 1) epidemiology and surveillance, 2) environmental approaches, 3) health care system interventions, and 4) community programs linked to clinical services. The 4 domains of public health action leverage data to inform action, support healthy choices and behaviors, strengthen delivery of clinical preventive services, and help Americans better manage their health.

## Introduction

Chronic diseases, including heart disease, cancer, stroke, diabetes, and related risk factors, are among the leading causes of death and disability in the United States. In 2010, 7 of the top 10 causes of

death were chronic diseases, which account for 86% of US health care costs (1). Furthermore, half of all adults have one or more chronic health conditions, and one-fourth of adults have 2 or more (2).

For 25 years, the National Center for Chronic Disease Prevention and Health Promotion (NCCDPHP) of the Centers for Disease Control and Prevention (CDC) has provided scientific leadership and technical expertise to state health and education departments to assist them in developing, implementing, and sustaining chronic disease prevention and health promotion programs. To facilitate greater progress in reducing the prevalence and incidence of multiple chronic diseases and their associated risk factors, NCCDPHP began funding programs to implement coordinated activities aligned with the 4 domains of public health action: 1) epidemiology and surveillance, 2) environmental approaches, 3) health care system interventions, and 4) community programs linked to clinical services. Together, the 4 domains provide a framework for addressing chronic conditions (eg, diabetes, hypertension) and their risk factors (eg, obesity) across multiple settings and sectors, and they allow CDC to support complementary strategies to prevent and manage the underlying risk factors for chronic diseases and to assist health care providers and individuals in self-managing multiple chronic conditions. By investing resources to implement key evidence-based strategies, NCCDPHP has sought to address multiple risk factors, conditions, and diseases simultaneously; improve program efficiency; increase program impact; and, ultimately, improve the health of communities.

To guide implementation of this new approach, the staff members of NCCDPHP programs reviewed evidence-based approaches and funding priorities across several chronic disease programs, developed a logic model of strategies and activities, and solicited partner feedback. This approach resulted in the creation of the program, State Public Health Actions to Prevent and Control Dia-



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betes, Heart Disease, Obesity and Associated Risk Factors, and Promote School Health (State Public Health Actions), for state health departments.

Partnering with state health departments began in July 2013, and by June 2018, NCCDPHP will have partnered with 50 state health departments and the District of Columbia to address chronic diseases and other risk factors through the 4 domains. This approach leverages data to inform action, supports healthy choices and behaviors, strengthens delivery of clinical preventive services, and helps Americans better manage their health (3). The 4 domains provide focus for State Public Health Actions to address chronic disease at the individual level by promoting health care interventions and at the population level by developing policies and creating environments that promote health. We anticipate that this coordinated approach will lead to the following outcomes:

- Increased consumption of a healthy diet.
- Increased physical activity across the life span.
- Improved medication adherence for adults with high blood pressure or diabetes.
- Increased self-monitoring of high blood pressure tied to clinical support.
- Increased access to and participation in diabetes self-management programs and type 2 diabetes prevention programs.
- Increased breastfeeding.

If successful, this approach also could lead to long-term improvement in the prevention and control of hypertension, diabetes, and obesity (Figure 1).



**Figure 1.** Overview of the State Public Health Actions to Prevent and Control Diabetes, Heart Disease, Obesity and Associated Risk Factors, and Promote School Health program (State Public Health Actions) for state health departments and the 4 domains of chronic disease prevention. The 4 domains provide focus for State Public Health Actions to address chronic disease at the individual level by promoting health care interventions and at the population level by developing policies and creating environments that promote health.

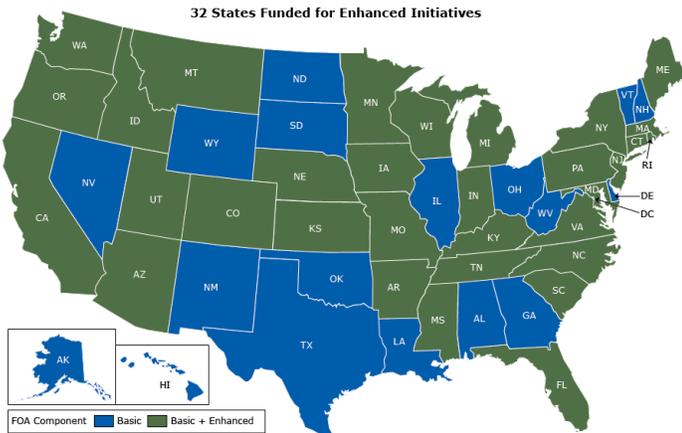
## Funding for State Public Health Actions

Four divisions within NCCDPHP are collaborating through a 5-year cooperative agreement to support State Public Health Actions: Diabetes Translation (<http://cdc.gov/diabetes/>); Heart Disease and Stroke Prevention (<http://www.cdc.gov/dhds/>); Nutrition, Physical Activity, and Obesity (<http://www.cdc.gov/nccdphp/dnpao/index.html>); and School Health (<http://www.cdc.gov/healthyschools/>) (5). The work being conducted through this cooperative agreement has basic and enhanced components. Funding for the basic component was awarded to all 50 states and the District of Columbia noncompetitively to support core public health functions such as the basic assessment strategies carried out under Domain 1 (epidemiology and surveillance). In 2013, CDC awarded approximately \$28 million to support the basic component.

Also in 2013, CDC awarded approximately \$39.5 million competitively to 32 states to support enhanced strategies across Domains 2, 3, and 4 (Figure 2). The purpose of the enhanced component was to build on activities supported by basic component funding to achieve greater results. In 2014, an additional \$11.9 million was awarded to the 18 states and the District of Columbia that had not received enhanced funding in 2013 to allow them to expand their efforts in diabetes, heart disease, and stroke prevention, detection, and control. The additional funding for each of these 19 grantees

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ranged from \$336,789 to \$885,199 and included state-specific adjustments for population size and poverty levels. Funding in fiscal year 2014 for the basic and enhanced components totaled approximately \$79.5 million.



**Figure 2.** A map illustrating the level of award states received for the State Public Health Actions cooperative agreement.

In 2013, CDC awarded approximately \$28 million to support the basic component and \$39.5 million competitively to 32 states to support enhanced strategies through the cooperative agreement. Before funding State Public Health Actions, each participating CDC program funded discrete efforts; only the Division for Heart Disease and Stroke Prevention and the Division of Diabetes Translation funded all 50 states and the District of Columbia. The State Public Health Actions effort is an attempt to purposely link strategies and activities that are mutually reinforcing to reduce duplication and maximize results (Box). For example, the Domain 3 strategy of increasing use of team-based care in health systems to improve clinical outcomes for people with hypertension and diabetes is similar to strategies already used in the health care system. Furthermore, the Domain 4 strategy of increasing use of community pharmacists to counsel individuals about how to manage their chronic conditions and adhere to medications benefits people with hypertension and diabetes. Also, greater access to, and use of, safe places to be physically active benefits the populations targeted by all 4 divisions as does increased access to healthy foods and beverages in various community settings, including schools (Domain 2). By combining forces, State Public Health Actions has resulted in an expansion of CDC’s programmatic efforts. The strategies addressed by funding to states are shown in Box.

**Box. Strategies and Activities Within State Public Health Actions**

**Basic Strategies**

- Promote the adoption of food service guidelines and nutrition standards, including dietary sodium.
- Promote the adoption of physical education and physical activity in schools.
- Promote adoption of physical activity in early care and education and work-sites.
- Promote reporting of blood pressure and hemoglobin A1C control measures; as able, initiate activities that promote clinical innovations, team-based care, and self-monitoring of blood pressure to improve blood pressure control.
- Promote awareness of high blood pressure among patients.
- Promote awareness of prediabetes among people at high risk for type 2 diabetes.
- Promote participation in diabetes self-management education programs.

**Enhanced Strategies**

Environmental approaches to promote health and support healthful behaviors

- Promote access to healthy food and beverages.
- Promote food service guidelines and nutrition standards where foods and beverages are available. Guidelines and standards should address sodium.
- Promote supportive nutrition environments in schools.
- Promote physical activity access and outreach.
- Promote physical activity in early care and education.
- Promote quality physical education and physical activity in grades kindergarten through 12 in schools.
- Promote access to breastfeeding-friendly environments.

Health system interventions to improve the delivery and use of clinical and other preventive services

- Develop quality improvement processes in health systems.
- Promote the use of team-based care in health systems.

Community clinical linkages to support cardiovascular disease and diabetes prevention and control efforts

- Promote the use of diabetes self-management education programs in community settings.
- Promote the use of CDC-recognized lifestyle change programs in community settings for primary prevention of type 2 diabetes.
- Promote the use of non-medical doctor health care providers in the community to support self-management of high blood pressure and diabetes.
- Promote the use of chronic disease self-management programs in community settings.

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- Develop policies, processes, and protocols in schools to meet the management care needs of students with chronic conditions.

## Evaluation Approach

CDC is evaluating both the processes and outcomes of State Public Health Actions to document efficiencies and improve programs, expand practice-based evidence, and demonstrate health outcomes. The answers to 4 broad evaluation questions will inform future collaborative efforts. An article on the evaluation approach CDC is using for State Public Health Actions appears in this week's *Preventing Chronic Disease* (6). Additionally, each state is conducting an evaluation of its own efforts over the 5-year project period, in collaboration with CDC.

## Administration and Management

CDC established an innovative organizational structure to support the administration and management of State Public Health Actions that is designed to facilitate program coordination and collaboration. The functional areas that had previously been performed independently by the individual divisions are now accomplished collectively. For example, previously a program would provide evaluation technical assistance based on the expertise and resources available within the program. Under State Public Health Actions, a group of evaluators representing all of the programs oversees the evaluation of the consolidated program as well as the technical assistance provided to the grantees. Seven workgroups are organized by functions (ie, fiscal management, evaluation support and guidance, program administration and technical assistance, training and conference planning, policy/communication support, epidemiology/surveillance technical assistance, and translation/dissemination guidance). Additionally, integrated teams of project officers and evaluators have been organized into 6 geographical regions consisting of 7 to 11 states each. Leadership for State Public Health Actions is provided by the 4 branch chiefs from the 4 divisions (Heart Disease and Stroke Prevention; Diabetes Translation; Nutrition, Physical Activity, and Obesity; and School Health).

Diversity of expertise within the teams provides opportunities to learn from each other, and the team structure encourages a stronger relationship between program and evaluation, thus elevating the role of evaluation within the grantees' activities. CDC developed a framework for governance and standard processes for program management that has improved information sharing within and across workgroups and regional teams.

## Technical Assistance and Evaluation Support

Teams of project officers representing each division provide guidance and support to states that are merged into geographic regions. The teams represent all 4 divisions, and each has 4 project officers, 4 evaluators, and a team lead from one of the 4 divisions. Project officers provide technical assistance and arrange for subject matter expertise from both CDC and non-CDC sources to support states' efforts. Evaluators assist states in developing and executing evaluation plans and provide additional technical assistance as needed. Team members adhere to standard operating procedures to ensure consistency across programs. Regular team meetings promote information sharing and problem solving and provide a forum to address grantee challenges, needs, and successes.

Each team has a lead project officer; lead project officers provide overall coordination for their assigned states. The team leads, project officers, and evaluators meet quarterly for training and to address identified needs.

## Discussion

The framework for State Public Health Actions builds on previous efforts in NCCDPHP to foster coordination and collaboration among programs. This approach, coordinated strategic activities aligned with the 4 domains of public health action, may result in greater program coordination among state and local health, community, and education partners. However, previous findings from similar efforts suggest that coordination and collaboration can be time-consuming, because joint decision making involves communication and negotiation. In addition, the State Public Health Actions program includes various funding streams and reporting requirements that place additional burden on program partners (7). Yet, the benefits resulting from reduced duplication and the potential for improved health outcomes could outweigh the perceived challenges (8). Sharing of evidenced-based best practices across programs, integration of performance measures, and development of new tools and resources may lead to improved health outcomes (9). Furthermore, working within the framework of the 4 domains provides the opportunity to address risk factors and diseases across various settings, including health care, education, and communities, by using multiple population-based approaches (9).

The management of State Public Health Actions across 4 programs has been both challenging and rewarding. The original intent of the approach, to enhance efficiency and impact, has not been completely fulfilled. Although the framework of the 4 domains is clear, implementation of strategies across the domains to

facilitate increased synergy among the programs has been a challenge. Other challenges reported by states include hiring restrictions, staff turnover, and time required to process contracts. Additional administrative challenges, such as complex reporting requirements related to fiscal tracking and management systems, have inhibited the exchange of information between the states and CDC. Finally, CDC funding priorities and strategies do not always directly align with those of the states, making program management challenging.

Despite the challenges associated with a collaboration of this magnitude, understanding of each program's strategies to manage and control diabetes, heart disease, and obesity and to promote school health has increased among those involved with this effort. The structure for managing the program across the 4 categorical areas, while complex, has its strengths. The development of new systems, such as a performance-monitoring database, and processes to facilitate communication, such as peer learning networks, appears to be of benefit both to the grantees and to CDC on the basis of anecdotal feedback from grantees and CDC staff. The coordination among the 4 divisions in delivering technical assistance and training to states may be a model worthy of replication.

Although it is too early to tell whether this program effort will produce the intended outcomes, the results of the evaluation will inform future efforts and point to opportunities for improvement. Considering CDC's and states' evolving priorities and the changes in the health care system, implementing evidence-based public health programs to prevent and control chronic diseases is both an opportunity and a challenge.

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Barbara Z. Park is retired from CDC and is now a public health consultant in Loudon, Tennessee. Rosanne P. Farris is retired from CDC and resides in Chicago, Illinois. The findings and conclusions in this article are those of the authors and do not necessarily represent the official position of CDC.

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## References

1. Centers for Disease Control and Prevention. Chronic diseases: the leading causes of death and disability in the United States. <http://www.cdc.gov/chronicdisease/overview/index.htm>. Accessed May 11, 2016.
2. Ward BW, Schiller JS, Goodman RA. Multiple chronic conditions among US adults: a 2012 update. *Prev Chronic Dis* 2014;11:E62.
3. Centers for Disease Control and Prevention. The four domains of chronic disease prevention: working toward healthy people in healthy communities. <http://www.cdc.gov/chronicdisease/pdf/four-domains-factsheet-2015.pdf>. Accessed May 11, 2016.
4. Centers for Disease Control and Prevention. State public health actions to prevent and control diabetes, heart disease, obesity and associated risk factors and promote school health (DP13-1305). <https://www.cdc.gov/chronicdisease/about/state-public-health-actions.htm>. Accessed November 6, 2017.
5. Pitt Barnes S, Shea P, Davis R, Rutledge S. Early Outcomes of State Public Health Actions' School Nutrition Strategies. *Prev Chronic Dis* 2017;14:160499.
6. Slonim AB, Callaghan C, Daily L, Leonard BA, Wheeler FC, Gollmar CW, et al. Recommendations for integration of chronic disease programs: are your programs linked? *Prev Chronic Dis* 2007;4(2):A34.
7. Allen P, Sequeira S, Best L, Jones E, Baker EA, Brownson RC. Perceived benefits and challenges of coordinated approaches to chronic disease prevention in state health departments. *Prev Chronic Dis* 2014;11:E76.
8. Frieden TR. Six components necessary for effective public health program implementation. *Am J Public Health* 2014; 104(1):17-22.
9. Bauer UE, Briss PA, Goodman RA, Bowman BA. Prevention of chronic disease in the 21st century: elimination of the leading preventable causes of premature death and disability in the USA. *Lancet* 2014;384(9937):45-52.

SPECIAL TOPIC

# Evaluating Cross-Cutting Approaches to Chronic Disease Prevention and Management: Developing a Comprehensive Evaluation

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## Abstract

We provide an overview of the comprehensive evaluation of State Public Health Actions to Prevent and Control Diabetes, Heart Disease, Obesity and Associated Risk Factors and Promote School Health (State Public Health Actions). State Public Health Actions is a program funded by the Centers for Disease Control and Prevention to support the statewide implementation of cross-cutting approaches to promote health and prevent and control chronic diseases. The evaluation addresses the relevance, quality, and impact of the program by using 4 components: a national evaluation, performance measures, state evaluations, and evaluation technical assistance to states. Challenges of the evaluation included assessing the extent to which the program contributed to changes in the outcomes of interest and the variability in the states' capacity to conduct evaluations and track performance measures. Given the investment in implementing collaborative approaches at both the state and national level, achieving meaningful findings from the evaluation is critical.

## Background

State Public Health Actions to Prevent and Control Diabetes, Heart Disease, Obesity and Associated Risk Factors and Promote

School Health (State Public Health Actions) is a program funded by the Centers for Disease Control and Prevention (CDC) to support the statewide implementation of strategies that promote health and prevent and control multiple chronic diseases and their risk factors (1). In the program, CDC partners with state health departments to address the 4 domains of chronic disease prevention: 1) epidemiology and surveillance, 2) environmental approaches, 3) health care system interventions, and 4) community programs linked to clinical services (2). Four divisions in the National Center for Chronic Disease Prevention and Health Promotion (NCCDPHP) at CDC, the Division of Diabetes Translation (DDT), Division for Heart Disease and Stroke Prevention (DHDSPP), Division of Nutrition, Physical Activity, and Obesity (DNPAO), and the School Health Branch (SHB) in the Division of Population Health, have collaborated to fund, implement, and evaluate State Public Health Actions.

Funding from the State Public Health Actions program has provided state health departments with an opportunity to address chronic diseases within their state at the individual level, such as by promoting health care interventions, and at the population level by developing policies and creating environments that promote health. This article is a companion to "Overview of State Public Health Actions to Prevent and Control Diabetes, Heart Disease, Obesity and Associated Risk Factors and Promote School Health," which was published December 7, 2017, in *Preventing Chronic Disease* (3). Here we describe the approach taken to evaluate the collaborative, complex State Public Health Actions program to ensure its accountability by demonstrating health outcomes, assisting states and CDC in improving the implementation of programs, and expanding the body of practice-based evidence by identifying successful and replicable strategies.

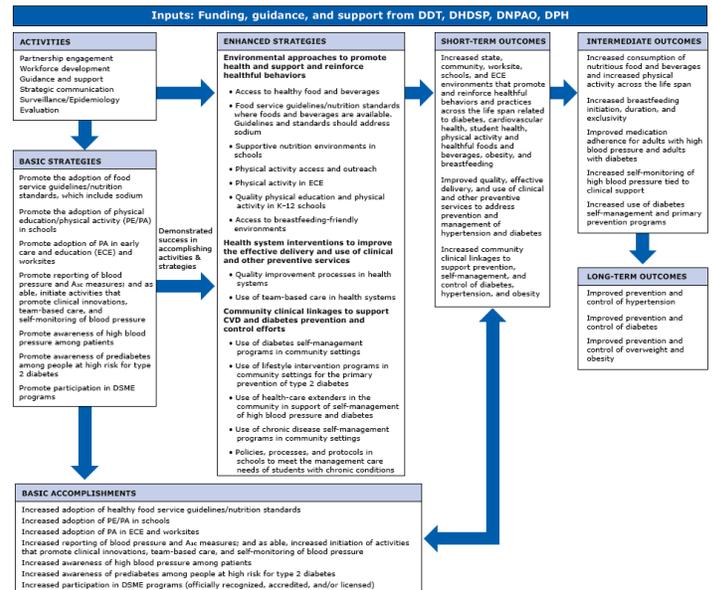


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## Evaluation Approach

Because State Public Health Actions is an innovative, cross-cutting program, it requires robust, multifaceted methods to evaluate it effectively. Although each of the 4 divisions conducted evaluations of their programs before State Public Health Actions, they took different approaches based on various factors, including the size and scale of the programs, the types of strategies being implemented (eg, policy, systems, and environmental changes, community-based and clinical interventions), and types of stakeholders engaged. Although evaluating large, federally funded public health programs is always challenging, the unique approach of State Public Health Actions compounded these challenges. Specifically, for State Public Health Actions there was a need to demonstrate to stakeholders its impact on disease-specific outcomes while implementing cross-cutting activities. Other challenges included coordinating across multiple chronic disease areas at the state and CDC level, accessing new partners and data sources, and the need to report performance measures that focused solely on outcomes.

These complex challenges required evaluators from each division to work together to design a comprehensive, multitiered approach to address the relevance, quality, and impact of State Public Health Actions. To begin, the evaluators followed standard practice by creating a logic model to highlight the inputs, activities, strategies, and outcomes of State Public Health Actions (Figure 1). The evaluators then designed the evaluation to assess and document the processes and outcomes of the program and to highlight how the implementation of the evidence-based strategies would lead to intended outcomes. The evaluation also examines the potential benefits and challenges of State Public Health Action's approach of improving individual disease outcomes through the use of cross-cutting strategies.

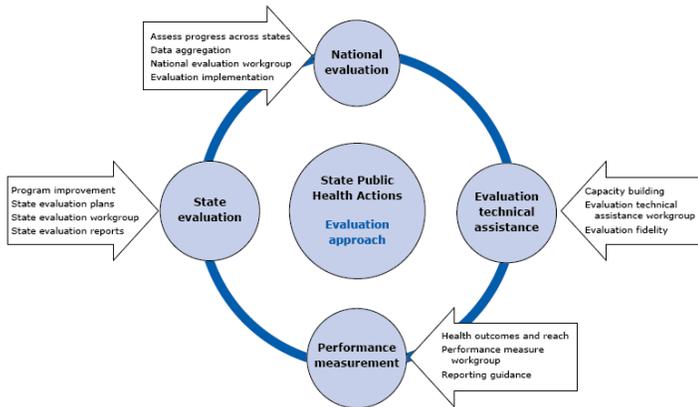


**Figure 1.** Program logic model for State Public Health Actions to Prevent and Control Diabetes, Heart Disease, Obesity and Associated Risk Factors and Promote School Health program. Abbreviations: A<sub>1c</sub>, glycated hemoglobin A<sub>1c</sub>; CVD, cardiovascular disease; DDT, Division of Diabetes Translation; DHDS, Division for Heart Disease and Stroke Prevention; DNPAO, Division of Nutrition, Physical Activity, and Obesity; DPH, Division of Population Health, School Health Branch; DSME, diabetes self-management education; K-12, kindergarten through 12th grade.

The evaluation approach includes 4 primary components: conducting a national evaluation that assesses progress across all states; reporting by the states of performance measures to track the reach of individual strategies and disease-specific outcomes; conducting evaluations by the states to assess and improve programs at the state level and understand the facilitators of, and barriers to, program implementation; and providing evaluation technical assistance to enhance the capacity for evaluation at the local level and improve the reporting of data. CDC developed a structure to plan and implement the 4 components of the evaluation, which is to be carried out over a 5-year period. DHDS was chosen to serve as the functional lead for evaluation in the administrative and management structure (3), while all 4 divisions identified a representative to act in a leadership role for evaluation-related decisions and the development of plans, processes, and guidance documents.

Four distinct evaluation workgroups were created to 1) oversee and implement the national evaluation; 2) collect, analyze, report, and provide guidance on performance measures; 3) provide guidance on planning and reporting the individual states' evaluations; and 4) give technical assistance to build evaluation capacity among the states and ensure successful implementation of the 4

components of the evaluation (Figure 2). For each component, the workgroup members identified and addressed both common and unique challenges to developing and implementing that component.



**Figure 2.** Components of state public health actions evaluation, State Public Health Actions to Prevent and Control Diabetes, Heart Disease, Obesity and Associated Risk Factors and Promote School Health (State Public Health Actions).

## National Evaluation

The national evaluation is the key mechanism for understanding the progress, achievements, and challenges of the overall State Public Health Actions program. This component aims to not only assess the impact, effectiveness, and efficiencies of the program but also to determine the degree to which cross-cutting approaches affect outcomes for health promotion and chronic disease prevention.

### Development

The national evaluation workgroup used the CDC evaluation framework (4) to guide the evaluation’s design and methods and to provide context for the findings. The workgroup developed 4 overarching evaluation questions that will be assessed throughout the 5-year span of State Public Health Actions:

1. To what extent has the program been effective, as indicated by progress toward the intended accomplishments and outcomes?
2. To what extent, if any, have state programs gained efficiencies (eg, in infrastructure, management, financial performance) through the implementation of the approach of State Public Health Actions?
3. To what extent, if any, has CDC gained efficiencies by combining the efforts of 4 of its divisions within NCCDPHP?

4. What promising and innovative strategies that could be replicated by state programs have been found effective and efficient?

The 5-year national evaluation plan comprises an examination of the collaborations, efficiencies, activities, and accomplishments of all awardees; an in-depth analysis of the implementation and effectiveness of specific strategies; and an examination of the efficiency of CDC’s internal coordination and the effectiveness of technical assistance to awardees.

### Implementation

The national evaluation seeks to assess the implementation and outcomes of the program across all 50 states and the District of Columbia. Because the grantees are at different stages of implementation throughout the program period and because there are several potential focus areas and priorities, CDC evaluators develop an evaluation protocol for each year that incorporates programmatic priorities and subevaluation questions guided by the 4 overarching evaluation questions. Once a protocol is drafted, CDC obtains feedback from evaluators, states, CDC partners, and program staff members to ensure that the protocol is feasible and aligns with stakeholder needs. CDC relies on the primary and secondary collection of both quantitative and qualitative data. Specific data collection and analyses include conducting quantitative analyses of data on state performance measures; fielding surveys to assess the efficiency and collaboration of CDC and the states; implementing focus groups and key informant interviews; and reviewing training and technical assistance notes, state work plans, annual performance reports, and evaluation plans and reports written by the states. While the nature of evaluating a large program conducted by all the states limits the ability to attribute outcomes to the program because of the lack of comparison groups, the multiple sources of data collected allow for data triangulation to identify and assess trends and common themes in state progress. The evaluation of State Public Health Actions strives to show the reach of the program, methods of implementation, its synergy and coordination, and its impact in terms of contributing to improvements in disease-specific outcomes.

### Reporting of Performance Measures

Performance measures provide accountability by answering questions about what was achieved or, conversely, not achieved (5). For State Public Health Actions, performance measures provide key data for reporting outcomes to stakeholders and provide quantitative data that is incorporated into the national evaluation for assessing short-term and intermediate progress across each strategy being implemented by states. There were, however, several challenges to the implementation of reporting on performance

measures. For example, previous programs funded by the 4 divisions within NCCDPHP did not require the reporting of outcome performance measures, many of the strategies that states are implementing as part of State Public Health Actions are new, many states were required to engage with new partners (eg, health care systems) and, as a group, states had varying capacity to collect and report measures and access data sources.

## Development

To develop the performance measures, leadership from the DHDSP, DDT, DNPAO, and SHB reviewed the purpose and intended outcome of each strategy in the logic model (Figure 1) to determine the areas and type of performance measures needed. Each division pulled most of its measures from previously developed and pilot-tested measures. For example, of the measures selected by the DHDSP, all but one were chosen from a prior multiyear project working with stakeholders to develop a menu of indicators for the control of high blood pressure. For State Public Health Actions, each performance measure aligns with a strategy or intervention that focuses on outcomes relevant to specific disease outcomes and the interests of stakeholders.

To ensure the reporting of high-quality data and to build capacity to collect and report performance measures at the state level, CDC developed guidance documents and provided webinars related to calculating the reach of the intervention and developing baseline and target values. CDC also developed operational definitions, also called profiles, for each of the performance measures; each 2-page profile defines and describes the purpose of the measure, unit of analysis, target population, and setting. It also describes how to calculate the measure, including the data sources to be used and the frequency of data collection, and provides additional resources and references (Appendix). CDC worked with the states to review and finalize the profiles. Once the profiles were disseminated, a tip sheet and considerations for reporting were provided to assist states with the reporting of data on performance measures.

## Implementation

In 2013, the states reported initial baselines and targets for strategy-specific performance measures. From 2015 until the end of the program (2018), states are required to report targets and annual progress for performance measures associated with their selected strategies and interventions. The states use a CDC-provided template that includes the measures required for a particular strategy, the prepopulated baseline (based on earlier reporting), targets for the current year and year 5, and actual data for the current year. Depending on the measure, the states report the data as a

number, rate, percentage, or numerator and denominator. They also report the data source(s) and, as needed, provide notes that would give context to CDC for understanding the data during its analysis.

Each year, CDC's performance measure workgroup assesses the quality of the state-reported data on these measures and the appropriateness of the analyses conducted (earlier, CDC had developed criteria for data quality and determined the type of analysis to be used for each performance measure). Data analysts at CDC use the criteria and inclusion and exclusion criteria for final cleaning and analysis of the data. Assessment of data quality also helps determine the performance measures for which the data are of sufficient quality to include them in the national evaluation and identifies measures that have widespread issues with quality. In addition, the process enables the provision of appropriate technical assistance to remedy those quality issues.

## Evaluations by the States

The evaluations performed by the individual states aim to provide data relevant to those states while also contributing to the national evaluation. States use data for purposes such as continuous program improvement and being responsive to local stakeholders. CDC uses these data for purposes such as synthesizing information on common strategies that states are using to identify and engage partners. This information provides a complete picture of progress on the performance measures, aids understanding of facilitators and barriers to implementation, and identifies potential best practices.

## Development

Acknowledging the difficulties of aggregating results from evaluations conducted by the states and other challenges in reporting their data, including varying capacities and a lack of standard data collection methods, CDC developed a set of core process evaluation questions and division-specific core outcome evaluation questions to facilitate the aggregation and cross-analysis of findings from the states for the national evaluation. States were also encouraged to develop additional evaluation questions and indicators to meet their own evaluation needs. The core process evaluation questions were related to their coordination with critical partners, their work across areas of chronic disease, their type of organizational structure, and their increased efficiencies obtained. The division-specific core outcome evaluation questions were related to progress made and both the barriers that they encountered and facilitators that aided selected strategies (Table). To reduce their burden and to focus the evaluation, states were required to evaluate only 1 strategy for each CDC division. States could also select whether they were in the adoption or implementation phase

of the strategy. CDC designed a template that states could use to provide background information on the particular approach and strategies of the program, the selection of activities implemented, settings and target populations, key stakeholders and partners involved in the program planning and implementation, indicators developed to monitor progress toward achieving an answer to the process evaluation question, and the synergistic approach used to implement the program.

The division-specific outcome evaluation sections of the template included additional information on barriers and facilitators, an indicator table, a findings and results section for each disease-specific core outcome evaluation question, and a plan to disseminate the results of their evaluation to internal and external stakeholders.

### **Implementation**

States annually submit to CDC their plans for evaluation and the evaluation results obtained. Data are stored on an internal SharePoint (Microsoft Corp) site, where CDC evaluators review the data and determine how best to synthesize the data and pull out common themes. The data are triangulated with other data for the national evaluation and summarized. The information provided in the evaluation plans enables CDC evaluation technical assistance providers to understand the proposed methods and, thus, more effectively assist the states in conducting their own evaluations. Technical assistance providers can also provide information to the program team about common barriers and facilitators, which can be used to develop trainings and technical assistance to support and improve program implementation.

### **Providing Evaluation Technical Assistance**

The national evaluation, reporting of performance measures, and state evaluations all rely on data received by the states. Because the states have varying levels of capacity for evaluation, CDC must provide technical assistance to ensure effective reporting to the agency and to make sure that the state-level evaluations are providing information relevant to improving programs and meeting the needs of stakeholders. Because 4 divisions at CDC support the work of the state health departments, with each bringing its own body of expertise as it pertains to implementing disease-specific interventions, evaluators from all 4 of these divisions have worked collaboratively as part of regional teams that support the states to evaluate various strategies they are implementing.

### **Development**

CDC's technical assistance plan for the 5-year evaluation consists of evaluation capacity assessments, annual reviews of documents,

the development of evaluation tools and resources, and other forms of technical assistance to the states. Evaluation capacity assessments were performed in the first year to understand the capacity of each state to conduct evaluations and to identify needs for technical assistance and types of trainings and resources that were needed for states to meet evaluation requirements. Ongoing assessments are also conducted to identify facilitators of and barriers to developing evaluation plans and tools, identifying appropriate indicators and data sources, and conducting data analysis for annual evaluation reporting. Evaluators at CDC maintain regular communication with evaluators at the state level and assist them with developing their evaluation plans, collecting and reporting performance measures, and reporting the results of their evaluations. CDC evaluators also assist both the states and project officers at CDC through the annual review of work plans, yearly performance reports, and evaluation reports to ensure that states are aligning activities with performance measures and accurately reporting data.

### **Implementation**

Evaluation resources made available to the states by CDC include training opportunities such as cross-state peer-learning communities, evaluation guidance documents, sample data collection tools, and evaluation plan and report templates. The peer-learning communities meet monthly for presentations and facilitated discussion. In addition, there is a listserv on which community members can pose questions to other members about their experiences implementing their evaluations and can share information and documents. Additional evaluation guidance documents and tools developed by CDC include templates and helpful hints documents to support the states' work throughout various phases of the program.

Consistent and coordinated communication with states and among CDC staff is important to reaching the goal of providing effective technical assistance. To standardize technical assistance, evaluators developed a guide designed to support consistent monitoring and documentation of evaluation technical assistance needs for a state during evaluation plan implementation and performance measure reporting. In collaboration with project officers, evaluators at CDC communicate with states at least monthly through regular calls with the regional team and ad hoc, evaluation-specific follow-up calls and email communication. Internally, CDC uses a performance-monitoring database to document progress on performance and evaluation activities and to track communication and follow-up activities between the states and CDC's evaluation staff and project officers.

## Dissemination and Use of Evaluation Findings

CDC regularly disseminates findings related to the evaluation of State Public Health Actions to various stakeholders, including internal and external partners as well as the general public, through reports, executive summaries or briefs, presentations, and journal publications. Reports internal to CDC are used to understand how states are implementing programs and how well CDC is providing technical assistance to states and coordinating across divisions. Briefing documents, such as the State Public Health Actions Year 3 Performance Measures Snapshots (6), and the DNPAO state snapshots website (7), which report on highlights at the state level, are used to provide information on the program's priorities and offer succinct outcomes that are relevant to stakeholders. Findings are also prepared for national partners and Congress to demonstrate accountability and program impact.

Presentations of findings are delivered internally to the CDC staff and externally to state health departments' staff and other public health practitioners. For example, presentations were made at a meeting of grantees in Atlanta, Georgia, and to various diverse audiences at national conferences, such as those that were held by the American Public Health Association and the American Evaluation Association (8). Evaluation methods and findings obtained are also being shared through journal articles written by the CDC staff and state representatives (3, 9–11). In addition, CDC provides assistance to states in writing journal articles and finding strategies for dissemination.

## Conclusion

The approach to the evaluation of State Public Health Actions is intended to demonstrate the impact of the overall program while capturing unique cross-cutting aspects of the program and the disease-specific outcomes. Lessons learned and key findings from the national evaluation, performance measures data, and evaluations conducted by the states will be summarized throughout the 5 years of the program to assist with ongoing program improvement, report progress to stakeholders, identify successful strategies, and inform future decisions on funding. While the comprehensive evaluation strives to evaluate efficiency, effectiveness, and impact at the state and national levels, it faces numerous challenges.

Evaluations of large public health programs are difficult to conduct, with one of the big challenges being the inability to attribute successes or shortfalls wholly to the program, because there are often confounding factors, a lack of comparison groups, long time frames, or multiple interventions going on at once. The development and use of performance measures to assess outcomes for fed-

eral programs is also challenging because of issues such as the complexity of public health problems, which may have multiple determinants or outcomes that may take several years to achieve; the decentralized implementation of public health programs; and measurement issues related to a lack of reliable, timely, and consistent data sources (5). Also, to successfully aggregate standardized measures, it would be ideal, but not realistic, for the states to have similar capacities to access, collect, analyze, and report data. Finally, federal agencies are challenged by the limited resources available to provide state health departments with consistent and intensive technical assistance with evaluation to help them with collecting and reporting performance measures and evaluating their programs.

These common challenges are clearly applicable to State Public Health Actions, with the added complexity of working across multiple topic areas and attempting to evaluate cross-cutting strategies when most state health departments and CDC operate within distinct disease or topic areas. Each topic area has discrete funding streams and must demonstrate effectiveness in achieving outcomes for each of these areas. The State Public Health Actions program also expands funding to more states than were previously funded by each division, and oversight and management requires complex coordination. To accurately describe the implementation and outcomes of State Public Health Actions, assessing collaboration and coordination across topic areas at the state level and at CDC is an important part of the evaluation. Surveys, focus groups, key informant interviews, and results obtained from evaluations conducted by the states using a standard template are employed to highlight this unique aspect of State Public Health Actions. CDC evaluators provide proactive and intensive technical assistance to address challenges, but the complex, cross-topic, structure of technical assistance can be time-consuming.

Although there are challenges and limitations with the evaluation of State Public Health Actions, given CDC's substantial investment in testing collaborative approaches and working across domains, striving to achieve meaningful findings from the evaluation is critical. Subsequent articles will highlight results achieved by the program and promising practices that can be implemented broadly.

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## References

1. Centers for Disease Control and Prevention. State Public Health Actions to Prevent and Control Diabetes, Heart Disease, Obesity and Associated Risk Factors and Promote School Health. <https://www.cdc.gov/chronicdisease/about/state-public-health-actions.htm>. Accessed May 11, 2017.
2. Bauer UE, Briss PA, Goodman RA, Bowman BA. Prevention of chronic disease in the 21st century: elimination of the leading preventable causes of premature death and disability in the USA. *Lancet* 2014;384(9937):45–52.
3. Park BZ, Cantrell L, Hunt H, Farris RP, Schumacher P, Bauer UE. Overview of State Public Health Actions to Prevent and Control Diabetes, Heart Disease, Obesity and Associated Risk Factors and Promote School Health. *Prev Chronic Dis* 2017; 14:160437. [http://www.cdc.gov/pcd/issues/2017/16\\_0437.htm](http://www.cdc.gov/pcd/issues/2017/16_0437.htm).
4. Centers for Disease Control and Prevention. Framework for program evaluation in public health. *MMWR Recomm Rep* 1999;48(RR-11):1–40.
5. DeGroff A, Schooley M, Chapel T, Poister TH. Challenges and strategies in applying performance measurement to federal public health programs. *Eval Program Plann* 2010; 33(4):365–72.
6. Centers for Disease Control and Prevention. State Public Health Actions (1305). Year 3 performance measures snapshot. Atlanta (GA): Centers for Disease Control and Prevention. <https://wwwdev.cdc.gov/dhdsp/docs/1305-y3-performance-measures-snapshot.pdf>. Accessed June 5, 2017.
7. Division of Nutrition, Physical Activity, and Obesity, National Center for Chronic Disease Prevention and Health Promotion, Centers for Disease Control and Prevention. Funding by state. 2017. <https://www.cdc.gov/nccdphp/dnpao/state-local-programs/funding.html>. Accessed November 13, 2017.
8. Jernigan JD. Evaluating cross-cutting approaches to addressing chronic disease: a comprehensive evaluation of program effectiveness and efficiency. Chicago (IL): American Evaluation Association; 2015.
9. Mensa-Wilmot Y, Bowen S, Rutledge S, Morgan JM, Bonner T, Farris K, et al. Early results of states' efforts to support, scale, and sustain the National Diabetes Prevention Program. *Prev Chronic Dis* 2017;14:170478. [http://www.cdc.gov/pcd/issues/2017/17\\_0478.htm](http://www.cdc.gov/pcd/issues/2017/17_0478.htm). Accessed December 7, 2017.
10. Geary NA, Dooyema CA, Reynolds MA. Supporting obesity prevention in statewide quality rating and improvement systems: a review of state standards. *Prev Chronic Dis* 2017; 14:160518. [http://www.cdc.gov/pcd/issues/2017/16\\_0518.htm](http://www.cdc.gov/pcd/issues/2017/16_0518.htm). Accessed December 7, 2017.
11. Pitt Barnes S, Skelton-Wilson S, Cooper A, Merlo C, Lee S. Early outcomes of State Public Health Actions' school nutrition strategies. *Prev Chronic Dis* 2017;14:170106. [http://www.cdc.gov/pcd/issues/2017/16\\_0518.htm](http://www.cdc.gov/pcd/issues/2017/16_0518.htm). Accessed December 7, 2017.

Table

**Table. Summary of Division-Specific Core Outcome Evaluation Questions for State Evaluations, the State Public Health Actions to Prevent and Control Diabetes, Heart Disease, Obesity and Associated Risk Factors and Promote School Health (State Public Health Actions) Program**

Division Topic Area	Outcome Evaluation Question
Nutrition, Physical Activity, and Obesity	<p>What are the key activities and/or resources considered critical to successful adoption/implementation of</p> <ul style="list-style-type: none"> <li>• Healthier retail food venues or farmers' markets in underserved areas?</li> <li>• Food service guidelines/nutrition standards in priority settings?</li> <li>• Interventions to create or enhance access to places for physical activity with an emphasis on walking through either state policies or pedestrian/transportation plans?</li> <li>• Standards to increase physical activity in ECEs?</li> <li>• Breastfeeding policies and practices?</li> </ul>
School Health	<p>What state activities have been effective in promoting</p> <ul style="list-style-type: none"> <li>• Nutrition policy development and nutrition practice adoption among districts and schools?</li> <li>• The development of CSPAPs among districts and schools?</li> <li>• The implementation of policies, processes, and protocols in schools to meet the management and care needs of students with chronic conditions?</li> </ul>
	<p>What critical factors or activities influence the successful implementation of</p> <ul style="list-style-type: none"> <li>• Nutrition policy and nutrition practice?</li> <li>• CSPAP?</li> </ul>
	<p>What are the major facilitators and barriers in helping districts and schools</p> <ul style="list-style-type: none"> <li>• Create supportive nutrition environments, such as partnerships (eg, MOUs) with the Department of Education? How were the barriers overcome?</li> <li>• Develop CSPAPs, such as partnerships (eg, MOUs) with the Department of Education? How were the barriers overcome?</li> <li>• Meet the management and care needs of students with chronic conditions? How were the barriers overcome?</li> </ul>
	<p>To what extent has implementation of nutrition policies and nutrition practices increased</p> <ul style="list-style-type: none"> <li>• Access to healthier foods and beverages at school?</li> <li>• The number of physical activity opportunities available to students during the school day?</li> <li>• The management and care needs of students with chronic conditions?</li> </ul>
Heart Disease and Stroke	<p>What were the major facilitators and barriers in promoting implementation of</p> <ul style="list-style-type: none"> <li>• Quality improvement processes, such as use of EHRs, in health care systems? How were the barriers overcome?</li> <li>• Team-based care in health systems? How were the barriers overcome?</li> </ul>
	<p>How has the state promoted the use of health-care extenders in the community in support of self-management of high blood pressure? What were key facilitators and barriers?</p>
	<p>To what extent has the state effectively promoted implementation</p> <ul style="list-style-type: none"> <li>• Of quality improvement processes, such as use of EHRs, in health care systems?</li> <li>• Of team-based care in health systems?</li> </ul>
	<p>What factors at the state level are necessary to promote the use of health-care extenders in the community in support of self-management of high blood pressure?</p>
	<p>How has the relationship between the state health department, health care systems, and other QI/HIT partners in the state changed as a result of State Public Health Actions? Include the following aspects:</p> <ul style="list-style-type: none"> <li>• The extent to which the state is able to obtain health systems data.</li> <li>• Key facilitators and barriers to strengthening these partnerships.</li> </ul>
	<p>What policies/systems facilitated the support and promotion of</p> <ul style="list-style-type: none"> <li>• Team-based care?</li> <li>• The increased use of health-care extenders?</li> </ul>
	<p>To what extent have the QI processes influenced the quality, delivery, and use of clinical services for hypertension management</p>

Abbreviations: CSPAP, Comprehensive School Physical Activity Program; ECE, early care and education; EHR, electronic health record; HIT, health information technology; MOUs, memorandums of understanding; QI, quality improvement.

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(continued)

**Table. Summary of Division-Specific Core Outcome Evaluation Questions for State Evaluations, the State Public Health Actions to Prevent and Control Diabetes, Heart Disease, Obesity and Associated Risk Factors and Promote School Health (State Public Health Actions) Program**

Division Topic Area	Outcome Evaluation Question
	among health systems? What policies/systems are needed for health care systems to effectively <ul style="list-style-type: none"> <li>• Implement team-based care?</li> <li>• Increase the use of health-care extenders?</li> </ul>
Diabetes	What were the major facilitators and barriers in implementing the 4 drivers during the start-up/implementation phase? How were the barriers overcome? <ul style="list-style-type: none"> <li>• For diabetes self-management education?</li> <li>• For lifestyle intervention programs?</li> </ul> What were the key activities critical to addressing disparities in the 4 drivers during the start-up/implementation phase? <ul style="list-style-type: none"> <li>• For diabetes self-management education?</li> <li>• For lifestyle intervention programs?</li> </ul>

Abbreviations: CSPAP, Comprehensive School Physical Activity Program; ECE, early care and education; EHR, electronic health record; HIT, health information technology; MOUs, memorandums of understanding; QI, quality improvement.

## Appendix. Sample Performance Measure Profile for State Public Health Actions to Prevent and Control Diabetes, Heart Disease, Obesity and Associated Risk Factors and Promote School Health (State Public Health Actions) Program

This appendix is available for download as a Microsoft Word document at

[https://www.cdc.gov/pcd/issues/2017/docs/16\\_0499-appendix.doc](https://www.cdc.gov/pcd/issues/2017/docs/16_0499-appendix.doc). [DOC – 57 KB]

## TOOLS AND TECHNIQUES

# Using Health Information Technology and Data to Improve Chronic Disease Outcomes in Federally Qualified Health Centers in Maryland

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## PEER REVIEWED

## Abstract

Federally Qualified Health Centers provide health care services to underserved communities and vulnerable populations. In Maryland, the burden of chronic disease is high among Federally Qualified Health Center patients. Electronic health records (EHRs) are becoming more widely used, and effective use of EHR data may improve chronic disease outcomes. This article describes the process of developing a data aggregation and analytics platform to support health centers in using population health data based on standardized clinical quality measures. This data warehouse, capable of aggregating EHR data across multiple health centers, provides opportunities for benchmarking and elicits a discussion of quality improvement, including identifying and sharing clinical best practices. Phase 1 of the project involved the strategic engagement of health center leadership and staff to get buy-in and to assess readiness. Phase 2 established the technological infrastructure and processes to support data warehouse implementation and began the process of information sharing and collaboration among 4 early adopters. Phase 3 will expand the project to additional health centers and continue quality improvement efforts. The health information technology marketplace is rapidly changing, and staying current will be a priority so that the data warehouse remains a useful quality improvement tool that continues to meet the demands of Maryland health centers. Ongoing efforts will also focus on ways to further add value to the system, such as incorporating new metrics to better inform health center decision making and

allocation of resources. The data warehouse can inform and transform the quality of health care delivered to Maryland's most vulnerable populations, and future research should focus on the ability of health centers to translate this potential into actual improvements.

## Introduction

Approximately 1 in 14 people in the United States access health care through a Federally Qualified Health Center (FQHC) (1). FQHCs provide primary and preventive health care services to vulnerable populations, including the medically underserved and uninsured. In addition to primary and preventive care, FQHCs provide services in women's health, behavioral health, substance abuse, dental health, pharmacy, and social work and enabling services, among others. There are 17 FQHCs in Maryland that serve more than 300,000 patients. Most (91.0%) of these patients have a household income less than 200% of the federal poverty level (2). Almost half (49.9%) are eligible for Medicaid, and 18.7% are uninsured (Table 1).

The burden of chronic disease is high in the Maryland FQHC population. Approximately 1 in 4 patients has hypertension, and only 62.9% of patients with hypertension have their blood pressure under control (<140/90 mm Hg). Additionally, more than 1 in 9 patients has diabetes, which is poorly controlled (hemoglobin A1c [HbA1c] >9%) among more than one quarter (Table 1).

Some research suggests that electronic health record (EHR) use does not lead to improved medical care (3,4). However, these results were based on old data sets and different types of practices (ie, non-FQHC ambulatory care settings). Other studies found that increased health information technology capacity in FQHCs was associated with improved quality of care and that safety-net practices with EHRs demonstrate higher levels of diabetes care and better outcomes compared with FQHCs that use paper-based systems (5,6).



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As EHR adoption continues to spread and health care systems address obstacles such as interoperability, health information technology can potentially transform health care delivery in the United States. Recognizing this, the federal government is committed not only to adopting EHR technology but also to using it meaningfully. Specifically, the 2009 Health Information Technology for Economic and Clinical Health Act authorized payments through Medicare and Medicaid to incentivize the meaningful use of EHRs to achieve specified improvements in health care delivery (7).

The Health Resources and Services Administration (HRSA) requires FQHCs to report EHR-generated data annually to the Uniform Data System (UDS) and evaluates the centers on standardized clinical quality measures that emphasize health outcomes and quality of care (8). Historically, HRSA has awarded additional quality incentives to FQHCs across the country that demonstrate significant improvement on key measures. Despite the availability of aggregated UDS data, the Mid-Atlantic Association of Community Health Centers (MACHC) and its member organizations recognized the need for a local data aggregation and analytics platform, a data warehouse, to support FQHCs in effectively using population health data to inform quality improvement efforts. This data aggregation and management strategy was identified as a priority goal by MACHC's governing board to help drive reporting, analytics, business decision-making, and most importantly, clinical transformation across its member health centers. This article describes the process of developing and implementing a data warehouse to aggregate EHR data across multiple health centers for the purposes of benchmarking, identifying, and sharing clinical best practices and for establishing systems to improve chronic disease outcomes.

## Data Warehouse Development and Implementation

MACHC is a federally designated Primary Care Association, which provides training and technical assistance to all Maryland and Delaware FQHCs. MACHC was thus well positioned to coordinate and implement a large-scale data warehouse to improve population health management in all Maryland FQHCs. In 2014, with support from the Maryland Department of Health and Mental Hygiene and other key partners, MACHC began planning for a data warehouse to extract data from the FQHC EHRs, aggregate these data into a centralized system, and regularly report data on standardized measures back to FQHCs in a useable dashboard format.

The MACHC board of directors oversees the data warehouse project, and MACHC formed the Community Care Informatics Center (CCIC) to carry out the project's scope of work. The project plan for fully developing the CCIC spans 4 years and is structured in 3 phases.

### Phase 1: Engage partners

During Phase 1, CCIC staff engaged FQHC leadership, quality improvement staff, and information technology staff to better understand existing data management structures, current successes, and challenges within the FQHCs as well as their development needs. The CCIC developed an assessment survey and met in person with each FQHC team for an information-gathering session that typically lasted approximately 2 hours. During these sessions, the teams and CCIC staff discussed factors such as the health centers'

- Strategic vision, goals, and plans with regard to using data to improve clinical outcomes.
- EHR use and workflow.
- Successes and areas for improvement in using data.
- Quality and consistency of clinical documentation in EHR.
- Existing tools for communicating data and outcomes, both internally and externally.
- Grant and program compliance, requirements, and challenges.

In Phase 1, the CCIC focused on the value added to FQHCs through provision of information, resources, and partnerships to improve health care quality and health outcomes. The CCIC also led a vendor analysis of available population health technologies to interface with the FQHCs' EHRs, pull relevant data from the EHRs, and aggregate the data into another platform (ie, the data warehouse). After assessing various options, the CCIC subsequently identified 2 vendors as key strategic partners, since many FQHCs were already working with 1 of the 2 vendors. Both vendors were FQHC-focused and understood the nuances and special reporting requirements of health centers. The CCIC purchased the data warehouse software that analyzes and aggregates the EHR information.

The CCIC determined that data ownership would reside with the individual FQHCs and that decisions on data sharing and other procedures would be made collectively by the health centers. The CCIC established an advisory council, comprising clinical and quality improvement staff from all Maryland FQHCs, to develop procedures that guide the data warehouse implementation. The

CCIC later formed a contributors committee, whose membership includes the CEOs of the early adopter health centers. The contributors committee provides strategic oversight and has decision-making authority about new requests for data and the sharing of CCIC-specific data with community partners and other stakeholders.

Contributing health centers entered into a participation agreement with MACHC as well as a user agreement with MACHC's selected software vendors. The participation agreement allowed the CCIC to aggregate and share data with other participating health centers and stakeholders as agreed on by the contributors committee. It also detailed the roles and responsibilities of MACHC staff regarding overall execution of the project from an information technology and management perspective, technical support to health centers during implementation and data validation, protection of data, and reporting expectations. Roles and responsibilities of the FQHCs included providing adequate staff resources to work with the CCIC staff during implementation and data validation, committing to implement 1 of 2 predetermined population health software systems to allow for data aggregation, and ensuring availability of data.

## **Phase 2: Building and validating**

In Phase 2, the CCIC advisory committee made operational decisions, including selecting specific clinical quality measures to be reported and approving the data validation process. The final agreed-on clinical dashboard for the data warehouse included measures that the advisory council believed were the most critical to focus on during the first years of the project. The council strove to include measures that aligned with federal, state, and grant-related reporting standards such as UDS, Meaningful Use, Healthcare Effectiveness Data and Information Set (HEDIS), and National Quality Forum (NQF) (9–12). The CCIC developed a cross-walk to indicate each measure's overlap in these commonly used, national standards.

Reporting accurate, consistent data is critical to the integrity of the project and its usefulness to the FQHCs. Data validation can be complicated and tedious as a result of varying workflows and documentation practices across health centers. Defining a clear process for initial and ongoing validation was essential. CCIC staff worked directly with the FQHCs to establish the reliability and validity of data in their EHR systems and provided training as needed. Ultimately, FQHCs signed off that the information in the CCIC data warehouse mirrored the data in the center's EHR and encompassed all data from the EHR necessary to accurately report each metric. The advisory council vetted and agreed on this data validation process, which was developed by the CCIC.

In collaboration with the EHR vendors and the 2 population health software vendors, the CCIC provided technical expertise when needed in the implementation of the population health systems that health centers purchased. CCIC staff collaborated with the FQHCs on implementation alignment aspects to ensure standardization of population health software setup and utilization functionality. Although there is functionality with these software products, the health centers also contributed significantly to necessary customizations in many cases to better manage population health efforts at the health center level. The CCIC also provided as-needed technical guidance, such as assisting FQHCs with systems assessments and discussing data readiness.

As of May 2016, 4 FQHCs were reporting to the data warehouse. The first dashboard had 29 measures and included specifically defined numerators and denominators. These data will serve as a baseline for future quality improvement work. The data warehouse gives FQHCs the capability to access aggregated health center data more frequently than once per year, as required for UDS, through quarterly dashboard reports provided by the CCIC. Health centers can also use their population health programs to review individual reports and to evaluate their individual progress at any time.

Within the first year of reporting, the delivery of preventive services and clinical outcomes varied widely among the 4 contributing FQHCs. The first dashboard report pulled EHR data from the 4 health centers for April 1, 2015, through March 31, 2016. During that time, the percentage of patients with hypertension whose blood pressure was adequately controlled during the measurement year ranged from 49.6% to 73.7%. During this same period, the percentage of patients aged 18 to 75 years with diabetes (type 1 or type 2) whose most recent HbA1c level during the measurement year was greater than 9.0% (ie, demonstrating poor blood glucose control) or whose data were missing ranged from 33.3% to 70.0%. Additional dashboard results are described in Table 2.

To facilitate effective use of the aggregate data for clinical and quality improvement, MACHC formed a contributors' workgroup, consisting of clinical and quality staff from the contributing health centers. The contributors' workgroup meets at least 6 times per year and focuses on developing and sharing evidence-based and innovative best practices as well as on prioritizing efforts to improve population health outcomes. As more centers are able to successfully report data into the CCIC data warehouse, participation in the contributors' workgroup will grow.

The difference in FQHCs' ability to demonstrate success on key performance indicators suggests there is an opportunity for peer-to-peer learning. In June 2016, the contributors' workgroup identified 3 initial priority focus areas: hypertension control, diabetes control, and colorectal cancer screening. MACHC plays a facilitation role in the workgroup, encouraging discussion on quality improvement while FQHCs that have demonstrated success in each priority area lead workgroup discussions on that topic.

### **Phase 3: Replication and continuous quality improvement**

During Phase 3, MACHC will use the infrastructure to replicate the process to include more FQHCs in the data warehouse. This final phase will also include continual quality improvement efforts, using data to inform health systems transformation efforts. Although new challenges to bringing on additional health centers will occur largely because of the varying EHR and population health information technology software, MACHC will leverage lessons learned and standardized processes, such as data validation and dashboard development processes, to ease onboarding for newly joining health centers.

Initially, only predetermined clinical quality data were included in the dashboard, with the sole focus being clinical quality improvement. Evaluating clinical metrics in the aggregate and individually, as well as comparing them with state and federal values when available, will allow the CCIC to continue to pinpoint best clinical practices and leverage knowledge and expertise from health centers that are performing well in certain areas. The CCIC will also continue to partner with organizations such as the American Cancer Society and Kaiser Permanente to provide evidence-based protocols and additional training for health centers to support improvement efforts. Although Maryland health centers are performing above the national average in many measures, these combined efforts will allow for focused continual quality improvement leading to even better health outcomes for some of the most vulnerable populations in the state.

Plans include adding data on social determinants of health and financial information to the clinical measures in the dashboard. Patients of FQHCs often have many comorbidities in addition to social and economic challenges. Managing these barriers alongside patients is a critical step in improving health outcomes. Including social barriers and cost-of-care information will allow health centers to better allocate resources for care of patients with these complex issues. Obtaining cost-of-care information will probably require an additional interface with third-party payers, but the data warehouse may be able to glean this information from the practice management portion of EHRs, which manage billing and collections.

## **Challenges**

As with most projects, the CCIC learned to adapt, because technology is ever-changing and the health care landscape continues to evolve. One initial challenge the CCIC faced was managing the work through 2 population health platforms. To address this challenge, the CCIC staff initially focused on FQHCs using the same population health platform software to become early adopters. Onboarding additional health centers, using either of the 2 selected platforms, will continue throughout Phase 3 of the project. MACHC will also continue to assess new technologies and monitor changes in the health information technology marketplace to ensure that the data warehouse remains a useful and relevant tool.

Overall, cost was a major challenge for both the health centers and MACHC. Although MACHC received significant grant funds from the State of Maryland — made possible by the Centers for Disease Control and Prevention's (CDC's) support to all 50 states and the District of Columbia via the State Public Health Actions to Prevent and Control Diabetes, Heart Disease, Obesity and Associated Risk Factors and Promote School Health (State Public Health Actions) program — these funds were still below the actual costs of the project. At the local level, the cost of the population health software products was prohibitive for some health centers. Recently, HRSA announced the availability of information technology grant funds, which many FQHCs chose to use to purchase the necessary population health software product. MACHC continues to work to leverage other available resources to continue the project and ensure its sustainability.

## **Conclusion**

The innovative data warehouse project in Maryland can inform and transform the quality of health care delivered to the state's most vulnerable populations. However, the project is still in its early stages and has yet to translate this tremendous potential into real-world improvements. Future research should revisit the data warehouse efforts to further evaluate its reach and impact. Future research should focus not only on progress on clinical outcomes and the delivery of preventive services but also on changes in clinical practice resulting from data sharing, benchmarking, and collaboration around quality improvement.

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## References

1. About health centers: what is a health center? Rockville (MD): US Department of Health and Human Services, Health Resources and Services Administration, Health Center Program. <http://bphc.hrsa.gov/about/what-is-a-health-center/index.html>. Accessed August 31, 2016.
2. Health center data. Maryland program grantee data. Rockville (MD): US Department of Health and Human Services, Health Resources and Services Administration, Health Center Program; 2015. <http://bphc.hrsa.gov/uds/datacenter.aspx?year=2015&state=MD>. Accessed August 31, 2016.
3. Burke HB, Becher DA, Hoang A, Gimbel RW. The adoption of an electronic health record did not improve A1c values in Type 2 diabetes. *J Innov Health Inform* 2016;23(1):144.
4. Linder JA, Ma J, Bates DW, Middleton B, Stafford RS. Electronic health record use and the quality of ambulatory care in the United States. *Arch Intern Med* 2007;167(13):1400–5.
5. Frimpong JA, Jackson BE, Stewart LM, Singh KP, Rivers PA, Bae S. Health information technology capacity at federally qualified health centers: a mechanism for improving quality of care. *BMC Health Serv Res* 2013;13(1):35.
6. Cebul RD, Love TE, Jain AK, Hebert CJ. Electronic health records and quality of diabetes care. *N Engl J Med* 2011; 365(9):825–33.
7. Blumenthal D, Tavenner M. The “meaningful use” regulation for electronic health records. *N Engl J Med* 2010; 363(6):501–4.
8. Quality improvement: clinical and financial performance measures. Rockville (MD): US Department of Health and Human Services, Health Resources and Services Administration, Health Center Program. <http://bphc.hrsa.gov/qualityimprovement/performanceasures/index.html>. Accessed August 31, 2016.
9. Health Center Quality Improvement. Rockville (MD): Health Resources and Services Administration; 2016. <http://bphc.hrsa.gov/qualityimprovement/index.html>. Accessed November 18, 2016.
10. Programs EHRI. Baltimore (MD): Centers for Medicare and Medicaid Services; 2016. <https://www.cms.gov/Regulations-and-Guidance/Legislation/EHRIncentivePrograms/index.html?redirect=/ehrincentiveprograms/>. Accessed November 18, 2016.
11. HEDIS and Performance Measurement. Washington (DC): National Committee for Quality Assurance; 2016. <http://www.ncqa.org/hedis-quality-measurement>. Accessed November 18, 2016.
12. Measures, reports and tools. Washington (DC): National Quality Forum; 2016. [http://www.qualityforum.org/Measures\\_Reports\\_Tools.aspx](http://www.qualityforum.org/Measures_Reports_Tools.aspx). Accessed November 18, 2016.

## Tables

**Table 1. Demographic Characteristics and Chronic Disease Status of Patients in Maryland Federally Qualified Health Centers<sup>a</sup>**

Characteristic	Percentage
<b>Patients</b>	
Household income <200% of the federal poverty level	91.0
Medicaid/CHIP recipients	49.9
Medicare	9.6
Third party insurance	21.8
Uninsured	18.7
Racial/ethnic minority	67.1
Homeless	5.0
<b>Chronic disease burden</b>	
Patients with hypertension	24.9
Patients with blood pressure control (patients with hypertension with blood pressure <140/90 mm Hg)	62.9
Patients with diabetes	11.6
Patients with uncontrolled diabetes (patients with diabetes with HbA1c >9%)	27.9

Abbreviations: CHIP, Children's Health Insurance Program; HbA1c, hemoglobin A1c.

<sup>a</sup> Data obtained from the Health Resources and Services Administration, Maryland Uniform Data System, 2015. A total of 17 health centers served 303,352 patients (2).

**Table 2. Hypertension and Diabetes Screening and Control Measures From 4 Federally Qualified Health Centers (FQHCs) in Maryland, 2015–2016**

Measure	Aggregate Percentage of Patients in Contributing FQHCs
<b>Hypertension</b>	
Blood pressure screening: percentage of patients aged 18 years or older who are screened for high blood pressure (Physician Quality Reporting System measure 317).	82.2
Blood pressure control: percentage of patients aged 18–85 years who had a diagnosis of hypertension and whose blood pressure was adequately controlled during the measurement year (National Quality Forum measure 18).	62.6
<b>Diabetes</b>	
Diabetic eye examination: the percentage of patients aged 18–75 years with diabetes (type 1 or type 2) who had a retinal or dilated eye exam or a negative retinal exam (no evidence of retinopathy) by an eye care professional (National Quality Forum measure 55).	7.0
Diabetic foot examination: the percentage of patients aged 18–75 years with diabetes (type 1 or type 2) who received a foot examination (visual inspection and sensory examination with monofilament and a pulse exam) during the measurement year (National Quality Forum measure 56).	45.9
Diabetic A1c testing: the percentage of patients aged 18–75 years with diabetes (type 1 or type 2) who received an HbA1c test during the measurement year (National Quality Forum measure 57).	68.4
HbA1c poor control: The percentage of patients aged 18–75 years with diabetes (type 1 or type 2) whose most recent HbA1c level during the measurement year was greater than 9.0% (poor control) or was missing a result, or if an HbA1c test was not done during the measurement year (National Quality Forum Measure 59).	49.2

Abbreviation: HbA1c, hemoglobin A1c.

## SPECIAL TOPIC

# Pharmacist-Driven Strategies for Hypertension Management in Los Angeles: A Community and Stakeholder Needs Assessment, 2014–2015

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## PEER REVIEWED

## Abstract

In 2014, the Los Angeles County Department of Public Health received federal funding to improve the prevention and control of hypertension in the population through team-based health care delivery models, such as pharmacist-led medication therapy management. To inform this work, the department conducted a 3-part needs assessment consisting of 1) a targeted context scan of regional policies and efforts, 2) a key stakeholder survey, and 3) a public opinion internet-panel survey of Los Angeles residents. Results suggest that political will and professional readiness exists for expansion of pharmacist-led medication management strategies in Los Angeles. However, several infrastructure and economic barriers, such as a lack of sufficient payment or reimbursement mechanisms for these services, impede progress. The department is using assessment results to address barriers and shape efforts in scaling up pharmacist-led programming in Los Angeles.

## Background

Approximately 75 million Americans aged 18 years or older have hypertension, about half of whom have their hypertension under control (1). The Healthy People 2020 goal is to increase the proportion of adults with hypertension whose blood pressure is under control to 61.2% by 2020 (2). As part of its comprehensive efforts

to improve hypertension management across the country, the Centers for Disease Control and Prevention (CDC) launched the 1422 State and Local Public Health Actions to Prevent Obesity, Diabetes, and Heart Disease and Stroke initiative (the 1422 initiative) (3). The initiative comprises 15 strategies, 2 of which focus on the use of team-based care models for hypertension prevention and control: 1) increase engagement of nonphysician team members in hypertension management, and 2) increase engagement of pharmacists in providing medication therapy management (MTM) for adults with high blood pressure. Pharmacist-led MTM is a distinct service or group of services that optimize therapeutic outcomes for individual patients (4). It is an example of a health care model built on team-based care principles that are effective in chronic disease management (5–7). Based on strong evidence that blood pressure control improves when a pharmacist is included in team-based care and the potential of MTM in supporting other chronic disease conditions, the 1422 initiative incorporated strategies designed to help scale up and spread these pharmacist-led interventions and related team-based care approaches in the United States (3,8). In 2014, the Los Angeles County Department of Public Health (DPH) became one of 4 large city jurisdictions funded by CDC to administer the 1422 initiative.

To inform programs to address the strategies outlined above, DPH conducted a 3-part community and stakeholder needs assessment, focusing on ways to scale up MTM and comprehensive medication management (CMM) — an advanced, evidence-based patient-centered MTM model — in both community and clinical settings. This article presents findings from the assessment and describes key needs and assets that can help steer efforts to improve hypertension prevention and control in Los Angeles and other jurisdictions.



The opinions expressed by authors contributing to this journal do not necessarily reflect the opinions of the U.S. Department of Health and Human Services, the Public Health Service, the Centers for Disease Control and Prevention, or the authors' affiliated institutions.

## Community and Stakeholder Needs Assessment

Guided by the ecological approach, DPH collected information at the policy, organizational/community, and individual level (9). The needs assessment was implemented in fall 2015. It comprised 1) a context scan of existing regional policies and efforts, 2) a key stakeholder survey, and 3) a public opinion internet-panel survey of Los Angeles residents.

### Part I: Context scan of existing regional policies and efforts

To understand the political and contextual landscape in which the strategies of the 1422 initiative would be implemented, the DPH team conducted a purposeful context scan of 1) state laws on licensed pharmacists' scope of practice and 2) public health and community-based programs aimed at promoting pharmacist-led MTM/CMM. We identified policies, programs, and initiatives as a result of conversations with subject matter experts.

#### State laws on licensed pharmacists' scope of practice

Pharmacy practice in California made a critical shift in 2013 with the passing of Senate Bill 493 (10). The bill declared pharmacists to be "health care providers" who can bill for services, allowed pharmacists to independently initiate and administer certain medications and immunizations per state protocols, and authorized an advanced practice pharmacist (APP) board recognition program. Once fully established, the APP program will allow certified APPs to perform patient assessments, refer patients to other health care providers, and coordinate with patients' physicians to participate in the evaluation and management of disease. At present, pharmacists in California are allowed to perform many of these tasks under collaborative practice agreements made with individual physicians and health care providers (11). However, the APP program will give them these rights without requiring collaborative practice agreements, ultimately allowing pharmacists greater flexibility in providing MTM/CMM services. Although Senate Bill 493 is an important step forward for the pharmacist community, the infrastructure and mechanisms needed to carry out such programs are mostly undeveloped; for example, efforts to develop and adopt the protocols needed to enact Senate Bill 493 continue nearly 3 years after the bill was signed into law (12).

#### Public health and community-based programs

Many agencies in California have begun to test or scale up MTM/CMM approaches. The California Department of Public Health released a report in 2015 describing some of these efforts (13). The report discussed the unique education, training, and credentialing needs of pharmacists and offered evidence of the favorable impact

of CMM on patient outcomes. The report highlighted several pilot projects, including a project in the Los Angeles area that provided CMM services to high-risk patients in one of the country's largest federally qualified health centers.

Other community-based efforts targeting low-income neighborhoods in Los Angeles have incorporated similar MTM/CMM strategies, including the LA Barbershop project in which African American men (aged 35–79 y) were screened and referred for hypertension management during their usual barbershop visits (R. Victor, A. Reid, R. Elashoff, unpublished data, 2015). Finally, MTM/CMM approaches have been promoted by nonprofit organizations such as the American Heart Association, which recently established the Western States Affiliate Blood Pressure Task Force to help states improve management of high blood pressure in vulnerable populations. One of the principal goals of the task force is to study the potential impact of MTM/CMM on health care and medical practices in health systems in California (14).

### Part II: Key stakeholder survey

In October 2015, DPH collaborated with the University of Southern California School of Pharmacy and its partners to host the first annual pharmacist leadership symposium on opportunities to align advanced community pharmacy practice with unmet healthcare needs. The event brought together representatives from retail chain pharmacies, independent community pharmacies, academia, professional organizations, nonprofit organizations, insurance companies and other payers, and local health departments. Presentations and discussions at the symposium centered on opportunities for pharmacists to meet the chronic disease needs of communities and strategies to effectively scale up advanced pharmacy practices such as MTM/CMM in Los Angeles.

After the symposium, all 56 attendees were asked to complete a 17-item paper questionnaire developed by DPH staff; the items were informed by a literature review. The questionnaire included both closed- and open-ended questions and took approximately 10 minutes to complete (Box 1). Questions captured data on participant perspectives on priority actions needed to scale up pharmacist-led patient care activities, organizational readiness for implementing such systems or models of practice, and barriers to delivering MTM/CMM services. Collected data were managed and tallied by using Microsoft Excel software (Microsoft Corporation). This program improvement project was considered an exempt activity by the Los Angeles County DPH institutional review board.

**Box 1. Selected Questions From Key Stakeholder Survey, Administered to Attendees of the Symposium on Opportunities to Align Advanced Community Pharmacy Practice with Unmet Healthcare Needs, University of Southern California, October 2015**

Q7. Of these options, which do you consider to be the 3 most important actions to consider regarding pharmacists' patient care services in California?

- Increase **health care provider** awareness of and receptivity to pharmacists' patient care services
- Increase **patient** awareness of and receptivity to pharmacists' patient care services
- Improve reimbursement procedures or options among private insurers for pharmacists' patient care services
- Advance federal policy at Centers for Medicare & Medicaid Services to expand coverage of pharmacists' patient care services
- Build support among health care institutions by highlighting the business case for pharmacists' patient care services
- Standardize and increase access to training of pharmacists for advanced patient care practices
- Scale the use of collaborative practice agreements to expand pharmacists' patient care services in the community

Q11. Please indicate the extent to which your organization has implemented the following systems or practices: [Response options: fully in place, partially in place, under development, not in place, don't know].

Q12. If not already in place, how feasible would it be to implement or scale these systems or practices within your organization? [Response options: very feasible, somewhat feasible, somewhat not feasible, not at all feasible]

Q13. Even if not currently in place, how important are each of these systems or practices to improve patient outcomes related to medication and chronic disease management? [Response options: very important, somewhat important, somewhat not important, not important at all]

Q14. What, if any, barriers or challenges exist to implementing or scaling any of the above practices within your organization? Please explain.

[Systems or practices referenced in questions 11–14]

- Mechanisms to perform or obtain necessary assessments of a patient's health status (eg, in-person assessments in private or semi-private settings)
- Comprehensive medication therapy reviews (MTRs) to identify, resolve, and prevent medication-related problems, including adverse drug events
- Systems to provide patients with personal medication records (PMRs) that catalog prescription and nonprescription medications, herbal products, and other dietary supplements to assist in medication therapy self-management
- Verbal education and training designed to enhance patient understanding and track progress of self-management
- Mechanisms to provide information, support services, and other re-

sources designed to enhance patient adherence to therapeutic regimens

- Systems to monitor and evaluate the patient's response to therapy, including safety and effectiveness
- Consulting services and interventions to address medication-related problems, including referral to a physician or other health care professional when necessary
- Systems to document care delivered and communicate essential information to the patient's other primary care providers
- Coordination and integration of MTM [medication therapy management] services within the broader health care management services being provided to the patient

Of 56 attendees, 26 (46%) completed the survey; not all respondents answered all questions. Thirteen survey respondents reported their level of experience as at least 11 years or more, and 11 respondents self-identified as a pharmacist or as a member of pharmacy leadership in California. Respondents rated the following as top priority actions for scaling up pharmacist-led patient care services: 1) improve reimbursement procedures or options among private insurers, 2) advance federal policy at the Centers for Medicare & Medicaid Services to expand coverage of pharmacists' services, and 3) increase health care provider awareness of and receptivity to pharmacists' services. Professional practices and patient care system elements (eg, systems to communicate with primary care providers, patient education to support self-management, mechanisms to obtain patient health information) were consistently rated as important (Table 1). However, participants were not as optimistic about the current level of implementation in practice or the feasibility of implementing these models of practice.

Respondents identified many barriers associated with the scale-up and spread of pharmacist-led patient care services: 7 respondents indicated reimbursement and funding challenges; 6 respondents indicated health care provider challenges (ie, need for increased physician/provider awareness, support, and coordination); and 5 respondents indicated limited electronic record capabilities (eg, need for electronic medical record systems that readily allow for pharmacist–provider communications).

### Part III: Public opinion internet-panel survey

#### Survey methods

In December 2015, DPH commissioned Global Strategy Group to conduct a clinical services internet-panel survey of adult residents of Los Angeles. DPH developed the survey questions with support from Global Strategy Group, drawing from nationally validated surveys and internally developed instruments. Data were collected during 2 weeks and included data on demographics, health behaviors and attitudes, opinions of health care providers (eg, pharmacists), and personal health status. The survey was admin-

istered in English and Spanish to adults (aged  $\geq 18$  y) who resided in Los Angeles. Participants were recruited from existing participant panels established by reputable panel providers via email, social media, and mobile telephone applications. Incentives were provided after survey completion based on a structured incentive schedule established by the panel provider; rewards were determined based on the length of the survey and could be redeemed for miles, gift cards, or other items. All collected data were weighted to account for differential sampling rates, differential nonresponse, and other variables (marital status, education, income, and other demographic distributions of Los Angeles County). Data for demographic weights were based on the 2013 American Community Survey (15) and the 2011 Los Angeles County Health Survey (16).

For the pharmacist-led MTM component of the survey, participants were asked 2 questions and provided with the following definition of pharmacist-led MTM: "Medication therapy management (MTM) is a medical service provided to patients by pharmacists to optimize drug and improve therapeutic outcomes. MTM includes a broad range of professional activities, including but not limited to performing patient assessment and/or a comprehensive medication review, formulating a medication treatment plan, monitoring efficacy and safety of medication therapy, enhancing medication adherence through patient empowerment and education, and documenting and communicating MTM services to prescribers in order to maintain comprehensive patient care." The 2 questions were 1) "To your knowledge, do you have access to MTM [medication therapy management] at the place where you usually go or last went for health care?" and 2) "If MTM were available where you currently go for health care, how interested would you be in receiving this service when you need to take medicine? If you have used MTM please check that box." All study materials were reviewed and approved by the DPH institutional review board before field implementation.

### Data analysis and survey results

We generated descriptive statistics to describe participant demographics and understand the response profiles of those who were aware of having access to MTM services and would be interested in receiving MTM services. To further explore participant interest in receiving MTM services (dependent variable), we performed binary logistic regression. Model covariates, which were entered at the same time in the final model, included demographic characteristics (ie, age, sex, race/ethnicity, education, relationship status, insurance status), health indicators (ie, number of chronic conditions ever diagnosed, self-reported health status), knowledge of having access to MTM, and level of comfort discussing health issues with pharmacists. All data analyses were conducted by using StataSE version 14.0 (StataCorp LP).

Of 33,766 people initially invited to participate in the internet-panel survey, 1,751 clicked on the survey link. Among those who clicked on the link, 737 people were excluded because 1) they did not meet survey criteria or quotas established by Global Strategy Group to ensure accurate representation of the Los Angeles population ( $n = 460$ ), 2) they did not complete the survey ( $n = 175$ ), or 3) they were invalidated because of speeding (when respondents answer questions so quickly that they probably are not thoughtfully answering the questions) or straight lining (when respondents choose the same response for every question and are probably not thoughtfully answering the questions) ( $n = 102$ ). Our analytic sample consisted of 1,014 participants. Approximately 10% of the data were missing; only those with complete data ( $n = 968$ ) were included in the model analysis.

Most participants were aged 25 to 64 (71.2%), were Hispanic (42.8%) or white (30.4%), and reported being in excellent or very good health (55.9%) (Table 2). Approximately one-third (34.8%) reported having at least 2 chronic conditions. Approximately 9% reported having access to MTM services where they usually go for care, and 41.3% expressed interest in using or having used MTM services, regardless of what was currently available. Among participants who expressed interest in using MTM, 51.2% were women, 54.0% reported excellent to very good health, and 85.5% said they were generally comfortable speaking to a pharmacist.

The binary logistic model indicated that older age ( $\geq 65$  y) predicted interest in MTM ( $P = .02$ ). The model also indicated that those who were aware of having access to MTM services were less likely than those who had no knowledge to express interest in receiving MTM services ( $P < .001$ ). Additionally, compared with those who felt comfortable talking to pharmacists about their health, those who were not comfortable speaking with their pharmacists were more likely to be interested in receiving MTM services ( $P < .001$ ). Although somewhat unexpected, these results align with research on the challenges of developing client interest in MTM services and the complexities of patient decision making (17,18). Factors that inform patients' decision making are complex, and the process is often influenced not only by the perceived value of an intervention but also by the level of perceived harm from their condition (19,20). Although more research is needed on patients' level of comfort in talking to pharmacists, patients who are not comfortable talking to an individual pharmacist may perceive the team-oriented MTM as a desirable alternative.

### Discussion

Our needs assessment suggests challenges and opportunities for scaling up pharmacist-led MTM/CMM interventions. First, legislation (ie, Senate Bill 493) supports advancing MTM/CMM prac-

tice. However, infrastructure for expanding the practice is lacking. Second, many in the pharmacist community are ready to take action to scale up and spread MTM/CMM, but the lack of mechanisms for reimbursement of more advanced pharmacist practices is a key barrier to expansion. Third, although many people report feeling comfortable discussing health issues with their pharmacist, this comfort level does not necessarily translate into interest in MTM services. Our assessment also led to the creation of a synthesized list of needs and assets (Box 2). This information could be useful for informing the scale-up and spread of MTM/CMM programming in Los Angeles and elsewhere in the United States.

**Box 2. Synthesis of Needs and Assets Associated With the Scale-Up and Spread of Medication Therapy Management and Comprehensive Medication Management Programming in Los Angeles<sup>a</sup>**

**Needs**

Interoperable electronic medical record systems that facilitate pharmacist and provider communication (ie, capability to share information across different software platforms).

Clinic workflows that facilitate integration of pharmacists into primary care settings.

Payment and reimbursement reform for pharmacists, particularly in the community setting.

Increased health care provider awareness of and receptivity to pharmacists' patient care services (eg, calm fears among health care providers of losing patients to other providers).

Increased leadership or champions at all levels of practice advocating for integration of pharmacists within team-based care models.

Increased patient awareness and receptivity to the broadened scope of work of pharmacists in the health care team.

**Assets**

Pharmacists represent a highly skilled workforce that is currently underutilized and is ready and willing to expand their contributions to the health care team.

Federal and state support for integrating pharmacists into health care teams (ie, Patient Protection and Affordable Care Act, Senate Bill 493 in California).

Emerging evidence of the positive impact of increasing the role of pharmacists on the health care team and resultant best practices from pilot projects in diverse populations.

Overall public familiarity with pharmacists and comfort working with them.

With a growing demand for primary care services, there is increased opportunity to demonstrate the potential value in incorporating pharmacists more broadly into team care models.

Designation of pharmacists as health care providers in California, allowing for increased opportunities to establish reimbursement mechanisms for an expanded scope of work.

<sup>a</sup> Data sources: Butler et al (13), Los Angeles County Department of Public Health.

Although this community and stakeholder needs assessment provides insights into readiness to scale up MTM/CMM strategies in Los Angeles, it has limitations. First, the context scan of MTM/CMM efforts in Los Angeles and across California was not exhaustive; it was purposefully focused on legislative and programmatic strategies. Second, results from the leadership symposium survey offered only a snapshot of pharmacist and public health leadership opinions and did not capture data on the viewpoints of other health care professionals (eg, physicians, nurses). Other viewpoints may be important, because key processes in the health care system are not under the purview of pharmacy or public health communities. Third, the sample size was small and represented a group of providers who self-selected to attend a meeting promoting the use of MTM/CMM, potentially biasing the results of the survey. Finally, the internet-panel survey posed challenges to precise interpretation of public support for MTM services. Survey limitations include the following: 1) the recruitment mechanism used by internet-panel surveys lends itself to a high nonresponse rate, which could have limited the survey's validity; 2) although most Los Angeles residents speak mostly English or Spanish at home, participant views may differ and not reflect the views of other populations; 3) because the survey was internet based, people who have a limited understanding of MTM/CMM programming and its definition may have been underrepresented; 4) questions assessing interest in MTM did not provide qualifying information such as cost or scope of MTM; and 5) the quantitative nature of the survey did not allow for exploration of participant reasoning for their interest or lack thereof.

Public health and other health professions can capitalize on the opportunities identified in our needs assessment to better coordinate care for hypertension management in the community. Lessons learned from the effort in Los Angeles can inform other jurisdictions interested in strengthening its infrastructure for MTM/CMM programs.

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## References

1. Merai R, Siegel C, Rakotz M, Basch P, Wright J, Wong B, et al. CDC Grand Rounds: a public health approach to detect and control hypertension. *MMWR Morb Mortal Wkly Rep* 2016; 65(45):1261–4.
2. Clinical preventive services. Washington (DC): Office of Disease Prevention and Health Promotion, Healthy People 2020. [https://www.healthypeople.gov/2020/leading-health-indicators/2020-lhi-topics/Clinical-Preventive-Services/data#blood pressure](https://www.healthypeople.gov/2020/leading-health-indicators/2020-lhi-topics/Clinical-Preventive-Services/data#blood%20pressure). Accessed February 7, 2017.
3. Centers for Disease Control and Prevention. Chronic disease prevention and health promotion. <http://www.cdc.gov/chronicdisease/about/foa/2014foa/index.htm>. Accessed July 31, 2016.
4. Bluml BM. Definition of medication therapy management: development of professionwide consensus. *J Am Pharm Assoc* (2003) 2005;45(5):566–72.
5. Santschi V, Chiolero A, Colosimo AL, Platt RW, Taffé P, Burnier M, et al. Improving blood pressure control through pharmacist interventions: a meta-analysis of randomized controlled trials. *J Am Heart Assoc* 2014;3(2):e000718.
6. Santschi V, Chiolero A, Paradis G, Colosimo AL, Burnand B. Pharmacist interventions to improve cardiovascular disease risk factors in diabetes: a systematic review and meta-analysis of randomized controlled trials. *Diabetes Care* 2012; 35(12):2706–17.
7. Carter BL, Clarke W, Ardery G, Weber CA, James PA, Vander Weg M, et al. A cluster-randomized effectiveness trial of a physician–pharmacist collaborative model to improve blood pressure control. *Circ Cardiovasc Qual Outcomes* 2010; 3(4):418–23.
8. Community Preventive Services Task Force. Cardiovascular disease prevention and control: team-based care to improve blood pressure control. <https://www.thecommunityguide.org/findings/cardiovascular-disease-team-based-care-improve-blood-pressure-control>. Accessed April 18, 2017.
9. Sallis JF, Owen N, Fisher EB. Ecological models of health behaviors. In: Glanz K, Rimer BK, Viswanath K, editors. *Health behavior and health education: theory, research, and practice*. 4th edition. San Francisco (CA): Jossey-Bass; 2008. p.465–85.
10. California Legislative Information. Senate bill no. 493. [http://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill\\_id=201320140SB493](http://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=201320140SB493). Accessed July 31, 2016.
11. Division for Heart Disease and Stroke Prevention, National Center for Chronic Disease Prevention and Health Promotion, Centers for Disease Control and Prevention. State law fact sheet: select features of state pharmacist collaborative practice laws; 2012. [https://www.cdc.gov/dhds/pubs/docs/Pharmacist\\_State\\_Law.PDF](https://www.cdc.gov/dhds/pubs/docs/Pharmacist_State_Law.PDF). Accessed February 24, 2017.
12. California State Board of Pharmacy. Pending regulations. [Updated April 14, 2017.] [http://www.pharmacy.ca.gov/laws\\_regs/pending\\_regs.shtml](http://www.pharmacy.ca.gov/laws_regs/pending_regs.shtml). Accessed August 24, 2016.
13. Butler A, Dehner M, Gates R, Shane P, Chu M, DeMartini L, et al. Comprehensive medication management programs: description, impacts, and status in Southern California. Sacramento (CA): California Department of Public Health; 2015.
14. Unpublished charter. Commission of the Blood Pressure Task Force. San Jose (CA): American Heart Association, Western States Affiliates; 2016.
15. US Census Bureau. American Community Survey. <https://www.census.gov/programs-surveys/acs/data.html>. Accessed April 27, 2017.
16. Los Angeles County Department of Public Health. Los Angeles County health survey. <http://www.publichealth.lacounty.gov/ha/hasurveyintro.htm>. Accessed May 19, 2017.
17. Garcia GM, Snyder ME, McGrath SH, Smith RB, McGivney MS. Generating demand for pharmacist-provided medication therapy management: identifying patient-preferred marketing strategies. *J Am Pharm Assoc* (2003) 2009;49(5):611–6.
18. Schultz H, Westberg SM, Oliveira DR, Brummel A. Patient-perceived value of Medication Therapy Management (MTM) services: a series of focus groups. *Innov Pharm* 2012;3(4):96.

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19. Eskås PA, Heimark S, Eek Mariampillai J, Larstorp AC, Fadl Elmula FE, Høieggen A. Adherence to medication and drug monitoring in apparent treatment-resistant hypertension. *Blood Press* 2016;25(4):199–205.
20. Rajpura J, Nayak R. Medication adherence in a sample of elderly suffering from hypertension: evaluating the influence of illness perceptions, treatment beliefs, and illness burden. *J Manag Care Pharm* 2014;20(1):58–65.

Tables

**Table 1. Responses to a Questionnaire on Implementation of Current Pharmacy Practices, Feasibility of Implementing Future Actions, and Perceived Importance to Patient Outcomes, Pharmacy Leadership Symposium, Los Angeles County, 2015<sup>a</sup>**

Pharmacy Practice	Answered "Fully" or "Partially" Implemented (%)	Answered "Very" or "Somewhat" Feasible to Implement (%)	Answered "Very" or "Somewhat" Important in Improving Patient Outcomes (%)
Mechanisms to perform or obtain assessments of patient's health status (eg, in-person assessments in private or semi-private settings)	10 of 21 (47.6)	12 of 15 (80.0)	19 of 19 (100.0)
Comprehensive medication therapy reviews to identify, resolve, and prevent medication-related problems, including adverse drug events	13 of 21 (61.9)	13 of 16 (81.3)	19 of 19 (100.0)
Systems to provide patients with personal medication records that catalog prescription and nonprescription medications, herbal products, and other dietary supplements to assist in medication therapy self-management	11 of 21 (52.4)	13 of 16 (81.3)	19 of 19 (100.0)
Verbal education and training designed to enhance patient understanding and track progress in self-management	10 of 20 (50.0)	15 of 17 (88.2)	19 of 19 (100.0)
Mechanisms to provide information, support services, and other resources designed to enhance patient adherence to therapeutic regimens	11 of 21 (52.4)	14 of 16 (87.5)	19 of 19 (100.0)
Systems to monitor and evaluate the patient's response to therapy, including safety and effectiveness	11 of 20 (55.0)	16 of 16 (100.0)	19 of 19 (100.0)
Consulting services and interventions to address medication-related problems, including referral to a physician or other health care professional when necessary	13 of 21 (61.9)	13 of 15 (86.7)	19 of 19 (100.0)
Systems to document care delivered and communicate essential information to the patient's primary care providers	12 of 21 (57.1)	12 of 15 (80.0)	19 of 19 (100.0)
Coordination and integration of medication therapy management services within the broader health care management services being provided to the patient	12 of 21 (57.1)	14 of 16 (87.5)	19 of 19 (100.0)

<sup>a</sup> Twenty-six of 56 symposium attendees completed the 17-item survey. Not all respondents answered all questions; denominators indicate the number of participants who answered the question.

**Table 2. Participant Demographics, Access to MTM, and Interest in Receiving MTM Services: Results of a Los Angeles County Internet-Panel Survey, 2015**

Characteristics	No. (Weighted Proportion <sup>a</sup> ) (n = 1,014)
<b>Age, y</b>	
18–24	107 (14.2)
25–44	407 (39.2)
45–64	334 (32.0)
≥65	166 (14.6)
<b>Sex</b>	
Male	454 (48.7)
Female	560 (51.3)
<b>Race/ethnicity</b>	
White	417 (30.4)
Hispanic	317 (42.8)
African American	69 (8.4)
Asian	184 (16.2)
Other	27 (2.3)
<b>Marital status</b>	
Married	429 (45.9)
Not married, but living with partner	91 (7.2)
Single	359 (35.3)
Divorced/separated/widowed	128 (11.0)
Prefer not to say	7 (0.6)
<b>Insurance status</b>	
Employer provided	480 (45.4)
Self-purchased	127 (11.3)
Medicare	182 (17.8)
Medicaid	139 (15.5)
Military	7 (0.5)
Other/don't know	79 (9.6)
<b>Education</b>	
High school diploma or less	183 (30.5)
Some college or technical school	227 (25.1)
Associate's degree	75 (8.5)
Bachelor's degree	324 (21.9)

Abbreviation: MTM, medication therapy management.

<sup>a</sup> All collected data were weighted to account for differential sampling rates, differential nonresponse, and other variables (marital status, education, income, and other demographic distributions of Los Angeles County). Data for demographic weights were based on the 2013 American Community Survey (15) and the 2011 Los Angeles County Health Survey (16).

<sup>b</sup> Survey participants were provided with the following definition of pharmacist-led MTM: "Medication therapy management (MTM) is a medical service provided to patients by pharmacists to optimize drug and improve therapeutic outcomes. MTM includes a broad range of professional activities, including but not limited to performing patient assessment and/or a comprehensive medication review, formulating a medication treatment plan, monitoring efficacy and safety of medication therapy, enhancing medication adherence through patient empowerment and education, and documenting and communicating MTM services to prescribers to maintain comprehensive patient care."

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(continued)

**Table 2. Participant Demographics, Access to MTM, and Interest in Receiving MTM Services: Results of a Los Angeles County Internet-Panel Survey, 2015**

Characteristics	No. (Weighted Proportion <sup>a</sup> ) (n = 1,014)
Graduate degree	198 (13.3)
Prefer not to answer	7 (0.7)
<b>Self-reported health status</b>	
Excellent/very good	587 (55.9)
Good/fair	413 (42.4)
Poor	14 (1.6)
<b>No. of chronic conditions ever diagnosed</b>	
0 or 1	649 (65.2)
2 or 3	247 (23.0)
≥4	118 (11.8)
<b>Comfort speaking to pharmacist</b>	
Extremely comfortable	119 (13.6)
Very comfortable	259 (24.2)
Somewhat comfortable	404 (38.6)
Not very comfortable	146 (14.6)
Not at all comfortable	86 (9.1)
<b>Do you have access to MTM at the place where you usually go or last went for care?<sup>b</sup></b>	
Yes	76 (9.1)
No	267 (25.3)
Don't know/not sure	671 (65.6)
<b>If MTM were available, how interested in receiving the service when you need to take medication?<sup>b</sup></b>	
Very interested	77 (8.1)
Somewhat interested	317 (31.0)
Not very interested	308 (28.5)
Not interested at all	292 (30.2)
Have used MTM	20 (2.2)

Abbreviation: MTM, medication therapy management.

<sup>a</sup> All collected data were weighted to account for differential sampling rates, differential nonresponse, and other variables (marital status, education, income, and other demographic distributions of Los Angeles County). Data for demographic weights were based on the 2013 American Community Survey (15) and the 2011 Los Angeles County Health Survey (16).

<sup>b</sup> Survey participants were provided with the following definition of pharmacist-led MTM: "Medication therapy management (MTM) is a medical service provided to patients by pharmacists to optimize drug and improve therapeutic outcomes. MTM includes a broad range of professional activities, including but not limited to performing patient assessment and/or a comprehensive medication review, formulating a medication treatment plan, monitoring efficacy and safety of medication therapy, enhancing medication adherence through patient empowerment and education, and documenting and communicating MTM services to prescribers to maintain comprehensive patient care."

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## ORIGINAL RESEARCH

# A Framework for Implementing the National Diabetes Prevention Program in Los Angeles County

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## PEER REVIEWED

## Abstract

### Introduction

Preventing type 2 diabetes is a public health priority in the United States. An estimated 86 million Americans aged 20 years or older have prediabetes, 90% of whom are unaware they have it. The National Diabetes Prevention Program (NDPP) has the potential to reduce the incidence of type 2 diabetes; however, little is known about the best way to institutionalize such a program in a jurisdiction with a racially/ethnically diverse population. The objective of this study was to develop a practice-grounded framework for implementing the NDPP in Los Angeles County.

### Methods

In 2015, the Los Angeles County Department of Public Health (LACDPH) partnered with Ad Lucem Consulting to conduct a 3-stage formative assessment that consisted of 1) in-depth interviews with key informants representing community-based organizations to learn about their experiences implementing the NDPP and similar lifestyle-change programs and 2) 2 strategic planning sessions to obtain input and feedback from the Los Angeles County Diabetes Prevention Coalition. LACDPH identified core activities to increase identification of people with type 2 diabetes and referral and enrollment of eligible populations in the NDPP.

### Results

We worked with LACDPH and key informants to develop a 3-pronged framework of core activities to implement NDPP: expanding outreach and education, improving health care referral systems and protocols, and increasing access to and insurance coverage for NDPP. The framework will use a diverse partner network to advance these strategies.

### Conclusion

The framework has the potential to identify people with prediabetes and to expand NDPP among priority populations in Los Angeles County and other large jurisdictions by using a diverse partner network

## Introduction

Preventing type 2 diabetes is a public health priority in the United States (1). Prediabetes occurs when a person's blood glucose level is higher than normal (fasting blood glucose level of 100–125 mg/dL [5.6 to 7.0 mmol/L]), putting the person at increased risk for heart disease, stroke, and developing type 2 diabetes (2,3). An estimated 86 million Americans aged 20 years or older have prediabetes, and 90% of those do not know they have it (3). In 2012, diabetes and prediabetes were estimated to cost \$245 billion nationally and \$32.3 billion in California, through direct medical spending and lost productivity (4).

Prediabetes can be reversed through lifestyle modifications (3,4). For example, the National Diabetes Prevention Program (NDPP), an intensive lifestyle-change program focused on improving diet and physical activity, can delay the onset of diabetes among those at risk (5,6). In response, the Centers for Disease Control and Prevention (CDC) made significant investments in state and local efforts to translate NDPP into community settings and to grow the program in the Los Angeles County (7). In 2014, the Los Angeles County Department of Public Health (LACDPH) was selected as a



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large-city participant in CDC's cooperative agreement 1422, State and Local Public Health Actions to Prevent Obesity, Diabetes, and Heart Disease and Stroke. In Los Angeles this program is called the Chronic Disease Prevention Strategy. One of the program's primary aims is to expand access to and participation in NDPP in Los Angeles. To advance this goal, LACDPH partnered with the YMCA of Metropolitan Los Angeles to co-lead the Los Angeles County Diabetes Prevention Coalition (LACDPC), which was established in 2012 to help the YMCA and others expand enrollment in the NDPP.

Although LACDPC could serve as a powerful vehicle in Los Angeles to implement NDPP, the actions the coalition should take to institutionalize the program across this large, racially/ethnically diverse jurisdiction were unclear. In particular, little is known about the best ways to implement such a program among high-risk, high-burden priority populations (ie, those who have prediabetes or uncontrolled high blood pressure, those who live in low-income communities, and those in racial/ethnic minority populations who experience disparities in access to and quality of care) (7). To develop a practice-grounded framework for the Los Angeles County NDPP, we conducted a 3-stage formative assessment. This assessment sought to answer the following questions: 1) what core activities are needed to identify, refer, and enroll eligible participants in the NDPP, including establishing payment options to offset costs?, and 2) what key partners are needed to advance this work?

## Methods

In summer 2015, LACDPH partnered with Ad Lucem Consulting (ALC) to conduct a 3-phase formative assessment to inform objectives for the Chronic Disease Prevention Strategy, including identifying a strategic plan for the LACDPC. The assessment team, which included staff members from LACDPH and ALC, used an outcomes-focused approach (8), first defining the desired goal — increasing identification, referral, and enrollment of eligible populations into the NDPP — and then working backward to identify key activities and partners. In phase 1, ALC conducted in-depth interviews with key informants to learn about their experiences implementing NDPP and similar lifestyle-change programs. In phase 2, ALC and LACDPH presented results from these interviews to LACDPC for input and feedback. In phase 3, LACDPH synthesized results from the interviews and coalition dialogues into a practice-based framework. The project was reviewed and considered exempt by the LACDPH internal review board.

### Phase 1: Qualitative key informant interviews

Eligible participants were recruited through a multistage sampling process that combined snowball and maximum variation techniques (9). The goal was to identify leaders in prevention and management in the United States working in various roles (ie, practitioners, policy makers, researchers, and funders) and organizations (eg, health care agencies, health plans, health departments, community-based organizations [CBOs]). First, LACDPH, along with contacts at the American Diabetes Association, American Association of Diabetes Educators, and CDC, provided ALC with a list of potential participants who were individuals or organizations that had field experience implementing the NDPP or other chronic disease prevention or management programs, or who had conducted NDPP-focused research and evaluation. An initial round of interviews was carried out with those listed: 1) organizations that were CDC-recognized NDPP providers (if applicable), and 2) individuals or organizations that had experience serving priority populations. Interviewees in the initial round were then asked to identify other individuals or organizations meeting the inclusion criteria. Recruitment continued until the sample included a balance of participants in terms of roles and organizational types. ALC recruited all potential interviewees through email, with follow-up telephone calls, as needed.

Of the 45 experts identified, 33 consented to participate. ALC conducted interviews with representatives from health departments and government agencies (9 respondents), health care providers and health plans (9 respondents), nonprofit and CBOs (8 respondents), academic institutions (4 respondents), and funders (3 respondents). Most participants were from Los Angeles (18 respondents), and the others (15 respondents) were from large metropolitan cities (populations of 8 million or more) or large states (populations of more than 19 million).

Four trained ALC interviewers conducted all interviews by telephone in August and September 2015. The interview guide included 7 primary open-ended questions and associated probes focused on understanding 1) how to increase referrals to NDPP, 2) how to increase enrollment in NDPP, 3) models for NDPP delivery, 4) barriers to implementing NDPP, 5) models for reimbursement and coverage of NDPP, 6) expanding the pool of NDPP providers, and 7) the role of health departments in implementing NDPP. Each interview was conducted by one interviewer and lasted approximately one hour, during which time the interviewer typed notes (transcripts) to record responses verbatim. The transcripts were then uploaded into Atlas.ti (Scientific Software Development, GmbH) for qualitative analysis. First, 2 interviewers developed a list of thematic codes based on the interview questions. Second, the 4 interviewers independently coded transcripts in batches, meeting 4 times as a full group to reconcile coding, re-

fine the coding scheme, and group codes into themes in 4 pre-defined areas relevant to developing a strategic plan for LACDPC 1): ways to increase demand for the NDPP among patients and providers, 2), ways to engage the health care system, 3) ways to increase the supply and capacity of NDPP providers, and 4) ways to conduct NDPP implementation research and evaluation.

**Phase 2: Input from the Los Angeles County Diabetes Prevention Coalition**

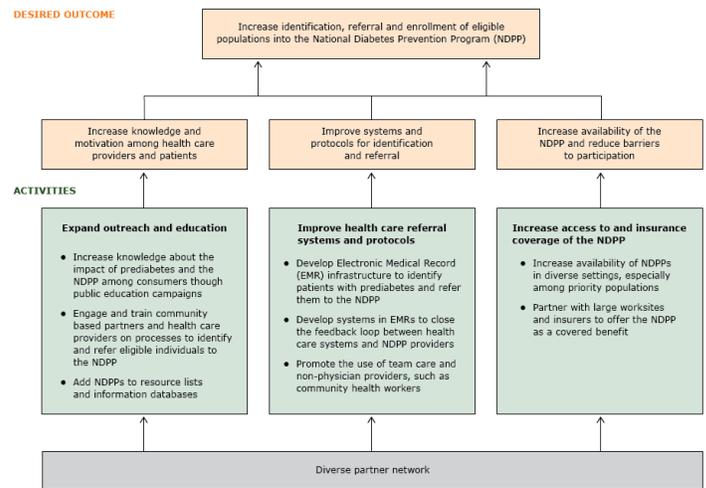
ALC and LACDPH presented the themes developed from the interviews during phase 1 to LACDPC during 2 in-person strategic planning sessions in December 2015 and February 2016. Sixteen coalition members, representing 11 institutions, participated. The sessions, which lasted approximately 3 hours each, focused on systematically generating input on key activities that were most important and relevant to advancing diabetes prevention in Los Angeles. We solicited reactions from coalition members with questions such as, Is this activity important?, What partners are needed to implement these activities?, What else could complement these activities?, and How can these activities be applied to diabetes prevention work locally in Los Angeles?. During each session, one trained note taker recorded participants’ discussion. ALC and LACDPH staff members then met to review and summarize the notes, which were then shared via email with the full coalition for final input and confirmation.

**Phase 3: Framework development**

Two LACDPH team members conducted a holistic analysis of the data generated during phases 1 and 2 and synthesized these into a framework that identified the core activities needed to increase identification, referral, and enrollment of eligible populations into the NDPP in Los Angeles. The 2 team members were guided by, but not bound to, analyses conducted by ALC in phase 1 to identify the themes that were presented to the coalition. LACDPH staff compiled interview transcripts and notes from coalition sessions into a master document. Two team members reviewed this document independently, working inductively to assign descriptive codes to segments of text (10,11). After independent review, the 2 team members met to discuss codes, reconcile differences in interpretation, and develop a core set of activities. The team prioritized activities that were identified by both multiple interview participants and members of LACDPC. The team grouped the activities into overarching domains and developed a visual representation to show how they relate to one another and the desired outcomes.

**Results**

Key informant interviews generated themes in phase 1, and the coalition generated additional input in phase 2 (Table). The framework developed in phase 3 consists of 3 domains 1): expanding outreach and education, 2) improving health care referral systems and protocols, and 3) increasing access to and insurance coverage for NDPP. The framework relies on a diverse partner network for advancing these strategies (Figure).



**Figure.** Framework for implementing the National Diabetes Prevention Program (NDPP) in Los Angeles County.

**Expand outreach and education.** The first domain emphasizes the importance of providing education and training to the public and community-based partners and health care providers to increase knowledge and awareness of prediabetes and of the NDPP. LACDPH identified 3 activities to expand outreach and education. First, to help increase knowledge among the general public, public education campaigns such as the Ad Council’s Diabetes Prevention Campaign ([www.adcouncil.org/Our-Campaigns/Health/Type-2-Diabetes-Prevention](http://www.adcouncil.org/Our-Campaigns/Health/Type-2-Diabetes-Prevention)) are needed to emphasize the importance of preventing diabetes and the value of lifestyle-change programs. Participants recommended creating and disseminating a national message that includes an appropriate local-level focus to help empower those most affected by prediabetes to talk to their health care providers (ie, helping to increase demand for the NDPP). Second, participants recommended developing educational resources targeting community partners and health care providers (ie, physicians, community health workers, *promotoras*, health navigators, and large employers). Participants emphasized the importance of training community-based partners and health care providers on the content and scope of NDPP, on tools to

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screen people for prediabetes, and on integrating screening and referral tools into practice. Existing training resources, such as the American Medical Association–CDC Prevent Diabetes STAT toolkit (<https://preventdiabetesstat.org/toolkit.html>), were identified as important tools for increasing knowledge and enhancing the referral process. Third, participants recommended creating an NDPP resource inventory (ie, informational resource lists and databases) as a complementary activity to increase knowledge and awareness of programs, including where, when, and in what languages classes are offered.

**Improve health care referral systems and protocols.** The second domain emphasizes the need to create referral systems and protocols for health care providers to refer and identify at-risk patients to NDPP. LACDPH identified 3 activities to improve health care referral systems and protocols. First, participants recommended enhancing the existing electronic medical record (EMR) system to identify patients with prediabetes and refer those eligible to local health care providers participating in NDPP. Participants recommended developing mechanisms to conduct regular queries of EMRs to identify patients at risk for prediabetes and link them to NDPP providers through an automatic referral process. CBOs could use similar electronic processes to screen people for diabetes risk and refer those eligible directly to local NDPP providers. Second, participants recommended modifying EMRs to create feedback loops between the health system and local NDPP providers. These feedback loops would help enhance bidirectional communication between health systems and community-based NDPP providers to more effectively manage patient care. Third, participants recommended expanding the use of team care and nonphysician providers, especially community health workers, to identify and refer patients to NDPP. Participants emphasized the relevance of using team-based approaches to reduce provider burden and enhance coordination of care for patients to improve processes for identifying and referring patients to NDPP.

**Increase access to and insurance coverage of the NDPP.** The third domain emphasizes the importance of increasing access to NDPP and insurance coverage for health care associated with participation in NDPP. Participants described the lack of program options (eg, delivery formats, language options) and insurance coverage for NDPP as significant barriers to enrollment, especially for priority populations, including those in low-income communities and those who speak languages other than English. LACDPH identified 2 activities to increase access and coverage. First, participants recommended increasing the availability of NDPP providers in diverse settings and expanding the network of NDPP providers by 1) providing technical assistance to new organizations to administer the NDPP and 2) helping current providers increase their reach in priority areas. Participants identified the need

to improve the cultural relevance of NDPP, including training lifestyle coaches that represent the cultures and languages of high-risk populations and developing and disseminating a culturally diverse resource guide for participants to augment NDPP and support the adoption of healthy behaviors. Recommendations were made to offer the program in identified priority languages: Spanish, Chinese, and Korean. Second, participants described the need to partner with large worksites and insurers to offer NDPP as a covered insurance benefit. Working directly with employers can help facilitate access to NDPP and insurance coverage for NDPP health care services. Interview participants felt that employer-based NDPP programs (ie, offering NDPP directly at targeted worksites) were a convenient way to engage potential program participants, implement screening protocols, and facilitate coverage of the program. Insurance providers were identified as another key partner in helping to remove cost barriers to participation in the NDPP. The need to conduct additional research and evaluation to identify NDPP models that meet the need of payers by demonstrating return on investment is a high priority. In addition, creating financial and quality incentives, such as a Healthcare Effectiveness Data and Information Set measure for prediabetes, might facilitate increased access to and insurance coverage of NDPP-related health care.

**Partner network.** The framework relies on a diverse partner network to implement NDPP. Participants described diverse partnerships to facilitate capacity building among providers, assist with the development of educational resources for training, increase awareness of NDPP, and provide resources for increasing access to the program. Participants stressed the importance of partnerships among health care organizations, local and national government entities, nonprofit organizations, CBOs, payers, local funding organizations, and NDPP provider organizations. Additionally, participants emphasized the need to work with local NDPP providers to pilot programs and test payment models to build the case for insurance coverage. Participants from LACDPC recognized the importance of their role in facilitating many of these partnerships by convening key stakeholders (ie, NDPP providers, insurers, academic partners, health care providers, government, CBOs) and working to grow the coalition to increase the diversity of organizations and member expertise.

## Discussion

We described a 3-pronged framework to increase the identification, referral, and enrollment of participants in NDPP: expanding outreach and education, improving health care referral systems and protocols, and increasing access to and insurance coverage of

the NDPP. The framework relies on a diverse partner network in advancing this work. The framework provides a roadmap for the work of LACDPH and LACDPC.

Increasing uptake of the NDPP in Los Angeles will require the use of a multipronged approach that simultaneously focuses on increasing availability of and demand for the program while reducing potential barriers to program participation. Such an approach echoes calls to action from leaders in community translation and in clinical prevention; these calls have separately included recommended actions to increase awareness among patients and health care providers about the risk of prediabetes (12), to enhance clinical systems to institutionalize the novel prevention approach (13,14), or to implement varied and sustainable program and payment models to ensure that the NDPP is available and accessible to the full population in need (12,15). The framework developed in this study synthesized key informant recommendations into a single practice-based model that emphasizes the importance of advancing the 3 prongs of the framework concurrently so that they are mutually reinforcing.

Our study suggests that diverse partners are needed to implement the framework. Best-practice recommendations to implement evidence-based programs reinforce the importance of early and meaningful involvement from a full range of stakeholders (8); our study suggests that key stakeholders in the implementation of NDPP should include representatives from business, health systems, NDPP providers, government, community, education/academia, and philanthropy. A coordinated, collaborative effort that includes these groups (the foundations of this effort were developed locally by LACDPC [16]) will be needed to advance the multifaceted and mutually reinforcing strategies necessary to implement NDPP in Los Angeles County. We anticipate that LACDPC can build on this study's framework with input from community members to address the complex health problem that diabetes poses (16–23).

The formative assessment process and resulting framework described in this study has been useful in Los Angeles for organizing and developing plans to implement NDPP (21). The framework is currently being implemented by LACDPC, which has adopted a subcommittee structure to advance activities in each of the framework's 3 domains. Other evidence-based health promotion programs have suggested the need for additional actions, such as assessing local conditions and capacity (24,25). However, this type of planning action did not emerge as a priority in our study. One potential reason for this is that the multistage process of vetting broader national perspectives (collected in phase 1) with local stakeholders (through the planning sessions held in phase 2), resulted in a framework that reflects existing conditions in Los Angeles County and steps needed to implement the framework.

Although more work is needed to systematically examine the framework's local usefulness and impact, other interested jurisdictions may wish to adapt the formative assessment process used in this study to develop practice-based frameworks that reflect their own local needs.

This study has several limitations. First, although the strategic planning process offered an opportunity to confirm and enrich interview data, the scope of the information presented during these sessions was limited by the initial interview guide. A more open-ended process could have acquired more information. Similarly, soliciting the perspective of potential NDPP participants could have provided information on barriers and facilitators to program enrollment; however, because our study focus was to identify key actions organizations could take to expand NDPP, collecting such data from potential participants was beyond the scope of this assessment. Second, the assessment was guided by an outcomes-focused, practice-grounded approach (7), which sought to identify concrete action steps to increase the identification, referral, and enrollment of eligible populations into NDPP in Los Angeles. A theoretical model was not used to guide the assessment. Finally, although key informant interviews were conducted with various local and national experts, viewpoints from Los Angeles were heavily represented in the development process. Additional efforts are needed to determine whether our framework can be useful for other jurisdictions.

A comprehensive framework that identifies the core activities and partners needed to implement the NDPP regionally can provide a useful platform to organize collaborative efforts. Other jurisdictions can use the processes and results in this study to help advance evidence-based, lifestyle-change programs such as the NDPP in their communities.

## Acknowledgments

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## References

1. Office of Disease Prevention and Health Promotion. Healthy people 2020: diabetes. <https://www.healthypeople.gov/2020/topics-objectives/topic/diabetes/objectives>. Accessed August 1, 2016.
2. Centers for Disease Control and Prevention. National diabetes fact sheet; 2011. <http://www.cdc.gov/diabetes/pubs/pdf/methods11.pdf>. Accessed March 1, 2017.
3. Centers for Disease Control and Prevention. Prediabetes: Could it be you? <https://www.cdc.gov/diabetes/pubs/statsreport14/prediabetes-infographic.pdf>. Accessed August 1, 2016.
4. American Diabetes Association. Economic costs of diabetes in the U.S. in 2012. *Diabetes Care* 2013;36(4):1033–46.
5. Diabetes Prevention Program (DPP) Research Group. The Diabetes Prevention Program (DPP): description of lifestyle intervention. *Diabetes Care* 2002;25(12):2165–71.
6. Hamman RF, Horton E, Barrett-Connor E, Bray GA, Christophi CA, Crandall J, et al.; Diabetes Prevention Program (DPP) Research Group. Factors affecting the decline in incidence of diabetes in the Diabetes Prevention Program Outcomes Study (DPPOS). *Diabetes* 2015;64(3):989–98.
7. Centers for Disease Control and Prevention. What is the dual approach? National fact sheet. <https://www.cdc.gov/dhdsp/docs/dhdsp-dual-approach.pdf>. Accessed March 1, 2017.
8. Edwards N. Scaling-up health innovations and interventions in public health: a brief review of the current state-of-the-science. Proceedings of the Conference to Advance the State of the Science and Practice on Scale-up and Spread of Effective Health Programs. 2010 July 6–8. Washington, DC: Institute for Health Care Improvement.
9. Palinkas LA, Horwitz SM, Green CA, Wisdom JP, Duan N, Hoagwood K. Purposeful sampling for qualitative data collection and analysis in mixed methods implementation research. *Adm Policy Ment Health* 2015;42(5):533–44.
10. Lincoln YS, Guba EG. *Naturalistic inquiry*. Newbury Park (CA): Sage Publications; 1985.
11. Neergaard MA, Olesen F, Andersen RS, Sondergaard J. Qualitative description — the poor cousin of health research? *BMC Med Res Methodol* 2009;9(25):52.
12. Ali MK, Echouffo-Tcheugui J, Williamson DF. How effective were lifestyle interventions in real-world settings that were modeled on the Diabetes Prevention Program? *Health Aff (Millwood)* 2012;31(1):67–75.
13. Wagner EH, Austin BT, Von Korff M. Organizing care for patients with chronic illness. *Milbank Q* 1996;74(4):511–44.
14. Whittemore R, Melkus G, Wagner J, Dziura J, Northrup V, Grey M. Translating the diabetes prevention program to primary care: a pilot study. *Nurs Res* 2009;58(1):2–12.
15. Ackermann RT, Marrero DG. Adapting the Diabetes Prevention Program lifestyle intervention for delivery in the community: the YMCA model. *Diabetes Educ* 2007;33(1):69–78, 74–5, 77–8.
16. Butterfoss FD, Goodman RM, Wandersman A. Community coalitions for prevention and health promotion. *Health Educ Res* 1993;8(3):315–30.
17. Roussos ST, Fawcett SB. A review of collaborative partnerships as a strategy for improving community health. *Annu Rev Public Health* 2000;21(1):369–402.
18. Singer HH, Kegler MC. Assessing interorganizational networks as a dimension of community capacity: illustrations from a community intervention to prevent lead poisoning. *Health Educ Behav* 2004;31(6):808–21.
19. Chavis DM. Building community capacity to prevent violence through coalitions and partnerships. *J Health Care Poor Underserved* 1995;6(2):234–45.
20. Donnelly PG, Kimble CE. Community organizing, environmental change, and neighborhood crime. *Crime Delinq* 1997;43(4):493–511.
21. Gase LN, DeFosset AR, Torres J, Kuo T. Using network analysis to build and strengthen the Diabetes Prevention Coalition in Los Angeles County. *Prev Chronic Dis* Forthcoming, 2017.
22. Ad Lucem Consulting. Scaling diabetes prevention efforts in Los Angeles: executive summary and action plan. Los Angeles (CA): Los Angeles County Department of Public Health, Division of Chronic Disease and Injury Prevention; 2016.
23. Babey SH, Wolstein J, Diamant AL, Goldstein H. Prediabetes in California: nearly half of California adults on path to diabetes (PB2016-1). Los Angeles (CA): UCLA Center for Health Policy Research; 2016, p. 1–8.
24. Gallivan J, Greenberg R, Brown C. The National Diabetes Education Program evaluation framework: how to design an evaluation of a multifaceted public health education program. *Prev Chronic Dis* 2008;5(4):A134.

25. Aziz Z, Absetz P, Oldroyd J, Pronk NP, Oldenburg B. A systematic review of real-world diabetes prevention programs: learnings from the last 15 years. *Implement Sci* 2015; 10(1):172.

Table

**Table. Recommended Actions for Implementing the National Diabetes Prevention Program (NDPP): Results From Key Informant (N = 33) Interviews and Discussions With the Los Angeles County Diabetes Prevention Coalition<sup>a</sup>**

Phase 1. Activities Identified from Key Informant Interviews (N = 33) <sup>a</sup>	Phase 2. Feedback from the LAC Diabetes Prevention Coalition
<b>Area 1: Ways to Increase Demand for the NDPP Framework Domain: Expand Outreach and Education</b>	
<b>Increase prediabetes awareness</b>	
<ul style="list-style-type: none"> <li>• Promote the Ad Council American Diabetes Association (ADA)/American Medical Association (AMA)/Centers for Disease Control and Prevention (CDC) National Prediabetes Awareness Campaign to increase knowledge and awareness of the NDPP (n = 9).</li> <li>• Work with regional NDPP provider organizations to encourage the use of traditional and social media channels to distribute the campaign (n = 17).</li> <li>• Partner with regional media outlets reaching high-risk ethnic populations to promote the campaign (n = 10).</li> </ul>	<ul style="list-style-type: none"> <li>• Develop a strategy for the coalition to promote the campaign in the region.</li> <li>• Develop relationships with local media outlets to promote the campaign.</li> <li>• Work to tailor the campaign to have more of a local focus and message.</li> </ul>
<b>Engage trusted, culturally relevant organizations and individuals to promote prediabetes screening and the NDPP</b>	
<ul style="list-style-type: none"> <li>• Adopt and disseminate non-invasive risk assessments screeners for prediabetes (eg, ADA and CDC prediabetes risk screeners) (n = 33).</li> <li>• Enlist organizations and individuals (eg, <i>promotoras</i>, diabetes educators, churches, community groups, health care systems) to conduct prediabetes screenings and concurrent NDPP promotion and referral (n = 25).</li> </ul>	<ul style="list-style-type: none"> <li>• Work with local health department to disseminate resources for identifying patient risk of prediabetes.</li> <li>• Host regional training on identifying prediabetes risk with community health workers, <i>promotoras</i>, and health navigators.</li> <li>• Partner with local community clinic organizations and community-based organizations (CBOs) to provide educational resources and training to increase screening and referrals.</li> <li>• Partner with Covered California to conduct screening of prediabetes risk with individuals applying for health insurance.</li> </ul>
<b>Outreach to employers to promote NDPP</b>	
<ul style="list-style-type: none"> <li>• Identify and develop resources for how to work with local employers to implement the NDPP (n = 20).</li> <li>• Work with employers to identify opportunities to offer onsite classes for employees and/or refer employees to NDPP programs in the region (n = 20).</li> <li>• Develop materials and resources on return on investment (ROI) of the NDPP, including impacts on absenteeism and worker productivity (n = 21).</li> <li>• Partner with regional organizations that work directly with large employers (eg, Los Angeles Chamber of Commerce Health Committee chapters, unions) (n = 8).</li> <li>• Facilitate healthy competition, for example, invite employers to publicize NDPP success stories (n = 6).</li> </ul>	<ul style="list-style-type: none"> <li>• Work with local health department to identify organizations (ie, employers, nonprofits) to adopt the NDPP for employees.</li> <li>• Partner with third-party groups to identify organizations interested in scaling the NDPP.</li> <li>• Host a convening of regional employer human resource departments to educate them about the NDPP and identify opportunities to implement the program.</li> <li>• Partner with local health plans to identify employers with robust worksite wellness options to discuss providing NDPP services on site for employees.</li> <li>• Identify models for how NDPP providers can work with employers in the region.</li> </ul>
<b>Area 2: Ways to Engage Health Care Systems Framework Domain: Improve Health Care Referrals Systems and Protocols</b>	
<b>Educate health care providers on prediabetes screening and the NDPP</b>	
<ul style="list-style-type: none"> <li>• Survey clinics to understand local health system approaches to identifying, referring, and enrolling individuals into the NDPP (n = 18).</li> <li>• Identify key individuals/organizations to facilitate conversations with health care systems (eg, chief medical officers, Community Clinic Associations) to identify education needs (n = 20).</li> </ul>	<ul style="list-style-type: none"> <li>• Work with local health department to develop/adapt materials and provide training and technical assistance for educating providers on the NDPP.</li> <li>• Partner with local health department to develop continuing medical education for providers and lay practitioners on the NDPP.</li> <li>• Partner with local health department to develop and pilot test NDPPs within local health systems.</li> </ul>

Abbreviations: LAC, Los Angeles County; NDPP, National Diabetes Prevention Program; STAT, Screen/Test/Act Today; CBOs, community-based organizations.  
<sup>a</sup> All themes and actions were generated from response rates from participants in key informant interviews and the in-person strategic planning session. Numbers in parentheses indicate how often the recommended action was recorded during the key informant interviews.

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**Table. Recommended Actions for Implementing the National Diabetes Prevention Program (NDPP): Results From Key Informant (N = 33) Interviews and Discussions With the Los Angeles County Diabetes Prevention Coalition<sup>a</sup>**

Phase 1. Activities Identified from Key Informant Interviews (N = 33) <sup>a</sup>	Phase 2. Feedback from the LAC Diabetes Prevention Coalition
<ul style="list-style-type: none"> <li>• Develop (as needed) and disseminate materials and toolkits for educating providers on the NDPP (eg, AMA CDC Prevent Diabetes STAT Toolkit, US Preventive Services Taskforce prediabetes screening guidelines) (n = 30).</li> <li>• Develop continuing medical education resources around prediabetes risk and identification and referral to the NDPP (n = 30).</li> </ul>	
<b>Promote use of electronic medical records (EMRs) to generate lists of patients with prediabetes and generate automatic referrals</b>	
<ul style="list-style-type: none"> <li>• Develop mechanisms and protocol for local health care systems to: 1) query EMRs to generate lists of patients with prediabetes (n = 20); use EMRs to generate patient referrals to the NDPP and other programs (n = 13); 3) create feedback loops between NDPP providers and health care providers to track patient NDPP enrollment and progress (n = 25).</li> <li>• Partner with organizations implementing EMRs (eg, CBOs, NDPP providers) to develop infrastructure for identification, referral, and enrollment in NDPP (n = 14).</li> </ul>	<ul style="list-style-type: none"> <li>• Partner with local health departments to develop/adapt materials for health systems to use to educate providers on the NDPP.</li> <li>• Partner with local health care systems to develop infrastructure to screen, refer, and enroll patients into the NDPP.</li> <li>• Develop a comprehensive database for chronic disease prevention and management programs in the region for providers to use to refer patients.</li> <li>• Partner with meaningful use governing boards to create practice-based models for screening and referring into the NDPP.</li> <li>• Partner with local health care systems to evaluate and identify best practices for implementing NDPP in the region.</li> </ul>
<b>Create financial and quality measure incentives for addressing prediabetes (n = 33)</b>	
<ul style="list-style-type: none"> <li>• Partner with health and medical groups (eg, CDC, Community Clinic Association of Los Angeles County) to promote: 1) including prediabetes screening in National Committee for Quality Assurance regulatory requirements for quality of care; 2) creating Health Care Effectiveness Data and Information Set measures for NDPP components; 4) incorporating NDPP in patient-centered medical home certification.</li> <li>• Partner with research institutions to conduct an economic analysis of the NDPP looking at ROI.</li> <li>• Engage health care systems and providers in quality improvement projects that focus on NDPP referral processes.</li> </ul>	<ul style="list-style-type: none"> <li>• Develop a white paper looking at the ROI for health care system implementing the NDPP.</li> <li>• Develop a white paper on facilitators and barriers to implementing the NDPP in health care settings.</li> </ul>
<b>Area 3: Ways to Increase the Supply and Capacity of NDPP Providers Framework Domain: Increase Access to and Insurance Coverage for the NDPP</b>	
<b>Expand the network of CDC-recognized NDPP providers</b>	
<ul style="list-style-type: none"> <li>• Develop resource inventory to include maps of current NDPPs in the region (n = 10).</li> <li>• Identify community organizations in high-need areas who may be interested in developing programs like the NDPP (n = 7).</li> <li>• Develop resources and training opportunities on the CDC NDPP recognition process to make it understandable and accessible to local community organizations (n = 20).</li> <li>• Identify funding sources to provide lifestyle coach training with no costs to participants (n = 23).</li> <li>• Work with small regional organizations serving low-income and ethnic populations to become recognized NDPP providers (n = 7).</li> <li>• Conduct training and technical assistance with regional organizations to obtain CDC recognition (n = 4).</li> <li>• Convene local CBOs and other potential provider organizations to discuss barriers and facilitators to implementing the NDPP (n = 17).</li> </ul>	<ul style="list-style-type: none"> <li>• Create resource inventory to identify and map NDPP providers in the region.</li> <li>• Facilitate resources and/or funding for CBOs to become recognized NDPP providers.</li> <li>• Provide trainings and technical assistance on how organizations can become CDC-recognized, especially with regard to data collection and reporting.</li> <li>• Identify and reach out to organizations working on chronic disease management to see if they are interested in providing NDPP.</li> <li>• Develop budget templates that organizations can use when establishing NDPPs.</li> <li>• Develop best practices resources of what has worked with providers regionally and locally in developing NDPP efforts.</li> <li>• Work with members of the coalition to identify funding opportunities (hospital benefits departments, etc.) for developing NDPPs.</li> </ul>

Abbreviations: LAC, Los Angeles County; NDPP, National Diabetes Prevention Program; STAT, Screen/Test/Act Today; CBOs, community-based organizations.  
<sup>a</sup> All themes and actions were generated from response rates from participants in key informant interviews and the in-person strategic planning session. Numbers in parentheses indicate how often the recommended action was recorded during the key informant interviews.

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Phase 1. Activities Identified from Key Informant Interviews (N = 33) <sup>a</sup>	Phase 2. Feedback from the LAC Diabetes Prevention Coalition
<ul style="list-style-type: none"> <li>• Work with existing recognized NDPP programs to: 1) expand their NDPPs to hard-to-reach areas; 2) develop a train-the-trainer model for NDPP program development and recognition; 3) partner with regional CBOs to host NDPPs for community members.</li> <li>• Identify funding opportunities to expand NDPP efforts (eg, ADA, AMA, regional hospital community benefits departments) (n = 33).</li> </ul>	
<b>Improve the cultural relevance of NDPP</b>	
<ul style="list-style-type: none"> <li>• Tailor NDPP curricula/materials to meet the needs of a variety of cultural and linguistic groups (n = 27).</li> <li>• Identify top 5 languages/cultures in the region and translate NDPP materials into those priority languages (n = 27).</li> <li>• Train lifestyle coaches to provide curriculum in priority languages identified for the region (n = 10).</li> <li>• Identify culturally competent lifestyle coaches to provide NDPP in priority languages (n = 10).</li> </ul>	<ul style="list-style-type: none"> <li>• Facilitate resources for CBOs to adapt/create materials and toolkits for NDPP implementation.</li> <li>• Adapt NDPP lifestyle coach training opportunities to include training options in languages identified as priority in the region.</li> <li>• Provide training for NDPP providers to include other issues impacting participants (eg, mental health).</li> </ul>
<b>Evaluate local prediabetes data</b>	
<ul style="list-style-type: none"> <li>• Identify methods for collecting prediabetes prevalence data (n = 8).</li> <li>• Monitor ongoing data collection and analysis of regional NDPP providers (n = 8).</li> <li>• Report and disseminate prediabetes data to help identify best practices (n = 3).</li> <li>• Publish papers on facilitators and barriers to implementing the NDPP (n = 10).</li> </ul>	<ul style="list-style-type: none"> <li>• Develop a survey for key stakeholders to understand the local impacts of prediabetes and the need for the NDPP.</li> </ul>
<b>Conduct NDPP implementation evaluation in existing and new pilot sites</b>	
<ul style="list-style-type: none"> <li>• Develop an evaluation toolkit that can be implemented in across NDPP sites that includes information on what data to collect, data sources, how to analyze data, and how to report to CDC (n = 13).</li> <li>• Develop resources to measure: 1) enrollment and retention: Individuals' decision-making processes; 2) program delivery (providers, cost, location, languages, frequency, use of personal scales); 3) impact (adoption of healthy behaviors, progression to diabetes).</li> <li>• Evaluate fidelity of NDPP implementation among local NDPP providers (n = 18).</li> </ul>	<ul style="list-style-type: none"> <li>• Convene key stakeholders to identify and prioritize data sources for evaluating implementation of the NDPP in the region.</li> <li>• Develop platform to facilitate sharing of NDPP program data.</li> <li>• Develop an evaluation plan for NDPP providers to use to measure success.</li> <li>• Conduct research of NDPP implementation efforts and disseminate reports on findings.</li> <li>• Disseminate finding of outcome data of existing pilot programs.</li> <li>• Develop and disseminate best practices from data collected through pilot projects in the region.</li> </ul>

Abbreviations: LAC, Los Angeles County; NDPP, National Diabetes Prevention Program; STAT, Screen/Test/Act Today; CBOs, community-based organizations.  
<sup>a</sup> All themes and actions were generated from response rates from participants in key informant interviews and the in-person strategic planning session. Numbers in parentheses indicate how often the recommended action was recorded during the key informant interviews.

### COMMUNITY CASE STUDY

# Using a Community Workshop Model to Initiate Policy, Systems, and Environmental Change That Support Active Living in Indiana, 2014–2015

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## Abstract

### Background

Engaging in regular physical activity reduces the likelihood of developing chronic diseases. A community's rates of physical activity are directly connected to its built environment characteristics, which correspondingly affect the chronic disease prevalence of its population. Community planning and design interventions can increase levels of physical activity and reduce chronic disease rates by identifying and removing environmental and policy barriers that may hinder active living.

### Community Context

Community stakeholder groups of various sizes and in various settings in Indiana are beginning to make changes to their policies, systems, and environments to increase levels of physical activity for residents.

### Methods

We conducted day-long active living workshops in cities and towns in Indiana to help organize and support public officials, community-based organizations, and advocates in their efforts to promote policy, system, and environmental (PSE) changes that lead to more active communities.

### Outcome

We found that following a consistent process of holding a community workshop and then conducting ongoing follow-up activities led to PSE changes within 1 year. Communities that hosted active living workshops created identifiable changes by supporting active living goals through policy adoption, the creation of new advisory committees, and new local funding allocations.

### Interpretation

The collaborative approach in the workshop provides a successful model for communities to build capacity to implement PSE strategies that support active living. This method requires various community stakeholders to work closely together, using a shared approach to make changes that would be difficult to achieve if they were working independently.

## Background

Participating in regular physical activity provides many health benefits, including the reduction of chronic diseases. Strong scientific evidence shows that, as opposed to inactive people, physically active people have lower rates of various chronic diseases, including multiple types of cancers, type 2 diabetes, and heart disease (1).

A community's built environment characteristics and the rates of physical activity and chronic diseases among its residents are directly connected (2). By identifying and removing environmental and policy barriers that hinder active living, community planning and design interventions can increase levels of physical activity and reduce levels of chronic disease among residents (3).

Active living is defined as a way of life that integrates physical activity into everyday routines, such as walking to the store or bicycling to work (4,5). The Community Preventive Services Task Force recommends the creation of or enhanced access to places for



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physical activity because of strong evidence of the effectiveness of these places in increasing physical activity and improving physical fitness (6).

Studies show that communities supporting and promoting active living exhibit higher levels of both leisure-related and transportation-related physical activity. However, in many settings, environments that support active living do not typically occur without deliberate intervention through community planning and design efforts (7).

Many communities in Indiana struggle to begin planning and designing their communities to promote active living. Community leaders, advocates, and public health professionals are often not familiar with communitywide approaches to identifying opportunities for active living. It is usually necessary to provide leaders with assistance in facilitating and understanding the process of collectively supporting and promoting active living in their communities.

## Community Context

Indiana's population is estimated by the US Census Bureau to be 6,619,680 as of July 2015 (8). In Indiana, only 44.1% of the adult population complete the recommended 150 minutes of physical activity per week (9), and only 25.3% of the youth population meet the recommended minimum of 60 minutes of physical activity per day (10). Overweight and obese adults in Indiana comprise 66.5% of the population, making Indiana the 15th most obese state in the nation (11).

Since the 1950s, communities throughout Indiana have developed without infrastructure that supports active living. From the 1950s through the 1990s, many Indiana residential and commercial developments were built without sidewalks, safe pedestrian crossings, or provisions for bicycles. This lack of safe pedestrian, bicycle, and transit options is a major barrier, severely limiting the options of Indiana residents trying to live more active lives.

Communities of various sizes and in various settings across the state are organizing stakeholder groups and initiating collaborative processes designed to increase levels of physical activity for residents. Much of this work began in 2010 with the preparation of Indiana's Comprehensive Nutrition and Physical Activity Plan (12). This plan contains community objectives that support the active living workshop approach. The goals and objectives contained in the 2010 plan were used as a basis to apply for enhanced funding from the Centers for Disease Control and Prevention

(CDC) as a means to support the active living workshop approach during the 5-year funding cycle. By providing technical assistance in assessing community physical activity policy, this approach meets an identified need in communities (13).

The objective of active living workshops and follow-up activities as public health interventions is to enable local stakeholders to understand challenges that community members face while trying to live more active lives. Workshops and follow-up activities should also provide guidance and technical assistance in addressing those challenges. The objective of community engagement efforts is to involve local citizens in educational and experiential learning activities, including presentations, walk audits, suitability mapping exercises, and exercises to identify and prioritize active living issues and action steps.

Outcomes of interest for community engagement efforts included the establishment of new active living advisory groups in communities. These groups assisted in the adoption of active living policies and programs, helped create changes to systems, and supported the construction of active living projects after completing their workshops (Table).

## Methods

The workshops were conducted by staff members from the Indiana State Department of Health's (ISDH's) Division of Nutrition and Physical Activity (DNPA), and by Health by Design (the organization that ISDH hires to help lead the workshops). We conducted 15 active living workshops in communities in Indiana in 2014 and 2015 to help organize public officials, staff members of community-based organizations, and advocates in their efforts to promote policy, system, and environmental (PSE) changes that lead to more active communities. Funding paid for staff members of Health by Design and ISDH to assist with the workshop planning, facilitation, and follow-up activities. No funding was provided directly to the communities to facilitate the workshops or for implementation activities. The workshops were funded with 1305 funds (State Public Health Actions to Prevent and Control Diabetes, Heart Disease, Obesity and Associated Risk Factors and Promote School Health Cooperative Agreement) from CDC. The workshops were conducted in communities across Indiana. Populations of host communities ranged from 1,898 to 145,448 in both rural and urban settings. The average host community's size was 34,824.

The workshops followed a prescribed approach that began with a competitive application and ended with the submission of a success story 1 year after the workshop (Appendix). Communities selected to host a workshop exhibited a readiness to proceed and a leadership structure that supported follow-up activities. Com-

munities not selected either submitted incomplete applications or failed to illustrate their readiness to host a workshop. The approach used in conducting the active living workshops and associated activities was the result of lessons learned from 25 workshops on related topics conducted by ISDH DNPA before 2014. We learned from prior workshops that immersive, hands-on activities, when combined with verbal presentations and small group discussions, resulted in high evaluation ratings from attendees. We also learned that extensive preworkshop planning and coordinated follow-up led to better long-term results. We funded 15 active living workshops during 2014 and 2015, part of the 5-year 1305 funding cycle.

### **Preworkshop selection and planning: before the workshop**

An annual call for applications was advertised throughout the state near the end of each year to notify community leaders of the schedule to submit applications to host a workshop. Fifteen to 20 applications were submitted by communities each year during the funding cycle for the 5 available workshop slots. A selection committee — comprising representatives from the IDSH and Health by Design — used an objective selection process to review the applications on the basis of each applicant's response to 10 questions. The 5 most qualified applicants were chosen to host a workshop each year.

Each community chosen to host a workshop was notified of its selection. An initial coordination conference call was scheduled to begin the process of organizing the workshop. Communities that were not chosen were offered consultations to discuss how they could prepare a successful application in the future. Two communities that were not selected for workshops requested follow-up consultations during this period.

The initial workshop coordination call included key community leaders who were the point of contact throughout the workshop and the year-long follow-up activities. The workshop agenda and required follow-up activities were discussed in detail. A list of potential groups to attend the workshop was provided to organizers to ensure that a broad representation of local leaders attended the workshop.

A preworkshop site visit was conducted with 6 of the 10 communities to view the walk audit route, finalize the design visualization location, and see the room where the workshop was to be located. Follow-up conference calls with the host community were conducted if a site visit was not possible. The conference calls provided an opportunity to coordinate various details of the workshop.

Before the workshop, the facilitation team and local organizers conducted promotional activities to maximize attendance and ensure participation from community representatives. The facilitation team prepared a workshop flyer and press release and provided it to the local organizers for distribution in the community. The facilitation team provided guidance on how to promote the workshop to potential attendees. An online signup page was also provided to allow workshop attendees to preregister. The facilitation team periodically reviewed the registration list and provided guidance to the local organizers if key community leaders had not registered. The preregistration process has been effective in monitoring the local promotional efforts of the workshops — we have not had to cancel any of the workshops because of low numbers of preregistered attendees. Workshops were typically scheduled during the warmer months of May through October in Indiana to allow for comfortable conditions for the walk audit.

### **Workshop activities: a detailed look**

The day-long workshop began with presentations that outlined the connection between public health and the built environment, as well as PSE change. Local, regional, state, and national data on public health indicators were presented to help attendees understand the challenges communities face when becoming healthier. Mayors, hospital administrators, and other elected and appointed officials typically spent the entire day at the workshop.

A guided walk audit was conducted during the morning. The walk audit route was typically 1 half-mile to 1 mile long, determined by the location of the workshop, and began with a brief presentation on elements that support a good walking environment. The intent was to enable attendees to see the built environment through the eyes of a pedestrian in various settings, including residential and commercial areas.

The walk audit was led by a facilitator who stopped at various points along the route to identify features that support walking and those that are barriers to walking. Attendees were asked for their observations of conditions along the route. When a member of the community with a disability participated in the walk audit, he or she provided a good perspective and a better understanding of the challenges that people with disabilities face in negotiating the built environment. Many attendees responded in the workshop evaluation that the walk audit provided a new appreciation of the barriers that prevent all members of the local community from living a more active life.

An active living suitability mapping exercise was conducted after lunch, using maps of the community prepared by the local host (Figure 1). Small groups (8 attendees per map) noted local destinations, as well as dangerous intersections and the level of suitability.

ity of roadway corridors for walking and bicycling. Each small group presented the results of their map to the entire group. The maps were photographed and included in the summary report for the workshop.



**Figure 1.** Workshop mapping exercise, using a community workshop model to support active living in Indiana, 2014–2015.

After the mapping exercise, we gave a presentation on best practices for planning and designing for active living. The presentation included best practices organized under the “5 Ps” of active living: policies, programs, plans, projects, and performance measures. A design visualization sketch, which illustrates a before-and-after design solution that enhances bicycle or pedestrian safety in a previously identified area in the community in need of a physical improvement, was also included in this part of the workshop (Figure 2).



**Figure 2.** Design visualization sketch, using a community workshop model to support active living in Indiana, 2014–2015.

The workshop concluded with an issue identification and prioritization exercise held in small groups. Tables of 8 attendees self-selected an active living topic to discuss. Topics have included walking, bicycling, land use and public spaces, parks and recreation, schools, and transit. Each group discussed both short-term and long-term ideas to address active living in the community and reported their findings to the larger group. The short-term and long-term strategies identified by each group were posted on a wall in the room. The workshop concluded with each attendee voting for the 3 issues they consider most important in both the short-term and long-term categories, using a dot voting method. This exercise was useful for visualizing and identifying consensus among the group on the various priorities discussed.

### **Workshop follow-up: 1 year postworkshop**

For all workshops, a summary document was prepared and sent to each attendee by email. This document included links to electronic copies of the presentations, a summary of the activities of the workshop, a description of the walk audit, the before-and-after design visualization sketch, a summary of the mapping exercise, and a summary of the issue-identification exercise, with the priority issues identified through the dot voting. Links to sources of additional information were listed under each of the issues that the groups identified in the small group session during the workshop.

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Three months after the workshops, each community prepared and submitted an action plan to the state workshop team, using a template provided to assist with its preparation. After 9 months, a progress report was completed using an online survey tool. Finally, the local workshop team wrote and submitted a success story to document the outcome of the year-long effort. Often, the local community workshop team leaders created a small working group to assist in preparing the action plan and the success story. Many communities dedicated staff time and funding to assist with the preparation and implementation of the action plan and the success story.

The effectiveness of the workshop was evaluated at several points during the process. At the end of each workshop, attendees completed an evaluation survey. The action plan submitted by the local organizer 3 months after the workshop was a good way to assess the results of the prioritization exercise. A progress report form was sent to the local organizer 9 months after the workshop to gather data on their progress in implementing their action plan.

## Outcome

Outcomes of interest focused on community accomplishments within 1 year of conducting the active living workshops. Communities established active living advisory groups, adopted active living policies and programs, created changes to systems, leveraged new funding, and constructed projects after completing their workshops (Table).

Many communities experienced quick results after hosting a workshop (Table). Some communities organized new committees to guide change; others adopted new policies. A few allocated new funding to implement the ideas that emerged from the workshops. One community created a new Active Living Committee comprising the attendees of the workshop. The committee helped guide the spending of \$100,000 that was allocated by the city council (after conducting the workshop) for active living improvements in the city. That same community created a bicycle festival and parade that was conducted by the workshop organizers to promote active lifestyles. After their workshop, 1 county allocated \$2,500 to help plan activities in support of a new regional trail. One organizer said of the workshop, “[It] was one of the most important events that the Adams County Winning With Wellness Coalition has ever done for the improvement of our community.”

Some communities found that the workshop increased the community’s capacity for collaboration and identified challenges they were facing. Unfortunately, an organizer of the Shelbyville work-

shop was struck by a vehicle while walking near downtown the day after the workshop. The workshop organizers immediately used presentation materials from the workshop to make a case to the Indiana State Department of Transportation (INDOT) for emergency pedestrian-safety improvements at the intersection of the crash.

Other communities realized the challenges they face in facilitating change on state highways running through their communities. Attendees at most workshops expressed difficulty in understanding the complex funding, regulatory, and development approvals necessary to make active living improvements along these corridors. We now ask for a regional representative of INDOT to participate in all our workshops to address these important concerns.

The workshop provides a unique opportunity for local and regional public health practitioners to communicate with community members. For many attendees, the workshop is the first opportunity they have had to work with one another. The Purdue University Extension Service recently hired more than 40 county-based community wellness coordinators to implement PSE changes throughout Indiana. The workshops have provided an opportunity for the newly hired community wellness coordinators to engage with their communities. The Purdue University Extension Service office is organizing their own active living workshops throughout the state to engage their community wellness coordinators with local stakeholders.

We found that using a consistent process — holding a community workshop and then conducting ongoing follow-up activities — led to PSE changes within a year. Our findings indicate that the workshops created identifiable changes that support active living in communities that hosted them, resulting in policy adoption, the creation of new advisory committees, and allocation of new local funding.

## Interpretation

The active living workshops in Indiana are helping local communities implement PSE changes to promote the levels of active living they desire. One of the keys to success in this type of intervention is to have paid staff members on the statewide workshop facilitation team who have the capacity to organize and follow up with the communities that host a workshop.

We found that the consistent, ongoing communication and reporting required for this program creates greater outcomes than a workshop without any required preliminary planning and ongoing

follow-up activities. Funding time for the facilitation staff members to oversee and manage the process before, during, and after the workshop is critical to the overall success of the program. The year-long follow-up process after the workshop is consistently effective in implementing the local action plans that communities have created.

We found that the communities involved desire an ongoing forum to discuss their efforts in promoting active living. To respond to this need, we invited community representatives who hosted a workshop to a peer exchange meeting at the 2016 statewide walking and bicycling summit. The intent of this exchange was to enable communities to share their successes and challenges in implementing active living initiatives. Representatives of communities scheduled to host a workshop in the future also attended the peer exchange meeting. The meeting provided a valuable forum for both existing and future grantees under this program to plan and implement their active living PSE strategies.

Some communities face challenges in preparing a winning application to host a workshop. Many communities with the greatest need have the least capacity to prepare an application that meets the requirements of being selected. We facilitated a half-day training session in a community that was not selected to host a workshop (although they had applied twice). The intent of the training was to increase the capacity of the community leaders to prepare a successful application in the future. The community submitted an application the following year to host an active living workshop, and it was selected. We are exploring additional half-day trainings to assist communities that need assistance preparing a successful application.

The use of a community workshop combined with structured follow-up activities provides an effective framework for implementing PSE changes to support healthier communities. The collaborative approach among various groups within the workshop setting provides an accepted model for community leaders to work toward long-term implementation of PSE strategies. This work requires alignment and coordination of various community stakeholders, offering a shared approach to accomplishing change that would be unlikely if they were working independently.

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represent the official position of CDC. Users of this document should be aware that every funding source has different requirements governing the appropriate use of those funds. Under US law, no federal funds are permitted to be used for lobbying or to influence, directly or indirectly, specific pieces of pending or proposed legislation at the federal, state, or local levels. Organizations should consult appropriate legal counsel to ensure compliance with all rules, regulations, and restriction of any funding sources. The authors thank Kelly Fritz for her assistance in editing this article for sentence structure and grammar.

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## References

1. US Department of Health and Human Services, Office of Disease Prevention and Health Promotion. 2008 Physical activity guidelines for Americans. <http://www.health.gov/paguidelines>. Accessed June 5, 2017.
2. Frank L, Engelke P, Schmid T. Health and community design. The impact of the built environment on physical activity. First edition. Washington (DC): Island Press; 2003.
3. Dobson NG, Gilroy A. From partnership to policy: the evolution of active living by design in Portland, Oregon. *Am J Prev Med* 2009;37(6S2):S436–S444.
4. Evenson KR, Sallis JF, Handy SL, Bell R, Brennan LK. Evaluation of physical projects and policies from the active living by design partnerships. *Am J Prev Med* 2012; 43(5S4):S309–S319.
5. World Health Organization. Jakarta statement on active living. [http://www.who.int/healthpromotion/conferences/previous/jakarta/statements/active\\_living/en/](http://www.who.int/healthpromotion/conferences/previous/jakarta/statements/active_living/en/). Accessed June 29, 2017.
6. US Department of Health and Human Services, Guide to Community Preventive Services. Increasing physical activity: environmental and policy approaches. <http://www.thecommunityguide.org/pa/environmental-policy/index.html>. Accessed June 5, 2017.
7. Aytur SA, Rodriguez DA, Evenson KR, Catellier DJ, Rosamond WD. Promoting active community environments through land use and transportation planning. *Am J Health Promot* 2007;21(4):397–406.

8. US Census Bureau. State and county quickfacts: Indiana. <http://www.census.gov/quickfacts/table/PST045215/18>. Accessed September 21, 2016.
9. Behavioral Risk Factor Surveillance System. Indiana statewide survey data 2015. Indianapolis (IN): Indiana State Department of Health; 2016. <http://www.in.gov/isdh/reports/brfss/2015/CLV11.24.htm>. Accessed June 29, 2017.
10. Youth Risk Behavior Surveillance. Indianapolis (IN): Indiana State Department of Health; 2016. <http://www.in.gov/isdh/20627.htm>. Accessed June 29, 2017.
11. Trust for America's Health, Robert Wood Johnson Foundation. The state of obesity: better policies for a healthier America; 2016. <http://stateofobesity.org/resources/>. Accessed September 21, 2016.
12. Indiana's comprehensive nutrition and physical activity plan, 2010–2020. Indianapolis (IN): Indiana State Department of Health, Indiana Healthy Weight Initiative Task Force; 2010. [https://www.in.gov/icw/files/IN\\_State\\_Obesity\\_Plan\\_2010-2020.pdf](https://www.in.gov/icw/files/IN_State_Obesity_Plan_2010-2020.pdf). Accessed June 5, 2017.
13. Goins KV, Ye J, Leep CJ, Robin N, Lemon SC. Local health department engagement in community physical activity. *Am J Prev Med* 2016;50(1):57–68.

Table

**Table. Selected Workshop Locations With Short-Term Outcomes and Long-Term Results, Indiana, 2014–2015**

Community	Population (2010)	Short-Term Outcomes	Long-Term Results
Lebanon	15,792	Completed bicycle and pedestrian master plan; secured \$100,000 for Safe Routes to School, sidewalks; secured \$100,000 budget line item for active living; enforced installation of bicycle racks with new development	Formed active living steering committee
Frankfort	16,422	Secured commitment to build bump-outs; installed bicycle racks; installed new signage for smoke-free parks, playgrounds; developed new shared-use policies and revised school wellness policy; secured active living and health references in comprehensive plan	Pursued local and grant funding; increased participation and strengthened existing partners
Batesville	6,520	Participated in first Walk to School Day; completed application for funding for bicycle lot; held Velo in the Ville event	Submitted grant applications to fund active living initiatives
Williamsport	1,898	Secured \$2,500 for trail development; held bicycle rodeo, community ride and education activities; created Facebook page	A small core group has begun to meet
Madison	11,967	Worked with school corporation to fabricate bicycle racks; secured funding for bicycle and pedestrian master plan	Developed and implementing a vision and action plan; meeting quarterly
Hendricks County	145,448	Analyzed data on bicycle and pedestrian crashes	Helped build better interdepartmental and interagency relationships; improved communication; connected to community health improvement plan
Anderson	56,129	Installed wayfinding; made spot improvements to sidewalks, intersections; developed pilot Safe Routes to School programs at 2 elementary schools; planned road diet projects	Helped to start/expand community conversations about active living, walking, and bicycling
Bloomington	80,405	Held Open Streets and ShareFest events; held public education program on volunteer driver programs; included broader audience and held focus groups as part of parks and recreation master planning efforts	Expanded active living coalition membership; led to greater coordination with other groups
Decatur	9,405	Developed pilot pedestrian alley project; secured community foundation funding to create bicycle racks; attained land for riverfront development	Funded and hired full-time community coordinator; improved networking and collaboration among community partners
Pendleton	4,253	Secured funding for bicycle and pedestrian master plan; developed story map for Safe Routes to School project	Strengthened relationship, partnership with school corporation

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## Appendix. Active Living Workshop Timeline, Showing Workshop Tasks and Months to Complete, Using a Community Workshop Model to Support Active Living in Indiana, 2014–2015

This file is available for download as a Microsoft Word document at [https://www.cdc.gov/pcd/issues/2017/docs/16\\_0503Appendix.docx](https://www.cdc.gov/pcd/issues/2017/docs/16_0503Appendix.docx) [DOC – 60KB].

## ORIGINAL RESEARCH

# A Project to Promote Adherence to Blood Pressure Medication Among People Who Use Community Pharmacies in Rural Montana, 2014–2016

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## PEER REVIEWED

## Abstract

### Introduction

Pharmacists can assist patients in managing their blood pressure levels. We assessed whether adherence to blood pressure medication improved among people who used community pharmacies in rural Montana after pharmacists initiated consultations and distributed educational materials developed for the Million Hearts Initiative's "Team Up. Pressure Down." (TUPD) program.

### Methods

From 2014 to 2016, the Cardiovascular Health Program at the Montana Department of Public Health and Human Services conducted a statewide project to evaluate an intervention for adherence to blood pressure medication administered through community pharmacies. After the year 1 pilot, we redesigned the program for year 2 and year 3 and measured the percentage of participating patients who adhered to blood pressure medication. We also conducted a statewide survey to assess pharmacy characteristics, computer-system capabilities, and types of consulting services provided by pharmacists.

### Results

Twenty-five community pharmacies completed Montana's TUPD program: 8 pharmacies in the pilot year, 11 pharmacies in year 2,

and 6 pharmacies in year 3. For year 2 and year 3 combined, the percentage of participating patients who achieved blood pressure medication adherence improved preintervention to postintervention from 73% to 89%, and adherence improved in 15 of the 17 pharmacies. The pilot pharmacies identified 3 major barriers to project success: patient buy-in, staff burden in implementing the project, and funding. In the statewide assessment, TUPD-funded pharmacies were significantly more likely than non-TUPD-funded pharmacies to provide prescription synchronization and medication management with feedback to the patient's physician.

### Conclusion

Community pharmacies in rural areas can effectively use brief consultations and standard educational materials to improve adherence to blood pressure medication.

## Introduction

High blood pressure is a controllable risk factor for cardiovascular diseases (eg, heart disease, stroke) (1). However, patients with hypertension often find it challenging to manage their condition. Barriers to management may include problems with medication adherence, not understanding the seriousness of the condition, or difficulty making lifestyle changes. Community pharmacists can extend the reach of health care providers and assist patients in controlling their hypertension. With ready and consistent access to patients who refill prescriptions monthly, pharmacists are in a position to establish an ongoing relationship with their patients.

A meta-analysis of 7 randomized controlled trials showed that adherence to blood pressure medication increased more in the pharmacist-led interventions than in the control groups (2). In the 6 studies that provided quantitative data, adherence in the intervention groups increased from 56% (203 of 360 participants) to 68% (246 of 360 participants); in the control groups, adherence in-



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creased from 59% (190 of 320 participants) to 61% (195 of 320 participants). Another meta-analysis found that 7 of 16 pharmacist interventions significantly increased medication adherence (3); the difference between adherence in the intervention groups compared with the control groups ranged from 8 to 58 percentage points.

Pharmacy-based interventions are also effective in improving medication adherence among people in racial/ethnic minority populations (4,5). We found no studies of pharmacy interventions to improve adherence to blood pressure medication in rural areas. Because of a shortage of primary care providers in rural areas (6), pharmacies in rural areas could play a larger role in improving medication adherence than pharmacies in urban areas. Pharmacists can help identify and overcome barriers (eg, financial difficulties, side effects) that health care providers may not detect during patient visits, which often are infrequent. Pharmacies also can assist patients in managing their blood pressure levels (3,7).

Only 2 interventions that we reviewed (4,8) provided patients with pharmacist consultations and educational materials on blood pressure medication adherence. However, these interventions did not rigorously assess the usefulness of the educational materials.

We evaluated whether patients' adherence to blood pressure medication improved in rural Montana when we used pharmacy consultations in combination with educational materials that were developed for the Million Hearts Initiative's "Team Up. Pressure Down." (TUPD) and were designed for community pharmacists and their patients (9). Our secondary objective was to describe pharmacy characteristics, computer-system capabilities, and types of consulting services provided by pharmacists throughout Montana.

## Methods

This study consisted of 2 components: 1) a 3-year (February 2014–June 2016) intervention to improve adherence to blood pressure medication among people using community pharmacies in rural Montana and 2) a statewide assessment (November 2015–February 2016) of pharmacy characteristics, computer-system capabilities, and types of consulting services provided.

Montana is the fourth largest state geographically but is ranked 48th in the United States for population density, with only 6.8 persons per square mile (10). Much of the state is classified as an area with a shortage of health care professionals or as a medically underserved area (11). According to rural–urban commuting area codes, less than 20% of Montana's counties had census tracts with

a classification of "metropolitan area core" or "metropolitan area high commuting" (12). For the TUPD project, most participating pharmacies were in counties outside these metropolitan areas (13).

### Community pharmacy intervention

In 2014, the Montana Cardiovascular Health (CVH) Program at the Department of Public Health and Human Services (DPHHS) initiated a project with 9 community pharmacies in Montana to conduct and evaluate a blood pressure medication adherence intervention. However, one funded pharmacy did not complete the project because of problems with business structure and staffing. The project used an implementation study design and 3 cohorts (Box 1). The project was supported by the Centers for Disease Control and Prevention (CDC) (14). The Montana DPHHS did not require institutional review board approval because pharmacies submitted only de-identified aggregate data.

**Box 1. Timeline for Team Up. Pressure Down. (TUPD) Blood Pressure Medication Adherence Project in Community Pharmacies, Montana, 2014–2016**

February–June 2014: Pilot project completed with 8 pharmacies  
June–August 2014: Formative evaluation  
August 2014–June 2015: Year 2 cohort – 11 pharmacies  
August 2015–June 2016: Year 3 cohort – 6 pharmacies  
November 2015–February 2016: Community pharmacy assessment

The University of Montana's Skaggs School of Pharmacy provided a list of 258 community pharmacies in Montana. A community pharmacy is designated by the Montana Department of Labor and Industry as a pharmacy that serves customers in a retail setting, such as a pharmacy chain or an independent pharmacy, rather than in an institutional setting, such as a hospital. To recruit pharmacies for the pilot project, the CVH Program mailed an application to all 258 community pharmacies listed, and the Montana Pharmacy Association emailed the announcement to its members. In addition, Montana's Medicare Quality Innovation Network–Quality Improvement Organization helped recruit pharmacies and disseminate project materials.

Montana DPHHS staff members reviewed 9 applications for the pilot year. The criteria for funding included providing an estimate of the number of patients in the pharmacy who were taking blood pressure medication and the number of patients to be tracked and providing an adequate description of a project plan, including selecting, tracking, and following up with patients. Applicants also were required to describe components that could be continued by

the pharmacy without external funding. In the pilot year, all 9 applicants met the application criteria and were funded. Using a similar application and notification process, we funded 2 more cohorts: 11 pharmacies in year 2 and 7 pharmacies in year 3 (one of which did not complete the project because of a staffing shortage).

### **Pilot project**

Each pilot pharmacy was required to recruit at least 25 patients. Participants were required to meet the following minimum criteria: 1) being an adult aged 18 years or older, 2) having had at least one pharmaceutical claim during the previous calendar year (ie, an active pharmacy patient), and 3) having had at least one current prescription for a medication to lower blood pressure. Pharmacies were permitted to customize approaches for identifying and recruiting participants (eg, letters, direct contact).

As part of the project, pharmacies conducted a brief consultation with each participating patient. During the consultation, the pharmacist discussed medication management and changes in lifestyle behavior to help improve the patient's medication adherence and blood pressure control. We asked the pharmacies to disseminate TUPD's patient-education materials and information on the Dietary Approaches to Stop Hypertension (DASH) program (15) and to refer smoking patients to the Montana Tobacco Quitline (16). TUPD's patient-education materials included a blood pressure journal, a medication tracker wallet card, and a medication reminder handout. Additionally, participants received a postcard with information on steps to control blood pressure and a place to list pharmacy and prescription information. TUPD's pharmacist materials included a pocket discussion guide, a drug-adherence work-up tool (to identify and address patient barriers to taking medication), a blood pressure guide (a quick reference on taking blood pressures manually and interpreting blood pressure readings), and a pharmacy poster.

During the pilot program, pharmacies measured medication adherence by 1) calculating the number of days of refill for a blood pressure medication for each participating patient or 2) using another standard method, such as calculating the percentage of participating patients who achieved blood pressure medication adherence, measured as the proportion of days covered (PDC) by prescription claims as 80% or greater (based on prescription fill date and days of supply). We did not require pharmacies to adhere to a particular method of calculating adherence. Some pharmacies electronically tracked prescription fill dates, and others used an Excel (Microsoft Corp) spreadsheet.

Although the pilot project was designed initially to be implemented during a 10-month period, it was implemented during a 4-month period because of a delay in budget approval. After the conclusion of the pilot program, we obtained feedback from the

pilot pharmacies and modified the intervention for year 2 and year 3. We also sought federal guidance on a standard definition of medication adherence (17) and requested additional funding so that we could recruit more pharmacies and increase the funding award to pharmacies as an incentive for them to participate.

### **Year 2 and year 3**

In year 2 and year 3, in addition to other program improvements (Box 2), we required pharmacies to use a standardized definition for medication adherence (PDC  $\geq$ 80%). We received additional funding, which allowed us to double the funding award to pharmacies. We shared lessons learned from the pilot pharmacies with the new pharmacies, emphasized project expectations, and provided additional technical assistance.

#### **Box 2. Components of Team Up. Pressure Down. (TUPD) in Year 2 and Year 3, Based on Feedback From Pilot Year, Montana, 2014–2016**

- Standardized the definition of medication adherence (17)
- Expanded project time frame from 4 months to 10 months
- Increased the minimum number of patients required to participate from 25 to 35 (year 3 only)
- Doubled the funding award to pharmacies as an incentive for participation
- Offered 2 training options for pharmacists: a home-study blood pressure curriculum and a 1-day hands-on hypertension workshop on accurate blood pressure measurements, current guidelines, lifestyle changes, and medication management
- Provided additional resources to each participating pharmacy: blood pressure cuffs for on-site use and 7-day pill boxes for participating patients
- Provided a sample letter that pharmacists could send to health care providers informing them of their patients' participation in the project
- Provided a sample press release that pharmacists could send to the local news media to inform their community of the project
- Created an Excel (Microsoft Corp) tracking program for such patient interventions as medication therapy management and lifestyle counseling
- Organized a conference call in which a previously participating pharmacist oriented newly participating pharmacists
- Hired a consulting pharmacist, who owns a community pharmacy, to provide technical assistance and engage pharmacists on a peer-to-peer basis

### **Data collection**

The CVH Program collected data from reports filed one month after the project began and final reports. Pre-intervention and postintervention data were collected on medication adherence at the start and end of each of the 3 project periods. The CVH Program developed a final report template that community pharmacies completed at the end of each project period. The final report

gave information on barriers, lessons learned, sustainable components, and suggestions for improvement. The final reports also provided data on types of counseling provided and pharmacists' perceptions of the usefulness of TUPD materials and resources. Lastly, the final report provided aggregate data on the percentage (numerator and denominator) of participating patients who adhered to their blood pressure medication schedule. In addition, for year 2 and year 3, the CVH Program periodically requested interim feedback from the participating pharmacies on progress made and barriers encountered. A consulting pharmacist reviewed the feedback and made suggestions to address barriers as part of his technical assistance.

### Statewide pharmacy assessment

From November 2015 through February 2016, the CVH Program conducted a statewide assessment of community pharmacies to collect data required by CDC to measure grant performance. In October 2015, the CVH Program and a community pharmacist reviewed and revised a survey instrument that the program had designed and used in a statewide assessment in 2013. In November 2015, the Montana Department of Labor and Industry provided a list of licensed community pharmacies. We merged this list and the TUPD recruitment list from the Skaggs School of Pharmacy and eliminated duplicate pharmacies by matching license number, business name, and city, which yielded 259 community pharmacies. The survey, which was mailed, collected information on pharmacy characteristics (the number of pharmacists and pharmacy technicians); computer-system capabilities (acceptance of electronic prescriptions from outside health care facilities, automatic refills on certain maintenance medications, automated refill reminders for blood pressure medication); provision of prescription synchronization (the process of aligning refill dates for all of a patient's multiple prescriptions); reimbursement of medication therapy management from Mirixa or OutcomesMTM, 2 leading vendors of medication therapy management services in Montana; and the types of consulting services provided by pharmacists. Medication therapy management is a service provided by pharmacists to optimize drug therapy and improve health outcomes.

### Data analysis

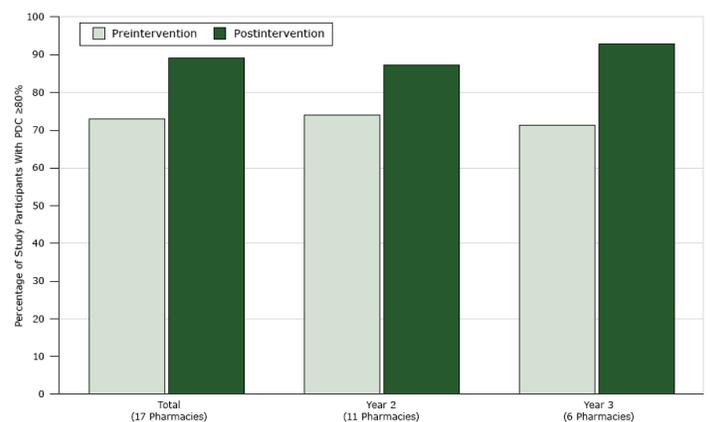
For year 2 and year 3 of the intervention, we aggregated the data from the final reports for medication adherence (percentage of participants with PDC  $\geq 80\%$  and total number of participants) from each pharmacy. Details on the calculation of PDC, including definition of terms, unit of analysis, and determination of numerators and denominators, are available elsewhere (17). To generate an overall rate, we aggregated the data on medication adherence by

year. The pilot sites were excluded from the medication adherence analysis because they were not required to use a standard definition for medication adherence.

For the community pharmacy assessment, we analyzed data using IBM SPSS Statistics version 21 (IBM Corporation). We used  $\chi^2$  tests to assess any differences in pharmacy and consultation services offered by pharmacists, such as consultation on blood pressure medication adherence, between pharmacies funded by TUPD and pharmacies not funded by TUPD. We also used the nonparametric Mann-Whitney *U* test to compare differences between pharmacies funded by TUPD and pharmacies not funded by TUPD in the number of pharmacists and pharmacy technicians. A *P* value of  $< .05$  was considered significant.

## Results

Twenty-five community pharmacies completed Montana's TUPD project: 8 in the pilot year, 11 in year 2, and 6 in year 3. All 25 pharmacies submitted a final report. For year 2 and year 3 combined (17 pharmacies), 534 patients completed the TUPD project, with 360 in year 2 and 174 in year 3; the aggregated percentage of participating patients who achieved blood pressure medication adherence increased from 73% pre-intervention to 89% postintervention (Figure). Blood pressure medication adherence improved in 15 of the 17 community pharmacies in year 2 and year 3.



**Figure.** Percentage of patients who achieved blood pressure medication adherence (proportion of days covered [PDC] by prescription claims  $\geq 80\%$ ) pre-intervention and postintervention among community pharmacies participating in TUPD ( $N = 17$ ) in year 2 and year 3, by year and overall, Montana, July 2014–June 2016. Community pharmacies during the pilot year were excluded from this analysis because they were not required to use a standardized definition for medication adherence. Abbreviation: TUPD, Team Up. Pressure Down.

## Feedback from pharmacists

The pilot pharmacies identified 3 major barriers to project success: patient buy-in, staff burden in implementing the project, and funding. A lack of awareness of the importance of controlling blood pressure, a lack of willingness or interest in project participation, and lack of recognition of the benefits of participation were major obstacles among patients. Staff burden was the most common barrier reported by the pharmacies. Adding another program to a busy schedule was difficult. A lack of time limited the ability of the pharmacists to provide customer service and pharmacy counseling beyond the core task of dispensing medication. In the pilot project, the pharmacists' suggestions for enhancing the project included developing a template for tracking patients, a notification letter to health care providers, and a checklist of topics to discuss with patients. These resources were added in year 2 and year 3. Other recommendations (a wallet card to log blood pressure values and a survey to obtain patient feedback) will be added in year 4.

Feedback from year 2 and year 3 indicated that involving the entire pharmacy team in the project helped reduce the burden of work on the pharmacists. For example, one pharmacy created a system in which TUPD materials were attached to a patient's medication refill. When the patient picked up the refill, the pharmacy technician notified the patient that the pharmacist wanted to speak with him or her. Another pharmacy involved the pharmacy technicians in using an alert system (tracking sheet) when a study patient was in the pharmacy so that pharmacists could provide consultations.

TUPD-funded pharmacies reported that TUPD materials and resources were useful. Although all participating pharmacies reported distributing TUPD materials, pharmacists reported only 75% of project participants received these materials because some patients refused them. Pharmacists noted that the wallet card and journal were helpful and of interest to patients, although they noted that some of the materials could be written more concisely. Additionally, 21 pharmacies reported their pharmacists provided lifestyle counseling and medication therapy management to their patients with hypertension.

The pharmacists noted that most of their patients appreciated the extra attention they received during the consultations. Pharmacists adjusted the length of the consultation according to the interest level and needs of each patient. Three pharmacists suggested that the TUPD project may be most suitable for patients with a new diagnosis of hypertension because patients with long-term hypertension had already found ways to manage their condition. One pharmacy lost many project participants because of the participants' transient employment (oil workers). In addition, 13 phar-

macies noted difficulty tracking patients (eg, patient used mail-order or 90-day prescriptions, transferred pharmacies, died, was hospitalized, or moved). Three pharmacies found opportunities to collaborate with patients' providers to improve blood pressure control.

Twenty pharmacies reported plans to sustain at least one project component to foster medication adherence (eg, measuring blood pressure on-site, offering counseling or medication reviews, providing blood pressure information materials, synchronizing medication, creating a system of automatic refills).

## Statewide pharmacy assessment

The response rate for the community pharmacy assessment conducted was 46% (120 of 259). The average number of pharmacists per pharmacy in Montana was fewer than 3 (Table). We found no significant differences between TUPD-funded pharmacies and non-TUPD-funded pharmacies in the number of pharmacy staff members or pharmacy services related to whether or not automatic refills or refill reminders are provided (Table). TUPD-funded pharmacies were significantly more likely than non-TUPD-funded pharmacies to provide prescription synchronization and medication management with feedback to the patient's physician. TUPD-funded pharmacies also were more likely than nonfunded pharmacies to report that pharmacists were reimbursed for formal medication therapy management from Mirixa or OutcomesMTM.

## Discussion

Our findings indicate that it is feasible for community pharmacies in rural areas to provide their patients with brief consultations and TUPD educational materials on how to improve blood pressure medication adherence. Our results are similar to those reported in other studies, which found that pharmacist interventions could significantly improve medication adherence (2–5,8,18,19). The project components in these previous studies were not identical to those in TUPD, however. Some of those interventions provided resources such as a take-home tool kit (4) or blood pressure cuffs for self-monitoring at home (5,7,8) that our project did not provide.

Our study differed from most other studies in that ours focused only on rural pharmacies. Although one study did examine rural Minnesota pharmacies, it was a biennial pharmacy workforce survey of outpatient pharmacies rather than an intervention (20). Also, we did not find any previous study that investigated use of TUPD materials.

Our results suggest that the pharmacies were able to customize the project to fit their needs. In addition, our findings indicate that major components of the project can be integrated into the usual prac-

tice of community pharmacies in rural areas. Pharmacies that were already being reimbursed for medication therapy management or that synchronized refills may have been more willing to participate in this project because of their experience in patient consultations.

This project has several limitations. First, our study did not include a control group; however, because this was a project evaluation and not a research project, a control group may not have been needed. Second, pharmacies were not required to collect data on patients' blood pressure control. We did not institute this requirement because of limited pharmacist time, lack of adequate funding, and difficulty in bringing participants in for measurement. Since we did not require pharmacies to collect data on patients' blood pressure, we could not conduct additional analyses. However, some participating pharmacies used a blood pressure cuff for on-site measurement, and some made the cuff available to nonparticipating patients. Third, because of the small sample of pharmacies, the results of our study may not be generalizable to all pharmacies. We expect to have a larger sample size for study when additional pharmacies are funded for 2 more years. Fourth, this project assessed only the perceptions of the pharmacists and not those of other stakeholders (pharmacy patients or health care providers). Lastly, because of the annual funding cycle of the CDC grant, we did not investigate long-term medication adherence. Despite these limitations, our project results suggest that community pharmacies in rural areas can use brief consultations and TUPD materials to improve blood pressure medication adherence.

The TUPD project could be expanded to other states that have community pharmacies in rural areas. In year 2, the DPHHS diabetes program broadened the TUPD project by conducting a similar project with 7 of the pilot pharmacies, targeting pharmacy patients taking blood pressure and diabetes medications. Also, in 2016 the state asthma control program recruited 2 of the pilot pharmacies to address asthma medication adherence. This expansion of the TUPD blood pressure approach indicates the willingness of community pharmacies to work on chronic disease management. Future research should evaluate whether the TUPD strategy also improves medication adherence for patients with other chronic conditions such as diabetes or asthma. In addition, research could assess blood pressure control and medication adherence in community pharmacies in rural areas.

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## References

1. Understand your risk to prevent a heart attack. Dallas (TX): American Heart Association; 2016. [http://www.heart.org/HEARTORG/Conditions/HeartAttack/UnderstandYourRiskstoPreventHeartAttack/Understand-Your-Risks-to-Prevent-a-Heart-Attack\\_UCM\\_002040\\_Article.jsp#.V6Scp-rt9A](http://www.heart.org/HEARTORG/Conditions/HeartAttack/UnderstandYourRiskstoPreventHeartAttack/Understand-Your-Risks-to-Prevent-a-Heart-Attack_UCM_002040_Article.jsp#.V6Scp-rt9A). Accessed May 6, 2016.
2. Cheema E, Sutcliffe P, Singer DR. The impact of interventions by pharmacists in community pharmacies on control of hypertension: a systematic review and meta-analysis of randomized controlled trials. *Br J Clin Pharmacol* 2014; 78(6):1238–47.
3. Morgado MP, Morgado SR, Mendes LC, Pereira LJ, Castelo-Branco M. Pharmacist interventions to enhance blood pressure control and adherence to antihypertensive therapy: review and meta-analysis. *Am J Health Syst Pharm* 2011;68(3):241–53.
4. Svarstad BL, Kotchen JM, Shireman TI, Brown RL, Crawford SY, Mount JK, et al. Improving refill adherence and hypertension control in black patients: Wisconsin TEAM trial. *J Am Pharm Assoc* (2003) 2013;53(5):520–9.
5. Lai LL. Community pharmacy-based hypertension disease-management program in a Latino/Hispanic-American population. *Consult Pharm* 2007;22(5):411–6.
6. Primary medical care HPSA designation overview. Rockville (MD): US Department of Health and Human Services, Health Resources and Services Administration. <http://bhpr.hrsa.gov/shortage/hpsas/>. Accessed May 9, 2016.

7. Stewart K, George J, Mc Namara KP, Jackson SL, Peterson GM, Bereznicki LR, et al. A multifaceted pharmacist intervention to improve antihypertensive adherence: a cluster-randomized, controlled trial (HAPPY trial). *J Clin Pharm Ther* 2014;39(5):527–34.
8. Fikri-Benbrahim N, Faus MJ, Martínez-Martínez F, Sabater-Hernández D. Impact of a community pharmacists' hypertension-care service on medication adherence. The AFenPA study. *Res Social Adm Pharm* 2013;9(6):797–805.
9. Million Hearts Team Up. Pressure Down. Atlanta (GA): US Department of Health and Human Services, Centers for Disease Control and Prevention. [https://www.cdc.gov/media/releases/2012/p0905\\_team\\_up\\_pressure\\_down.html](https://www.cdc.gov/media/releases/2012/p0905_team_up_pressure_down.html). Accessed May 9, 2016.
10. US Census Bureau. Population, housing units, area, density: 2010 — United States and Puerto Rico, 2010 Census summary file. American FactFinder. <http://factfinder2.census.gov/http>. Accessed April 8, 2016.
11. HRSA Data Warehouse. Find shortage areas by address. Rockville (MD): US Department of Health and Human Services, Health Resources and Services Administration. <https://datawarehouse.hrsa.gov/tools/analyzers/hpsafind.aspx>. Accessed April 8, 2016.
12. Rural classifications. Washington (DC): US Department of Agriculture Economic Research Service; 2016. <http://www.ers.usda.gov/topics/rural-economy-population/rural-classifications/data-for-rural-analysis.aspx#ruralstatus>. Accessed May 16, 2016.
13. Location of Montana Community Pharmacies. Year 1-Year 3 Team Up. Pressure Down. (TUPD) sub-awardees, and prevalence of high blood pressure by public health region, 2015. Helena (MT): Department of Public Health and Human Services, Public Health and Safety Division, Chronic Disease Prevention and Health Promotion Bureau, Cardiovascular Health Program. <http://dphhs.mt.gov/Portals/85/publichealth/documents/Cardiovascular/Pharmacy%20BP%20Resources/MapMTCommunityPharmaciesHTNPrevalence.pdf>. Accessed December 13, 2016.
14. State public health actions to prevent and control diabetes, heart disease, obesity and associated risk factors and promote school health (DP13-1305). Atlanta (GA): US Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion; 2016. <http://www.cdc.gov/chronicdisease/about/state-public-health-actions.htm>. Accessed July 26, 2016.
15. Your guide to lowering your blood pressure with DASH. Bethesda (MD): US Department of Health and Human Services, National Institutes of Health, National Heart, Lung, and Blood Institute; 2006. <http://www.nhlbi.nih.gov/health/resources/heart/hbp-dash-index>. Accessed April 25, 2016.
16. Montana Tobacco Quitline. Helena (MT): Department of Public Health and Human Services, Public Health and Safety Division, Chronic Disease Prevention and Health Promotion Bureau, Montana Tobacco Use Prevention Program. <http://dphhs.mt.gov/publichealth/mtupp/quitline>. Accessed April 26, 2016.
17. Blood pressure medication adherence definition. Helena (MT): Department of Public Health and Human Services, Public Health and Safety Division, Chronic Disease Prevention and Health Promotion Bureau, Cardiovascular Health Program. <http://dphhs.mt.gov/Portals/85/publichealth/documents/Cardiovascular/Pharmacy%20BP%20Resources/CDCPerfMeasureGuidance1305MedicationAdherenceDefinitionAccessi....pdf>. Accessed December 8, 2016.
18. Aguwa CN, Ukwe CV, Ekwunife OI. Effect of pharmaceutical care programme on blood pressure and quality of life in a Nigerian pharmacy. *Pharm World Sci* 2008;30(1):107–10.
19. Chabot I, Moisan J, Grégoire JP, Milot A. Pharmacist intervention program for control of hypertension. *Ann Pharmacother* 2003;37(9):1186–93.
20. Haag JD, Stratton TP. Patient care services in rural Minnesota community pharmacies. *J Am Pharm Assoc* (2003) 2010; 50(4):508–16.

Table

**Table. Characteristics and Services Provided by Community Pharmacies in Rural Areas, by TUPD Funding Status, Montana, 2015–2016<sup>a</sup>**

Characteristic or Service	Pharmacies Funded by TUPD (n = 25)	Pharmacies Not Funded by TUPD (n = 95)	P Value <sup>b</sup>
<b>Pharmacy staff, mean (standard deviation)</b>			
No. of pharmacists	2.6 (1.4)	2.6 (1.4)	.74
No. of pharmacy technicians	3.4 (2.0)	3.1 (2.0)	.64
<b>Pharmacy services and computer-system capabilities, % (no.)</b>			
Accept electronic prescriptions from outside health care facilities	100 (25)	95 (90)	.24
Automatically refill selected maintenance medication	88 (22)	79 (74)	.30
Provide automated refill reminders for hypertension medication	60 (15)	50 (47)	.35
Provide prescription synchronization <sup>c</sup>	88 (22)	56 (53)	.003
Obtain reimbursement for pharmacists for formal medication therapy management <sup>d</sup> from Mirixa or OutcomesMTM <sup>e</sup>	92 (22)	50 (47)	<.001
<b>Pharmacist counseling, % (no.)</b>			
Provide consultation services daily	92 (23)	92 (87)	.95
Emphasize importance of following prescribed medication regimen	96 (22)	86 (75)	.21
Assist with medication management and provide feedback to patient's physician	100 (23)	81 (70)	.02
Provide comprehensive medication review	56 (14)	69 (61)	.21

Abbreviation: TUPD, Team Up. Pressure Down., a program of the Million Hearts initiative (9).

<sup>a</sup> Data collected through a survey mailed to 259 community pharmacies.

<sup>b</sup> Calculated by using nonparametric Mann–Whitney *U* test (mean numbers) or  $\chi^2$  test (percentages).

<sup>c</sup> The process of aligning refill dates for all of a patient's multiple prescriptions.

<sup>d</sup> Provided by pharmacist to optimize drug therapy and improve health outcomes.

<sup>e</sup> Two leading medication therapy management vendors in Montana.

ORIGINAL RESEARCH

# Implementation of Best Practices in Obesity Prevention in Child Care Facilities: The Arizona Empower Program, 2013–2015

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PEER REVIEWED

## Abstract

### Introduction

Obesity is a major health concern in every US age group. Approximately one in 4 children in Arizona's Special Supplemental Nutrition Program for Women, Infants, and Children is overweight or obese. The Arizona Department of Health Services developed the Empower program to promote healthy environments in licensed child care facilities. The program consists of 10 standards, including one standard for each of these 5 areas: physical activity and screen time, breastfeeding, fruit juice and water, family-style meals, and staff training. The objective of this evaluation was to determine the level of implementation of these 5 Empower standards.

### Methods

A self-assessment survey was completed from July 2013 through June 2015 by 1,850 facilities to evaluate the level of implementation of 5 Empower standards. We calculated the percentage of facilities that reported the degree to which they implemented each standard and identified common themes in comments recorded in the survey.

### Results

All facilities reported either full or partial implementation of the 5 standards. Of 1,678 facilities, 21.7% (n = 364) reported full implementation of all standards, and 78.3% (n = 1,314) reported at least partial implementation. Staff training, which has only one component, had the highest level of implementation: 77.4% (n = 1,299) reported full implementation. Only 44.0% (n = 738) reported full implementation of the standard on a breastfeeding-friendly environment.

### Conclusion

Arizona child care facilities have begun to implement the Empower program, but facilities will need more education, technical assistance, and support in some areas to fully implement the program.

## Introduction

The US Surgeon General recognizes obesity as a major health concern (1). Obese children as young as 2 to 5 years are more likely than children who are not obese at that age to become obese adults (2). Approximately one in 4 children aged 2 through 4 years enrolled in Arizona's Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) is overweight or obese (3).

Approximately 80% of preschool-aged children spend as much as 40 hours per week in nonparental care (4). National recommendations have established the early care and education setting as an important opportunity for obesity intervention (5). Evaluations of obesity prevention interventions in child care facilities show improvements in children's mealtime behaviors, dietary preferences, and levels of physical activity (4).



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Several prominent authorities collaboratively published national standards for best practices in 2010 (6). The Empower program, based on these national standards, was implemented in 2010 to promote healthy environments for children in Arizona's licensed child care facilities. Participating facilities receive discounted licensing fees for their agreement to follow the program's 10 standards (Box).

**Box. Ten Empower Standards to Improve Health in Licensed Child Care Facilities in Arizona<sup>a,b</sup>**

**Standard 1. Provide at least 60 minutes of daily physical activity, and do not allow more than 3 hours of screen time per week.**

Standard 2. Practice sun safety.

**Standard 3. Provide a breastfeeding-friendly environment.**

Standard 4. Determine whether site is eligible for the US Department of Agriculture Child and Adult Care Food Program.

**Standard 5. Limit serving fruit juice.**

**Standard 6. Serve meals family style.**

Standard 7. Provide monthly oral health care education or implement a tooth-brushing program.

**Standard 8. Ensure that staff members receive 3 hours of training annually on Empower topics.**

Standard 9. Make Arizona Smokers' Helpline (ASHLine) education materials available at all times.

Standard 10. Maintain a smoke-free campus.

<sup>a</sup> Data source: Arizona Department of Health Services Bureau of Nutrition and Physical Activity (7).

<sup>b</sup> Implementation of standards in boldface were evaluated in this study.

The objective of this evaluation was to determine the level of implementation of the 5 Empower standards that relate to obesity prevention: the standards on physical activity and screen time, breastfeeding, fruit juice and water, and family-style meals, and the standard on staff training. We hypothesized that none of the standards would have been implemented across all participating facilities.

## Methods

We designed a self-assessment survey to collect data from licensed child care facilities enrolled in Arizona's Empower program between July 1, 2013, and June 30, 2015.

Child care facilities volunteer to implement 10 Empower standards. As part of the program, participating facilities receive the Empower guidebook (7), a reference manual on early care and education best practices and national recommendations (6,8), and documents on state rules and regulations (9,10). The guidebook defines key terms related to standards and provides age-specific guidance and adaptations for special circumstances. Examples of policies and materials were also provided for staff education, family engagement, and marketing to assist with implementation.

The Arizona Department of Health Services (ADHS) inspects all types of licensed child care facilities at least once annually. The data for this study were collected during the first inspection completed for each participating facility during the 2-year study period. At least one assessment was completed by 1,862 facilities. Data for 12 facilities were excluded because the provider identification number did not match information in the licensing database, which we used to verify the identity of each facility and its enrollment capacity. Our sample consisted of 1,850 facilities serving 182,602 children.

Surveyors from the ADHS Bureau of Child Care Licensing collected data from a facility staff member during their annual on-site inspections. In year 1, electronic tablets and paper surveys were used to collect data, which were then entered into an Excel (Microsoft Corp) form. Surveyors requested paper surveys in year 2; data from these surveys were also entered into an Excel form. These data were then compiled into an Empower database in Excel. Surveyors also recorded comments from facility staff.

The data collection tool was a self-administered survey that asked facilities to self-report their level of implementation on each component of each standard. Four of the 5 standards consist of more than one component: physical activity and screen time (10 components), breastfeeding (4 components), fruit juice and water (7 components), and family-style meals (6 components). The fifth standard, staff training, has only one component. Each component represents a discrete, observable aspect of the standard.

We conducted 3 levels of analysis: by component, by standard, and by facility. Proportions were calculated for each component, standard, and facility by using SPSS version 24 (IBM Corp). For the analysis by component, each component was examined for its level of implementation as either full, partial, or not at all. Missing values and responses of "don't know" were combined into one category. Because the staff training standard has only one component, we did not analyze this standard by component.

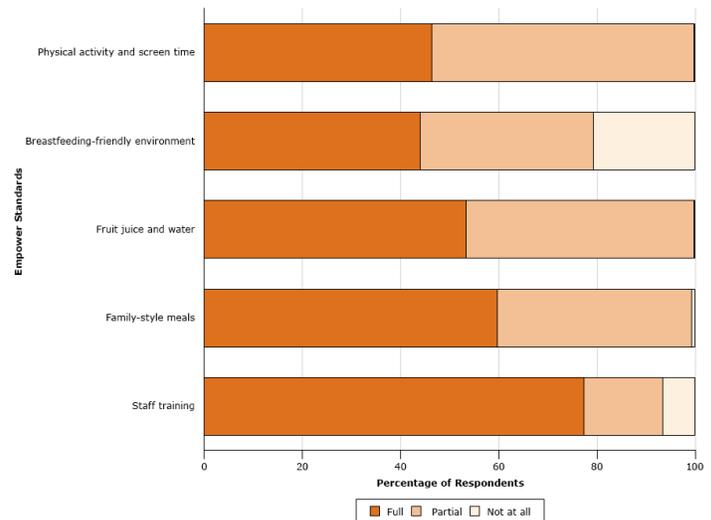
For the analysis by standard, we categorized each standard into an overall rating across its components. A standard was categorized as fully implemented when a facility reported fully implementing all of the components of the standard. The standard was categorized as not at all being implemented when a facility reported implementation of all components of the standard as “not at all.” If a facility reported any other mix of ratings across components, the standard was categorized as partially implemented. Components with missing values and responses of “don’t know” were excluded from the analyses by standard. The analysis by standard consisted of 1,678 assessments.

For the analysis by facility, we calculated the percentage of facilities that implemented standards fully, partially, or not at all. A facility was classified as fully implemented if all standards were rated as fully implemented. Facilities that had implemented none of the standards were classified as “not at all” implemented. Any facility with any other combination of fully or partially implemented standards was classified as partially implemented. Components with missing values and responses of “don’t know” were excluded from the analyses by facility. The analysis by facility consisted of 1,678 assessments.

We conducted a content analysis of comments by using QDA Miner version 4.0 (Provalis Research). We identified themes and developed codes for analysis. The 1,850 assessments offered 283 comments; we excluded 77 comments because they were not relevant to the study. The remaining 206 comments were classified into one of 6 categories (general Empower program and the 5 standards) and then analyzed for themes.

## Results

In the analysis by facility, all 1,678 facilities reported either full or partial implementation of all 5 standards. About one-fifth (21.7%; n = 364) of facilities reported full implementation of all standards, and 78.3% (n = 1,314) of facilities reported at least partial implementation. In the analysis by standard, the percentage of child care facilities reporting full implementation ranged from 44.0% (n = 738), for the breastfeeding-friendly environment, to 77.4% (n = 1,299) for staff training (Figure). In the analysis by component (Table), the level of full implementation ranged from 45.6% (provides breastfeeding information to families) to 97.9% (offers water as the first choice for thirst). Four standards had a component on providing information to families; these components had the lowest levels of implementation. We observed the highest levels of implementation for the standard on fruit juice and water.



**Figure.** Level of implementation, by standard, of Arizona Licensed Child Care Facilities Empower standards reported by 1,678 child care facilities, July 2013–June 2015. Components with missing values and responses of “don’t know” were excluded from the analyses by standard. Four standards have multiple components; the staff training standard has only one component.

Of the 206 relevant comments, 92.7% (n = 191) were from surveys completed during the first year of the 2-year study period. Seventy-five comments related to the Empower program in general; of these, 33 (44.0%) comments related to the process of developing policies; 35 (46.7%) comments related to being new to the program and not receiving, or only recently receiving, the guidebook; 3 (4.0%) comments related to changes in personnel; and 4 (5.3%) comments indicated that the respondent did not know if the facility had a policy. The other 139 relevant comments related to one of the 5 standards and are summarized below.

**Physical activity and screen time.** Nearly half (46.3%) of facilities reported fully implementing all 10 components of the standard on physical activity and screen time (Figure). Most reported fully implementing the component on providing free-play opportunities (92.5%) and outdoor activity (91.1%), and 67.2% reported fully implementing the component on providing vigorous physical activity. Providing information on screen time to families had the lowest level of implementation (67.0%). Of the 55 comments on physical activity and screen time, 11 (20.0%) comments related to the need to clarify language or confusion about components, and 14 (25.5%) comments related to facilities not being all-day centers. Some respondents asked about the definitions of words such as vigorous, moderate, sedentary, and screen time. Other comments related to a facility being a partial-day facility or not having an outdoor playground.

**Breastfeeding-friendly environment.** The breastfeeding-friendly environment standard had the lowest level of implementation. Only 44.0% of facilities reported full implementation, and 20.7% reported that they had not implemented any components. The lowest component scores for this standard were in providing information to families (45.6%) and displaying information (47.8%). Of the 76 comments related to breastfeeding-friendly environments, most (67.1%) indicated that the respondent's facility did not provide care for infants and 16 (21.1%) indicated that the standard was not applicable.

**Fruit juice and water.** More than half (53.3%) of facilities reported fully implementing all of the components of the standard on fruit juice and water. Nearly all reported full implementation of 2 components: offering water throughout the day (98.6%) and offering water as the first choice for thirst (97.9%). Most (91.4%) facilities reported fully implementing the component for serving only 100% fruit juice. The component for providing information on fruit juice and water to families had the lowest level of implementation, with only 59.7% of facilities reporting full implementation. Of the 37 comments related to the standard on fruit juice and water, 27 (73.0%) indicated not serving fruit juice at all.

**Family-style meals.** More than half (59.7%) of facilities reported fully implementing all components of family-style meals. Most (93.2%) reported full implementation of the component for prohibiting the use of food as punishment or reward, and most (91.2%) required staff participation in meals. More than four-fifths fully implemented the components for using child-friendly serving utensils (85.7%) and allowing children to choose what and how much to eat (83.4%). The component of this standard with the lowest level of implementation was providing information to families (78.4%). Of the 35 comments related to family-style meals, 18 (51.4%) were about children bringing their own food from home. Three comments were about not serving food at all (8.6%).

**Staff training.** The staff training standard had the highest percentage (77.4%) of facilities reporting full implementation. We found 3 comments on staff training.

## Discussion

Approximately one in 5 licensed child care facilities in Arizona reported full implementation of all 10 standards of the Empower program; most facilities reported at least partially implementing

them. Survey comments suggested that many facilities were not familiar with the Empower guidebook, especially the sections explaining key terms related to physical activity and offering guidance on partial days and indoor play. It appears that more training and technical assistance are needed on these topics. Future training and technical assistance will focus on educating facility staff members on these topics, which are fundamental in transforming the early care and education setting to support healthy behaviors (11).

A breastfeeding-friendly environment is another important area of focus for obesity prevention. Observational studies suggest that the first 2 years of life are an optimal time in which to prevent obesity by establishing positive eating behaviors (12). They also suggest that breastfeeding has a promising role in preventing childhood obesity (13,14). The Empower breastfeeding standard focuses on creating a breastfeeding-friendly environment (7), which applies to all child care facilities, even if they do not serve infants. This standard had the lowest rate of implementation, with comments indicating that many thought the standard did not apply to facilities that did not care for infants. These comments suggest that facilities will need additional training and technical assistance on this topic. Child care staff members may need a place to express and store breastmilk for their own breastfeeding children who are not at the facility. Alternatively, a mother of an older enrolled child may need a private lactation area to breastfeed a younger sibling. A breastfeeding-friendly environment should not be limited to facilities that enroll infants.

Arizona's standard on fruit juice is more restrictive than the national recommendation to serve no more than 4 to 6 ounces of fruit juice per day to children aged one to 6 years (6). Arizona's standard requires no more than 2 four-ounce servings of 100% fruit juice per week be given to children aged one to 6, unless it is appropriate for a child's special health care need (7). Water and milk are the preferred beverages for meals and snacks (7). Nearly all facilities reported full implementation of components for offering water throughout the day and offering water as the first choice for thirst. Arizona's revised statutes on fruit and fruit juice align with national recommendations; however, Empower standards exceed those requirements. Empower training in standards on accessible and abundant water is especially emphasized in Arizona because of the potential for dehydration in extreme temperatures. It is critically important to comply with this requirement in Arizona, where temperatures in the shade frequently measure more than 110°F.

The Institute of Medicine recommends that child care providers practice responsive feeding, which includes self-regulation of intake by infants and allowing toddlers and preschoolers to serve themselves from common bowls (family-style service) (15). This practice encourages children to eat according to their own hunger and fullness cues (16) and develop their hand–eye coordination skills. Additionally, the presence of an adult facilitates learning about nutrition and can lead to pleasant mealtimes (6). Implementation levels for serving meals family-style were relatively high among the facilities studied.

Parents and families are role models and strongly influence young children’s eating and activity environments (14,17). Communication between child care staff and parents is important to promote healthy weight in children (4). Each standard includes a component on providing information to the family, and we found that this component had the lowest level of implementation in each standard, indicating a need for specific, standardized educational materials for all facilities to display, disseminate, and have available for families. Anecdotal feedback from monthly meetings with the licensing surveyors indicated that child care staff were receptive to distributing and posting colorful educational materials. They suggested that providing a variety of educational information on a regular basis could help improve family engagement on Empower topics.

A strength of the study is the size of the sample. The ADHS Bureau of Nutrition and Physical Activity leveraged a unique partnership with the Bureau of Child Care Licensing to administer the assessments as part of its routine site inspections. By embedding the assessments into licensing processes, we were able to collect data throughout the state using fewer resources and less time than we would have used otherwise. The Bureau of Child Care Licensing surveyors also were able to offer education and technical assistance to encourage facilities to implement standards. Other states may want to explore this type of opportunity with their child care regulatory agencies to leverage similar efforts.

Our study had several limitations, including selection and response biases. That facilities volunteered to implement the 10 standards and participate in the program is a selection bias. Discounted licensing fees provided a monetary incentive to overstate levels of implementation. In addition, the self-assessment was part of a site inspection in which a reviewer had authority to sanction noncompliance of official rules. These factors exerted potentially strong external pressures toward favorable responses. The Empower survey had never been used before and has not been validated. It was a self-assessment, and there was no way to know how closely a respondent’s self-reported responses corresponded with their actual practices. The survey did not have an option for “does not apply” because standards were designed to apply to all set-

tings. Although modifications of standards are permitted for the unique aspects of some sites, the survey did not account for these modifications. Finally, this evaluation was limited to ADHS-licensed child care facilities, and our findings might not generalize to other early care and education settings in or outside Arizona.

Despite these limitations, our results provide insights into an ongoing statewide effort to implement the Empower program in licensed child care facilities and provide baseline data against which future measures can be assessed. Low levels of implementation in providing information to families show a need to develop standard educational materials for families, while state requirements have led to high levels of implementation for the most stringent standards, such as fruit juice and water, suggesting that family engagement should be a focus of further study. Our findings will be used in Arizona to more effectively promote policy, system, and environmental changes in child care settings, which have the potential to improve the health of and reduce obesity rates among preschool-aged children in Arizona. The program is still in a capacity-building phase, and it is too early to assess its effect on childhood obesity rates.

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## References

1. US Department of Health and Human Services. The Surgeon General's vision for a healthy and fit nation. Rockville (MD): US Department of Health and Human Services, Office of the Surgeon General; 2010.
2. Freedman DS, Khan LK, Serdula MK, Dietz WH, Srinivasan SR, Berenson GS. The relation of childhood BMI to adult adiposity: the Bogalusa Heart Study. *Pediatrics* 2005; 115(1):22–7.
3. Arizona Department of Health Services Bureau of Nutrition and Physical Activity. WIC needs assessment. The Arizona WIC program. <http://azdhs.gov/documents/prevention/azwic/wic-needs-assessment-02-22-13.pdf>. Published February 22, 2013. Accessed August 30, 2016.
4. Larson N, Ward DS, Neelon SB, Story M. What role can child-care settings play in obesity prevention? A review of the evidence and call for research efforts. *J Am Diet Assoc* 2011; 111(9):1343–62.
5. Reynolds MA, Jackson Cotwright C, Polhamus B, Gertel-Rosenberg A, Chang D. Obesity prevention in the early care and education setting: successful initiatives across a spectrum of opportunities. *J Law Med Ethics* 2013;41(Suppl 2):8–18.
6. Preventing childhood obesity in early care and education: Selected Standards From Caring for Our Children: National Health and Safety Performance Standards; Guidelines for Early Care and Education Programs, 3rd edition. Aurora (CO): American Academy of Pediatrics, American Public Health Association, and National Resource Center for Health and Safety in Child Care and Early Education; 2010.
7. Arizona Department of Health Services Bureau of Nutrition and Physical Activity. Empower guidebook. Ten ways to empower children to live healthy lives. Standards for Empower child care facilities in Arizona. 2nd edition. <http://www.theempowerpack.org>. Accessed July 24, 2016.
8. Let's Move! Child Care. <https://healthykidshealthyfuture.org>. Accessed July 24, 2016.
9. Arizona Department of Health Services Bureau of Child Care Licensing. Arizona administrative code and Arizona revised statutes for child care facilities. <http://azdhs.gov/documents/licensing/childcare-facilities/rules/bccl-child-care-facility-rules.pdf>. Accessed August 23, 2016.
10. Arizona Department of Health Services Bureau of Child Care Licensing. Arizona administrative code and Arizona revised statutes for child care group homes. <http://azdhs.gov/documents/licensing/childcare-facilities/rules/bccl-child-care-group-home-rules.pdf>. Accessed August 23, 2016.
11. Trost SG, Messner L, Fitzgerald K, Roths B. Nutrition and physical activity policies and practices in family child care homes. *Am J Prev Med* 2009;37(6):537–40.
12. Ciampa PJ, Kumar D, Barkin SL, Sanders LM, Yin HS, Perrin EM, et al. Interventions aimed at decreasing obesity in children younger than 2 years: a systematic review. *Arch Pediatr Adolesc Med* 2010;164(12):1098–104.
13. Bernardo H, Cesar V. Long-term effects of breastfeeding: a systematic review. Geneva (CH): World Health Organization; 2013. <http://www.who.int/iris/handle/10665/79198>. Accessed August 23, 2016.
14. Allen KL, Gibson LY, McLean NJ, Davis EA, Byrne SM. Maternal and family factors and child eating pathology: risk and protective relationships. *J Eat Disord* 2014;2(1):11.
15. Early childhood obesity prevention policies. Washington (DC): Institute of Medicine; 2011.
16. Branen LJ, Fletcher JW, Myers LS. Effects of pre-plated and family-style food service on preschool children's food intake and waste at snacktime. *J Res Child Educ* 1997;12(1):88–95.
17. Daniels LA, Mallan KM, Nicholson JM, Thorpe K, Nambiar S, Mauch CE, et al. An early feeding practices intervention for obesity prevention. *Pediatrics* 2015;136(1):e40–9.

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Table

**Table. Results of Survey Among Licensed Child Care Facilities in Arizona (n = 1,850) on Level of Implementation of Selected Empower Standards, by Component, July 2013–June 2015<sup>a,b</sup>**

Component	Percentage of Respondents Indicating Level of Implementation			
	Fully Implemented	Partially Implemented	Not at All Implemented	Response of Don't Know or Missing Data
<b>Standard 1: Physical activity and screen time</b>				
Provides at least 60 minutes of planned physical activity per day	89.1	9.7	0.3	0.9
Includes teacher-led activities	86.5	12.3	0.4	0.7
Includes free play opportunities	92.5	6.9	0.1	0.5
Includes outdoor physical activity	91.1	7.5	0.9	0.5
Includes moderate physical activity	87.4	11.5	0.4	0.8
Includes vigorous physical activity	67.2	26.7	4.3	1.8
Limits sedentary activity to no more than 60 minutes at a time (except nap time)	89.2	6.2	2.5	2.1
Limits screen time to 3 hours or less per week	88.5	4.3	5.9	1.3
Prohibits use of physical activity as punishment	89.9	1.5	7.9	0.7
Provides information on screen time to families	67.0	15.9	13.9	3.2
<b>Standard 3: Breastfeeding-friendly environment</b>				
Provides a place to breastfeed or express milk (not a bathroom)	62.3	4.8	27.8	5.1
Provides a refrigerator for milk storage	71.4	1.6	23.1	3.9
Displays breastfeeding promotion information	47.8	7.7	38.1	6.4
Provides breastfeeding information to families	45.6	10.5	37.5	6.4
<b>Standard 5: Fruit juice and water</b>				
Offers water throughout the day	98.6	0.6	0.3	0.5
Offers water as the first choice for thirst	97.9	1.2	0.4	0.5
Prohibits serving fruit juice more than twice per week for children aged 1 year or older	84.7	8.0	6.1	1.2
Prohibits serving more than 4 to 6 ounces of fruit juice at one time	88.7	5.6	4.1	1.7
Serves juice that is only 100% fruit juice with no added sugar	91.4	2.9	4.4	1.3
Serves fruit juice only at meal or snack times	88.5	4.9	5.4	1.2
Provides information on fruit juice to families	59.7	15.8	20.1	4.4
<b>Standard 6: Family-style meals</b>				
Serves meals family style	78.7	12.8	7.2	1.2
Uses child-friendly serving utensils	85.7	7.6	5.6	1.0

<sup>a</sup> Percentages do not always sum to 100 because of rounding. All percentages are based on a denominator of 1,850.

<sup>b</sup> The standard on training is not included because it has no components.

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(continued)

**Table. Results of Survey Among Licensed Child Care Facilities in Arizona (n = 1,850) on Level of Implementation of Selected Empower Standards, by Component, July 2013–June 2015<sup>a,b</sup>**

Component	Percentage of Respondents Indicating Level of Implementation			
	Fully Implemented	Partially Implemented	Not at All Implemented	Response of Don't Know or Missing Data
Requires staff participation in meal-time with children	91.2	5.8	2.2	0.9
Allows children to choose what and how much to eat	83.4	12.6	3.2	0.7
Prohibits using food as a punishment or reward	93.2	0.9	4.7	1.2
Provides information on healthy eating to families	78.4	13.6	6.3	1.7

<sup>a</sup> Percentages do not always sum to 100 because of rounding. All percentages are based on a denominator of 1,850.

<sup>b</sup> The standard on training is not included because it has no components.

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## ESSAY

# Implementing Key Drivers for Diabetes Self-Management Education and Support Programs: Early Outcomes, Activities, Facilitators, and Barriers

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Diabetes, a serious and costly condition, is characterized by illness and death from long-term microvascular and macrovascular complications (1). Additionally, numerous and well-known comorbidities can accompany diabetes, including cardiovascular disease, retinopathy, amputations, and nephropathy (1). Often these complications and comorbidities interfere with a person's ability to self-manage their diabetes (2). The Centers for Disease Control and Prevention (CDC) projects that as many as 1 in 3 adults could have diabetes by 2050 (3). In 2012, the United States spent an estimated \$245 billion on diabetes care, including \$176 billion in direct medical costs and \$69 billion in indirect costs from lost workdays, restricted activity, disability, and early death (4). Many costly complications among people with diabetes can be prevented or delayed with appropriate preventive care and self-management (5).

CDC's National Center for Chronic Disease Prevention and Health Promotion leads efforts to address the chronic disease burden effectively and equitably in the US population. Generally positioned as the primary public health authority supporting the delivery of public health services within a state, the state health department is a unique partner for the collaborative implementation of population-focused interventions. The 5-year cooperative agreement SPHA1305 (State Public Health Actions to Prevent and Con-

trol Diabetes, Heart Disease, Obesity and Associated Risk Factors and Promote School Health) is such a partnership, involving 4 CDC divisions, all 50 state health departments, and the District of Columbia, to develop strategies to reduce the risk factors for obesity and the management and prevention of chronic conditions such as type 2 diabetes. Through this partnership, CDC's Division of Diabetes Translation provides scientific leadership and technical expertise to support implementation of cross-cutting approaches to improve diabetes outcomes nationally. This essay reflects on the first 3 years of activity of the cooperative agreement.

## Clinical and Community Linkages To Support Diabetes Self-Management

One way to improve diabetes management is to increase linkages between community resources and clinical services. Diabetes self-management education and support (DSMES) programs connect people with diabetes to effective clinical services in their communities. DSMES is usually offered to patients at diagnosis, during annual assessments, and when transitions or new disease complications occur that influence self-management and is guided by evidence-based standards. DSMES is an individualized process in which health care providers incorporate information on the needs, goals, and life experiences of patients when imparting knowledge, teaching skills, and coaching for behavioral change necessary for diabetes self-care (6). Through an assessment of program structure, process, and outcomes, the American Diabetes Association (ADA) and the American Association of Diabetes Educators (AADE) recognize or accredit organizations providing DSMES programs to assure quality.



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Studies show that participants in DSMES programs reduce glycosylated hemoglobin (HbA1c) levels, have fewer emergency department visits, and incur lower in-patient costs (7). Findings of a longitudinal study over a 10-year period showed that each 1% reduction in HbA1c was associated with reductions in risk of 21% for diabetes-related deaths, 14% for myocardial infarctions, and 37% for microvascular complications (8). Significant decreases in in-patient costs, a primary source of savings for Medicaid and commercial payers, have been attributed to DSMES (9).

## Assessing Key Activities Implemented by State Health Departments

Increasing the number of DSMES programs in communities and securing Medicaid reimbursement in states with no DSMES coverage for beneficiaries are critical goals of cooperative agreement SPHA1305. State health departments partner with health systems and community organizations to increase DSMES program access, patient referrals, and reimbursement. The partners' activities are anchored in 4 promising practice areas known to drive implementation: 1) supporting organizations in establishing ADA-recognized or AADE-accredited DSMES programs, 2) securing Medicaid coverage for DSMES, 3) establishing referral policies and practices in health care systems to efficiently connect people to DSMES programs, and 4) raising awareness and enhancing the capacity of people with diabetes to participate in DSMES. Numerous state health departments have implemented such activities (Table 1).

Assessment of program activities to monitor and understand how the activities lead to improved health outcomes is critical to the success of any system-wide intervention. Performance monitoring provides useful and timely information on strengths and opportunities for improvement and on how to tailor technical assistance for midcourse corrections.

In year 3 of the 5-year cooperative agreement, we examined data on the progress made by analyzing the annual reports of the 51 grant recipients. We abstracted such data as quantitative performance measures describing the reach of activities, the number of ADA-recognized and AADE accredited DSMES programs, the proportion of counties with ADA-recognized and AADE accredited DSMES programs, the number of Medicaid recipients with DSMES as a covered Medicaid benefit, and the number of people with at least one encounter at an ADA-recognized or AADE-accredited DSMES program. Overall, 43 states were implementing activities to address DSMES access, participation, and/or coverage. Our analysis included data reported only by state health departments that provided data for a given measure for all 3 years: 2012, 2013, and 2014 (Table 2). The proportion of counties offer-

ing DSMES programs increased from 54.7% at baseline to 57.0% in year 3 (based on data from 38 states). The overall number of DSMES programs increased by 7.8% from 2,822 to 3,043 (based on data from 41 states). We also found a 12.6% increase in the number of Medicaid beneficiaries with DSMES as a covered benefit, from 1.26 million to 1.42 million (based on data from 20 states). The number of people with diabetes who had at least 1 session at an ADA-recognized or AADE-accredited DSMES program went up by 16.6%, from 906,402 at baseline to 1,057,194 by year 3 (based on data from 50 states and the District of Columbia) (Table 2).

## Supportive Partnerships in Diabetes Self-Management Education and Support

Analysis of information in the annual reports on the particular activities of 43 state health departments that implemented DSMES-related activities were coded according to the 4 promising practice areas known to drive implementation. In addition, barriers and facilitators reported by 16 state health departments that elected to evaluate their progress were analyzed.

Health departments and their partners undertook a wide range of activities. They worked to expand program locations to worksites and faith-based organizations; convened advisory groups to identify existing programs interested in obtaining ADA-recognition or AADE-accreditation; sponsored diabetes symposia to provide education for clinical staff, pharmacists, payers, and interested stakeholders on appropriate billing and coding for DSMES services, sustainability strategies, and reimbursement models; and worked with partners to survey health care providers to increase referrals to DSMES programs. Some state health departments developed data sharing agreements to automate DSMES program referrals through electronic health records, while others developed toolkits and educational materials for health care providers. Some developed radio public service announcements and engaged community health workers to raise awareness and increase program participation in the community. Additionally, several states posted maps of DSMES program locations on websites. Health departments entered into partnerships with Federally Qualified Health Centers (FQHCs), medical practices, diabetes coalitions, and pharmacists to advocate for adoption and sustainability of DSMES programs and provided technical assistance to programs seeking AADE accreditation or ADA recognition.

Health departments reported that the inclusion of DSMES as a preventive service in the state's Medicaid expansion program was critical to success. Establishing champions and creating advocacy for policy change through statewide diabetes coalitions were also vital. Having similar software for electronic health records across

FQHCs, using a statewide database of health information resources and programs, and having health care providers who were willing to refer patients to programs increased patient participation. DSMES programs that held classes in easily accessible locations and at convenient times and that used culturally and linguistically appropriate curricula increased participation rates.

Challenges that affected program availability and access included the application process for AADE accreditation and ADA recognition. Further analysis showed that state health departments have limited staff to support the processes of accreditation, recognition, and compliance. Other challenges were a lack of site-level assessment data on DSMES programs; clinicians' concerns about low insurance reimbursement rates, not getting reimbursed, and complicated reimbursement processes; scheduling, transportation, and child care difficulties; and limited availability of culturally and linguistically appropriate programs.

## Future Directions

Assessment of the progress made in implementing DSMES programs under cooperative agreement SPHA1305 provides information to develop guidance for helping state health departments identify how to further improve results by the end of the SPHA1305 funding cycle. In addition, information on barriers and facilitators will inform and guide technical assistance and training provided by the Division of Diabetes Translation for the remainder of the cooperative agreement. The Division of Diabetes Translation developed a series of interactive webinars to build the evaluation capacity and enhance completeness and quality in data reporting. Topics included improving data quality along with developing and disseminating health impact statements and program success stories to various audiences. Continued attention to program activities and performance monitoring data with a goal of real-time action to overcome challenges and provide technical assistance will ensure that our partners promote sustainable strategies for improved health outcomes in diabetes management.

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## References

1. Kent D, D'Eramo Melkus G, Stuart PM, McKoy JM, Urbanski P, Boren SA, et al. Reducing the risks of diabetes complications through diabetes self-management education and support. *Popul Health Manag* 2013;16(2):74–81.
2. Haas L, Maryniuk M, Beck J, Cox CE, Duker P, Edwards L, et al. National standards for diabetes self-management education and support. *Diabetes Care* 2013;36(Suppl 1):S100–8.
3. Boyle JP, Thompson TJ, Gregg EW, Barker LE, Williamson DF. Projection of the year 2050 burden of diabetes in the US adult population: dynamic modeling of incidence, mortality, and prediabetes prevalence. *Popul Health Metr* 2010;8(1):29.
4. American Diabetes Association. Economic costs of diabetes in the U.S. in 2012. *Diabetes Care* 2013;36(4):1033–46.
5. Nathan DM, Genuth S, Lachin J, Cleary P, Crofford O, Davis M, et al. The effect of intensive treatment of diabetes on the development and progression of long-term complications in insulin-dependent diabetes mellitus. *N Engl J Med* 1993; 329(14):977–86.
6. Powers MA, Bardsley J, Cypress M, Duker P, Funnell MM, Fischl AH, et al. Diabetes self-management education and support in type 2 diabetes: a joint position statement of the American Diabetes Association, the American Association of Diabetes Educators, and the Academy of Nutrition and Dietetics. *Clin Diabetes* 2016;34(2):70–80.
7. Klein HA, Jackson SM, Street K, Whitacre JC, Klein J. Diabetes self-management education: miles to go. *Nurs Res Pract* 2013;58:1012.
8. Stratton IM, Adler AI, Neil HA, Matthews DR, Manley SE, Cull CA, et al. Association of glycaemia with macrovascular and microvascular complications of type 2 diabetes (UKPDS 35): prospective observational study. *BMJ* 2000; 321(7258):405–12.

9. Duncan I, Ahmed T, Li QE, Stetson B, Ruggiero L, Burton K, et al. Assessing the value of the diabetes educator. *Diabetes Educ* 2011;37(5):638–57.

Tables

**Table 1. Examples of Diabetes Self-Management Education and Support Activities Implemented by State Health Departments, 2012–2014**

Strategy Driver	Example Activities
ADA-recognized or AADE-accredited DSMES programs established (primary or satellite sites)	The Alabama Department of Public Health created an advisory group to work with department staff members to identify existing DSMES programs, areas of the state underserved or unserved by DSMES programs, and organizations interested in becoming providers of accredited or recognized programs, and to determine which strategies should be pursued in which areas to increase access and referrals to and use of DSMES programs.
	Arizona Department of Health Services staff members provided technical assistance and training to 3 organizations in Arizona to obtain AADE accreditation (eg, capacity building within each organization, curriculum development, credentialing compliance, training of staff on evidence-based strategies).
Insurance coverage for DSMES	The Illinois Department of Public Health engaged with Medicare/Medicaid Alignment Initiative Health Plans to discuss DSMES coverage for patients/members with diabetes.
	Staff members of the Indiana State Department of Health provided live webinars on DSMES reimbursement for 20 hospital-based and 4 pharmacy-based DSMES programs.
Referral policies and practices in place in the health system to efficiently connect people with diabetes to DSMES programs	Members of the Nevada Diabetes Education Stakeholder group, created by the Nevada Department of Health and Human Services, used a DSMES academic detailing toolkit to educate health care providers on ways to increase self-care options for patients and make referrals to ADA-recognized or AADE-accredited DSMES programs.
	Maryland Department of Health and Mental Hygiene staff members designed and built an online self-management referral website that allows the public to search for DSMES classes and health care providers to refer patients to DSMES programs.
Awareness, capacity, and willingness of people with diabetes to attend DSMES programs when other drivers are in place	Michigan Department of Health and Human Services staff members expanded media promotion of recognized or accredited DSMES programs through their diabetes program website and a statewide radio public service announcement.
	The New York State Department of Health's diabetes program partnered with the state's arthritis program to develop a digital media campaign to promote DSMES among women aged 40 or older in 2 counties.

Abbreviations: ADA, American Diabetes Association; AADE, American Association of Diabetes Educators; DSMES, diabetes self-management education and support.

**Table 2. Performance Measures for Diabetes Self-Management Education and Support (DSMES) Activities Implemented by State Health Departments<sup>a</sup>**

Funding Year	No. of ADA-Recognized and/or AADE-Accredited DSMES Programs	Proportion of Counties with ADA-Recognized and/or AADE-Accredited DSMES Programs	No. of Medicaid Recipients With DSMES as a Covered Medicaid Benefit	No. of People With ≥1 Encounter at an ADA-Recognized and/or AADE-Accredited DSMES Program
No. of state health departments reporting data for all 3 years	41	38	20	51
Baseline (2012)	2,822	54.7	1,258,042	906,402
Year 2 (2013)	3,117	57.8	1,204,677	1,049,473
Year 3 (2014)	3,043	57.0	1,417,124	1,057,194
Percentage change from 2012 to 2014	7.8	4.2	12.6	16.6

ADA, American Diabetes Association; AADE, American Association of Diabetes Educators; DSMES, diabetes self-management education and support.

<sup>a</sup> Analysis included data reported only by state health departments that provided data for a given category for all 3 years (2012, 2013, and 2014).

## SPECIAL TOPIC

# Early Results of States' Efforts to Support, Scale, and Sustain the National Diabetes Prevention Program

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## PEER REVIEWED

## Abstract

The Centers for Disease Control and Prevention (CDC) developed a cooperative agreement with health departments in all 50 states and the District of Columbia to strengthen chronic disease prevention and management efforts through the implementation of evidence-based strategies, such as CDC's National Diabetes Prevention Program. The National Diabetes Prevention Program supports organizations to deliver the year-long lifestyle change program that has been proven to prevent or delay the onset of type 2 diabetes among those at high risk. This article describes activities, barriers, and facilitators reported by funded states during the first 3 years (2013–2015) of a 5-year funding cycle.

## Introduction

Prediabetes is clinically known as the stage between normal blood glucose and severe glucose intolerance (1) where blood glucose or glycated hemoglobin A1C levels are elevated but not high enough to be diagnosed as diabetes. The Centers for Disease Control and Prevention (CDC) estimates that 84 million adults aged 18 years or older in the United States have prediabetes, nearly 90% of whom are unaware of their condition (2). Prediabetes increases the risk of developing not only type 2 diabetes but cardiovascular dis-

ease as well (3). The progression of prediabetes to type 2 diabetes can be prevented or delayed by lifestyle behavior modification addressing diet, exercise, and stress reduction that results in a 5% to 7% weight loss (3,4). On the basis of findings from the Diabetes Prevention Program research study and subsequent translation studies (5,6), Congress authorized CDC in 2010 to establish the National Diabetes Prevention Program (National DPP), which provides a framework for type 2 diabetes prevention efforts in the United States.

A key component of the National DPP is a structured, evidence-based, year-long lifestyle change program (LCP) to prevent or delay onset of type 2 diabetes in people with prediabetes or at risk of developing type 2 diabetes (7). The LCP is group-based program that is facilitated by a trained lifestyle coach, and uses a CDC-approved curriculum. The curriculum uses regular opportunities for direct interaction between the lifestyle coach and participants, builds peer support, and focuses on behavior modification through healthy eating, increasing physical activity, and managing stress. The program may be delivered in person, online, or through a combination of both delivery modes (8,9,10).

CDC's Division of Diabetes Translation works collaboratively to scale and sustain the National DPP through partnerships with public and private organizations at state and local levels (7). The Division of Diabetes Translation also manages the Diabetes Prevention Recognition Program (DPRP), the quality assurance arm of the National DPP. Through the DPRP, CDC awards recognition to organizations delivering the LCP that are able to meet national quality standards and achieve the outcomes proven to prevent or delay onset of type 2 diabetes (11).

In 2013, in an effort to promote an integrated model of chronic disease prevention and management, CDC's National Center for Chronic Disease Prevention and Health Promotion developed the



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State Public Health Actions to Prevent and Control Diabetes, Heart Disease, Obesity and Associated Risk Factors and to Promote School Health (SPHA-1305) cooperative agreement. Under this 5-year cooperative agreement, all 50 state health departments and the District of Columbia were funded to implement strategies to reinforce health promotion, epidemiology, and surveillance activities and implement targeted strategies that would have a significant impact on school health, nutrition, obesity, diabetes, heart disease, and stroke.

We present preliminary findings from a collaborative effort between CDC and state health departments designed to scale and sustain the National DPP. Findings from the first 3 years are described with the goal of providing an in-depth understanding of types of activities implemented along with barriers and facilitators experienced. Comments from grantee reports are included to augment findings presented. The information described in this article was exempt from ethical research approval because it involved only a secondary analysis of state program reports. Grantees did not report data in year 1; thus, findings reflect years 2 and 3 of the funding cycle (reports submitted in 2015 and 2016).

## Implementation Framework To Scale And Sustain the National DPP

Through funding to state health departments, CDC works to promote awareness of prediabetes and the National DPP; increase prediabetes screening, testing, and referral; and increase program participation by facilitating relationships between government agencies, community-based organizations, insurance providers, private-sector employers, academia, and health care providers (8). State health departments also work to secure the program as a covered benefit for state employees and Medicaid beneficiaries at risk for type 2 diabetes.

The strategy for scaling and sustaining the National DPP is a set of recommended activities grouped into 4 drivers that are essential to long-term success: 1) support the efforts of partners to increase the availability of LCPs, 2) implement referral policies and mechanisms, 3) establish payers and payment mechanisms, and 4) identify and enroll people with prediabetes or at high risk for type 2 diabetes in LCPs (Table 1). When targeted individually and collectively, these drivers are designed to improve availability of programs; expand reimbursement and insurance coverage; increase the use of practices and policies within health care systems to screen, test, and refer patients; and increase willingness of people at high risk of developing type 2 diabetes to enroll.

## State Health Department Progress on Key Activities

State health departments provide an account of their progress for key activities and outcomes to CDC annually. Two CDC authors (Y.M. and S.R.) qualitatively analyzed data from grantee annual performance reports from years 2 and 3 to summarize the types of activities implemented. We developed structural codes from the drivers and analyzed 20 activities from each data set to ensure reliability of the codes. To ensure consistency in coding, authors then discussed their findings and refined codes to reach a consensus before independently analyzing the remaining data. During their discussion, authors added codes to capture activities that were inconsistent with the drivers. Activities that were dropped by state health departments were not included in the analysis.

### Barriers and facilitators encountered by state health departments

State health departments selected 1 intervention strategy to evaluate over the cooperative agreement period. In year 2, California, Colorado, Florida, Kentucky, Maine, Maryland, Minnesota, Missouri, Montana, New Mexico, Nebraska, New York, North Carolina, Oregon, and Rhode Island chose to evaluate the National DPP strategy. In year 3, Nebraska elected not to evaluate its National DPP work. Evaluation reports from 15 states were included in the year 2 analysis, and reports from 14 states were included in year 3. Two authors (S.B. and Y.M.) analyzed the 2 data sets by using a multistage iterative process to develop a hierarchy of codes for the data. Authors determined a priori to use the drivers as basic codes, then conducted a thematic analysis coding of reported facilitators and barriers to each driver. After an initial analysis of 2 reports, authors compared findings and refined and added subcodes before proceeding to code the remaining reports. An additional “other” category was added to capture information not classified within the codes and subcodes.

The number of activities implemented by state health departments across all 4 categories of drivers doubled from year 2 to year 3, from 148 to 295. State health departments engaged partners to support the scaling of the National DPP gradually and strategically through the funding cycle. A summary of key facilitators and barriers with representative comments is presented (Table 2).

### Support the efforts of partners to increase availability of LCPs

Thirty-five state health departments supported the implementation of activities of their partners to increase availability of programs in year 3, an increase of 133% from 15 state health departments in year 2 (Figure). The most commonly reported activities for this

driver were creating a network of partners to develop a strategic plan to scale and sustain the National DPP, convening key stakeholders to address barriers affecting programs, examining state data to prioritize the location of new programs, establishing mechanisms to increase the availability of LCPs, identifying organizations with infrastructure and capacity to deliver programs, and leveraging state resources to support their partners to start new programs. State health departments partnered with community organizations, health care organizations, employers, private insurers, and government agencies to increase the availability of LCPs in the community.

nership roles, follow-through with strategic planning efforts, decision-making power, clear partner priorities, and interest. All of these challenges impeded efforts to increase program uptake.

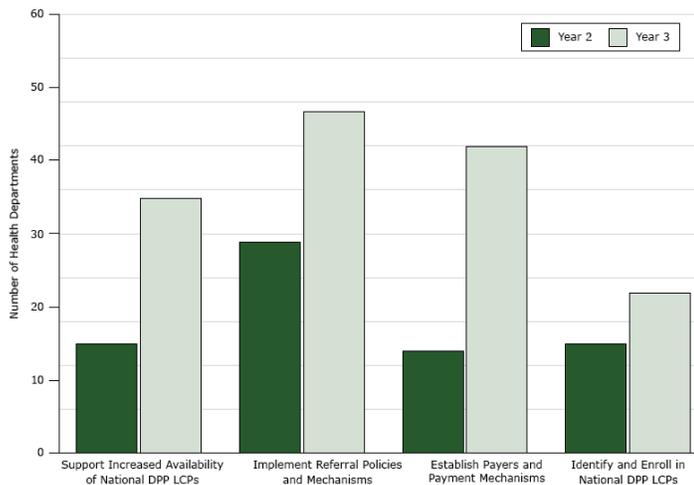
### Implement referral policies and mechanisms

Forty-seven state health departments implemented activities to increase the number of provider referrals made to LCPs in year 3. This represented a 62% increase in number of state health departments from year 2 (Figure). Of the 11,385 participants enrolled in LCPs in year 3, 67.6% (7,700) were referred by a provider. The most common activities reported were promoting the adoption of the American Medical Association (AMA)/CDC provider tool kit (12), providing technical assistance on prediabetes screening and testing, integrating referrals into coordinated care models, and leveraging existing electronic health records (EHRs) as novel referral methods to increase participation in LCPs partnering with state and local medical and nonmedical associations to engage the clinical community. For example, in years 2 and 3, the Florida Department of Health, in partnership with the American Diabetes Association (ADA), provided mini-grants to 14 LCPs. These grantees were able to reach 503 health care practices and 955 physicians to discuss establishing processes or policies for referrals to LCPs, and 33 policies and 256 procedures were implemented to refer patients to LCPs. In the 14 LCPs, 336 participants achieved the desired weight loss outcome of 5% or more in year 3.

Facilitators to developing referral policies for LCPs were having the buy-in of hospital systems, partnering with providers to establish patient referral policies, delivering provider education through academic detailing (face-to-face education of providers by trained health care professionals), providing feedback to providers on referral status, and integrating or linking CDC-recognized lifestyle change programs to referring clinics. Having LCPs attached to primary health care settings was valuable. For example, “YMCA’s that established referral policies with local hospitals or health care providers show greater success recruiting and filling workshop classes than those that did not” (New York State). Integration of prediabetes clinical measures into EHRs and providing prediabetes resources in patient waiting areas contributed to referral success. Lifestyle coaches and participants viewed health care providers and workplace health programs as effective referral mechanisms. Grantees also reported challenges to increasing referrals, such as low provider awareness, provider resistance to making referrals, and difficulty reaching providers to establish a feedback loop.

### Establish payers and payment mechanisms

Activities to establish coverage through payers and payment mechanisms included convening stakeholders to develop a state-



**Figure.** Number of state and District of Columbia health departments (n = 51) implementing activities within each of 4 drivers essential to increasing enrollment of people with prediabetes or at high risk of developing type 2 diabetes into National Diabetes Prevention Program (National DPP) lifestyle change programs (LCPs), 2015–2016.

California reported “a marked increase in the number of in-person and online LCPs due, in part, to organizations and businesses that were able to host LCPs in multiple locations.” The ability of these organizations and businesses to obtain funding was reported as another facilitator that “removed key barriers to the start-up of new programs” (Minnesota) and “supported program uptake” (Maryland). Nebraska reported that “The complex nature of evidence-based programs made timely, clear, and adequate technical assistance important to our programs and enabled us to continue with our implementation efforts.”

Although partnerships were vital, some state health departments faced several challenges in their partnerships, including a lack of accountability, predetermined reporting structure, clarity in part-

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specific business case, recruiting champions, and engaging stakeholders to discuss coverage for state employees and Medicaid beneficiaries. By year 3, 42 state health departments were implementing activities around this driver, a threefold increase from 14 state health departments in year 2.

Establishing partnerships to address lack of coverage was key to increasing LCP reimbursement and enrollment for state health departments: “State employees began having the National DPP offered to them as a covered benefit. Our diabetes program has been working [for a while] with the State Employee Group Insurance Program to promote the ‘Prevent’ program within our agency” (Minnesota); “The National DPP was added as a covered health benefit for state employees enrolled in Kaiser Permanente and United Healthcare plans” (Colorado).

Lack of insurance coverage for the National DPP was reported as a significant barrier. One state health department expressed concern that the lack of insurance coverage for the National DPP transferred the implementation costs to delivery sites that depended on reimbursement to be sustainable. In this state, low or no availability of coverage is reportedly driven by a complex payer landscape where Medicaid reimburses for the National DPP, but not all employers offer insurance coverage for prediabetes. Another state health department established a formal relationship with the state governor’s office, which resulted in coverage for state employees. The governor subsequently established National DPP enrollment as a leading health metric for the state.

### **Identify and enroll people with prediabetes or at high risk for type 2 diabetes in LCPs**

In year 3, 22 state health departments were involved in activities to increase enrollment of people at high risk of developing type 2 diabetes into LCPs (Figure). This was a 46% increase in the number of state health departments implementing activities to support this driver from year 2 to year 3. The most commonly reported activities were training lifestyle coaches, developing a marketing plan, and directing culturally appropriate marketing materials to people at high risk of developing type 2 diabetes.

State health departments reported that availability of culturally and linguistically aligned lifestyle coaches was a major facilitator for identification and enrollment of people with prediabetes or at high risk for type 2 diabetes into LCPs. Transportation, proximity to programs, awareness of programs, maintaining contact with program participants on a regular basis, and availability of low-cost or no-cost programs were also reported as facilitators to increasing enrollment. The Montana state health department reported increased enrollment and participation in the LCPs and concluded that incentives contributed significantly to participants’ weight

loss outcomes. Barriers to participants’ willingness to enroll were transportation needs, cost, scheduling difficulties, nonadherence to care, LCP complexity and length, lack of perceived self-efficacy, lack of skills needed to track food intake and physical activity, and feelings of discomfort in group settings. Another state health department reported that “the challenge continues in assuring that both consumers and clinicians recognize that prediabetes is a considerable risk factor and one that can be reduced with participation in evidence-based programming” (Nebraska). Solutions reported were using Medicaid transportation assistance, adapting the curriculum without changing core elements, reiterating key session points, simplifying tracking tools, promoting coping skills, and providing ongoing support from multiple people beyond the coaches (case managers, doctors, therapists, family, and friends).

### **Limitations of this early analysis**

Reporting from state health departments on their implementation of activities to scale and sustain the National DPP had some limitations. Because the evaluation of activities implemented to scale and sustain the National DPP was optional, only 15 state health departments in year 2 and 14 in year 3 elected to evaluate the impact of their activities. Thus, the discussion of barriers and facilitators to implementation represents what was reported by state health departments that evaluated their National DPP work. If state health departments opted to evaluate a strategy on the basis of how well they were doing, the overall results would appear more favorable than what actually took place. In addition, the variation in the level of detail provided in the annual performance reports and evaluation reports is a limitation of this study. Some grantee reports provided detailed accounts of activities, successes, and barriers, whereas other reports provided brief responses.

Despite aforementioned limitations, this report reflects efforts to promote an integrated model of chronic disease prevention and provides insights into ways to evaluate activities to support and scale a complex, multisector national program designed to stem the current and projected growth in new cases of type 2 diabetes. Our findings identify unique and innovative approaches for real-world program adoption and implementation — specifically, approaches that inform new ways of encouraging people in various sectors to work together to improve health. Our findings provide real-time insight that can be used to refine universal program implementation and increase opportunities for people at risk to be exposed to evidence-based interventions and to have good health outcomes.

### **Implications for the Future**

State health departments are effectively supporting evidence-based programs such as the National DPP to prevent or delay the onset

of type 2 diabetes in people at high risk. Improving and sustaining collaborations between public health agencies and health systems is crucial to the success of this work. We present information on what works and also information for developing guidance on implementing activities that support and scale this evidence-based intervention in community settings. Understanding the activities being implemented, along with barriers and facilitators, has implications for technical assistance to support the expansion and sustainability of the National DPP. These results provide relevant data on state health departments' progress and contribute to the identification of potential best practices. Furthermore, what is learned from states' evaluations is critical to making adjustments midstream during implementation of activities to scale and sustain the National DPP. These early findings can inform the establishment of communities of practice, identify state health departments to lead peer-to-peer learning collaboratives, and shape guidance for scaling not just the National DPP but future public health practice.

## Acknowledgments

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## References

1. McCain J. Prediabetes: pre- does not mean preordained. *Manag Care* 2016;25(5):35–41.
2. Centers for Disease Control and Prevention. National diabetes statistics report, 2017. Atlanta (GA): US Department of Health and Human Services, Centers for Disease Control and Prevention; 2017.
3. Geiss LS, James C, Gregg EW, Albright A, Williamson DF, Cowie CC. Diabetes risk reduction behaviors among US adults with prediabetes. *Am J Prev Med* 2010;38(4):403–9.
4. Perreault L, Pan Q, Mather KJ, Watson KE, Hamman RF, Kahn SE; Diabetes Prevention Program Research Group. Effect of regression from prediabetes to normal glucose regulation on long-term reduction in diabetes risk: results from the Diabetes Prevention Program Outcomes Study. *Lancet* 2012;379(9833):2243–51.
5. Diabetes Prevention Program (DPP) Research Group. The Diabetes Prevention Program (DPP): description of lifestyle intervention. *Diabetes Care* 2002;25(12):2165–71.
6. Knowler WC, Fowler SE, Hamman RF, Christophi CA, Hoffman HJ, Brenneman AT, et al. 10-Year follow-up of diabetes incidence and weight loss in the Diabetes Prevention Program Outcomes Study. *Lancet* 2009;374(9702):1677–86. Erratum in *Lancet* 2009;374(9707):2054.
7. Centers for Disease Control and Prevention. The National Diabetes Prevention Program. <https://www.cdc.gov/diabetes/prevention/index.html>. Accessed September 24, 2017.
8. Albright AL, Gregg EW. Preventing type 2 diabetes in communities across the US: the National Diabetes Prevention Program. *Am J Prev Med* 2013;44(4,Suppl 4):S346–51.
9. Sattin RW, Williams LB, Dias J, Garvin JT, Marion L, Joshua TV, et al. Community trial of a faith-based lifestyle intervention to prevent diabetes among African-Americans. *J Community Health* 2016;41(1):87–96.
10. Zhuo X, Zhang P, Gregg EW, Barker L, Hoerger TJ, Tony Pearson-Clarke, et al. A nationwide community-based lifestyle program could delay or prevent type 2 diabetes cases and save \$5.7 billion in 25 years. *Health Aff (Millwood)* 2012; 31(1):50–60.
11. Centers for Disease Control and Prevention. CDC Diabetes Prevention Recognition Program. <https://www.cdc.gov/diabetes/prevention/lifestyle-program/requirements.html>. Accessed September 24, 2017.
12. American Medical Association, Centers for Disease Control and Prevention. Preventing type 2 diabetes: a guide to refer your patients with prediabetes to an evidence-based diabetes prevention program. Atlanta (GA): US Department of Health and Human Services, Centers for Disease Control and Prevention; 2015.

Tables

**Table 1. Abbreviated List of Activities from the National Diabetes Prevention Program Technical Assistance Guide**

Driver	Activities
Support the efforts of partners to increase the availability of LCPs	<ul style="list-style-type: none"> <li>• Integrate LCP planning and implementation with ongoing state/city diabetes coalition activities or state diabetes action plans.</li> <li>• Explain readiness criteria to organizations interested in becoming LCPs.</li> <li>• Use grant funds to help ADA/ADE DSME programs develop a strategic business plan to determine their capacity to offer a LCP.</li> </ul>
Implement referral policies and mechanisms	<ul style="list-style-type: none"> <li>• Distribute the AMA/CDC provider tool kit, and engage health care systems and providers in using it; partner with state and local medical associations in reaching the clinical community.</li> <li>• Provide technical assistance, training, and academic detailing (face-to-face education of providers by trained health care professionals) on prediabetes screening, testing, and referrals to health care providers and care teams within existing LCP service areas.</li> <li>• Support health care systems in building EHRs or other systems to facilitate and track referrals and enhance decision support.</li> </ul>
Establish payers and payment mechanisms	<ul style="list-style-type: none"> <li>• Develop a state-specific business case for the National Diabetes Prevention Program.</li> <li>• Work with state employee health plans and the state Medicaid agency to secure or extend coverage where needed.</li> <li>• Encourage LCP providers to connect with third-party administrators where necessary to facilitate billing and reimbursement.</li> </ul>
Identify and enroll people with prediabetes or at high risk for type 2 diabetes in LCPs	<ul style="list-style-type: none"> <li>• Use strategic communication strategies (eg, customized waiting room advertising) to reach people at high risk about the importance of National Diabetes Prevention Program benefits and coverage.</li> <li>• Provide advanced training for lifestyle coaches (eg, motivational interviewing) to further strengthen group facilitation skills.</li> <li>• Provide materials and other resources to support existing LCP providers' marketing efforts to recruit participants.</li> </ul>

Abbreviations: AADE, American Association of Diabetes Educators; ADA, American Diabetes Association; AMA, American Medical Association; CDC, Centers for Disease Control and Prevention; DSME, diabetes self-management education; EHR, electronic health record; LCP, lifestyle change program.

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**Table 2. Facilitators and Barriers to Implementing the National Diabetes Prevention Program, 2015–2016**

Themes	Comments From State Health Department Representatives
<b>Facilitators</b>	
Reimbursement availability	<ul style="list-style-type: none"> <li>• “State employees began having the National DPP lifestyle change program offered to them as a covered benefit. Our diabetes program has been working with the State Employee Group Insurance Program to promote the ‘Prevent’ program within our agency.” (Minnesota)</li> <li>• “A large employer and a large insurance company announced (2017) that the National DPP will become a covered benefit. Expansion in insurance coverage is due in part to California’s Department of Public Health’s PDSTAT statewide organization of stakeholders, which has been instrumental in educating payers and insurance companies about the need for and value of the National DPP. The US Preventive Services Task Force recommendations on diabetes screening, released in October 2015, were another factor in encouraging adoption of coverage for the National DPP.” (California)</li> </ul>
Practice/provider referral policies	“Based on CDC DPRP data, over 75% of participants in lifestyle change programs have enrolled based on a blood-based diagnostic test, which indicates that the majority of participants had a clinical test indicating prediabetes and were likely referred by a health care provider. YMCAs that established referral policies with local hospitals or health care providers show greater success in recruiting and filling classes than those that did not.” (New York State)
Program curriculum	“Having standard curricula and referral policies helps facilitate dissemination of the National DPP lifestyle change program in community settings, particularly since coordinated care organizations want to implement evidence-based programs.” (Oregon)
<b>Barriers</b>	
CDC recognition process	“Paperwork and complicated processes, as well as the inability to use grant funds to support direct services, have been a challenge.” (Maryland)
Limited program resources	<ul style="list-style-type: none"> <li>• “Several health systems, clinics, and community-based organizations are linked to lifestyle change programs for delivery and referral. However, many do not have formal policies and bidirectional networks in place. Staff and funding aimed at enhancing these policies and networks have been essential to carry this work forward.” (Nebraska)</li> <li>• “These were the barriers to optimal National DPP implementation. There is a limited amount of wellness funding that has to be stretched across different priority areas.” (Colorado)</li> </ul>
Reimbursement availability	There is no standardized method of reimbursement, and confusion exists about who within the health system can apply for reimbursement: “Lack of insurance coverage for the program often shuts down conversations about referrals and is a constant barrier. Despite these obstacles, we do have some early adopters who are developing policies or willing to undergo practice change.” (Minnesota)
Obtaining referrals	“Many lifestyle change programs report low enrollment and almost no referrals from physicians, even in cases where outreach was conducted to provider offices and larger health systems.” (California)
Participant cost	“Lack of insurance coverage for lifestyle change programs statewide is most often cited as a reason for why providers are not diagnosing and referring patients and why patients are not attending (due to the high cost of the program). There are only a small handful of insurers in New York State that are covering the National DPP as a benefit for their members.” (New York State)
Lack of data	“There is a lack of data on program completion rates, insurance information of enrollees, and measured health outcomes of program completers. Some insurers are aware of the benefit of the program but need more information on completers and outcomes to consider reimbursement.” (Rhode Island)
Lack of awareness	“The majority of employees were not aware of the health and wellness policies in place in their departments.” (Colorado)

Abbreviations: CDC, Centers for Disease Control and Prevention; DPRP, Diabetes Prevention Recognition Program; National DPP, National Diabetes Prevention Program; PDSTAT, Prevent Diabetes Screen Test Act Today.

## ORIGINAL RESEARCH

# Supporting Obesity Prevention in Statewide Quality Rating and Improvement Systems: A Review of State Standards

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## PEER REVIEWED

## Abstract

### Introduction

A quality rating and improvement system (QRIS) is a fundamental component of most states' early care and education infrastructures. States can use a QRIS to set standards that define high-quality care and award child care providers with a quality rating designation based on how well they meet these standards. The objective of this review was to describe the extent to which states' QRIS standards include obesity prevention content.

### Methods

We collected publicly available data on states' QRIS standards. We compared states' QRIS standards with 47 high-impact obesity prevention components in *Caring for Our Children: National Health and Safety Performance Standards; Guidelines for Early Care and Education Programs, 3rd Edition*, and 6 additional topics based on the Centers for Disease Control and Prevention's *Spectrum of Opportunities for Obesity Prevention in the Early Care and Education Setting*.

### Results

Thirty-eight states operated a state-wide QRIS in early 2015. Of those, 27 states' QRIS included obesity prevention standards; 20 states had at least one QRIS standard that aligned with the high-impact obesity prevention components, and 21 states had at least

one QRIS standard that aligned with at least one of the 6 additional topics. QRIS standards related to the physical activity high-impact obesity prevention components were the most common, followed by components for screen time, nutrition, and infant feeding.

### Conclusion

The high proportion of states operating a QRIS that included obesity prevention standards, combined with the widespread use of QRISs among states, suggests that a QRIS is a viable way to embed obesity prevention standards into state early care and education systems.

## Introduction

The Centers for Disease Control and Prevention (CDC) identifies Early Care and Education (ECE) as a priority setting for public health obesity prevention efforts (1). Every state public health department (including the District of Columbia), as a grantee of CDC's State Public Health Actions, requires activities specific to the ECE setting (2). CDC supports state grantees to embed nationally recommended obesity prevention standards into components of their ECE systems by using a guiding framework, *Spectrum of Opportunities for Obesity Prevention in the Early Care and Education Setting (Spectrum of Opportunities)* (3). The *Spectrum of Opportunities* outlines common mechanisms through which states can support ECE facilities to achieve recommended standards for obesity prevention. One component of this framework is a quality rating and improvement system (QRIS).

A QRIS is a core component of most states' ECE infrastructures and is relatively new; most states began operating a QRIS by 2012 (4). QRIS is one approach to assess and improve quality in child care settings. Through a QRIS, states establish standards that define gradations of quality of care and award a quality rating designation to participating ECE programs based on how well they meet these standards. Many states use a star rating system, with



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more stars indicating higher quality. Some states use licensing regulations as the basis of their lowest quality rating designation. States' QRIS standards typically cover the following categories: professional development, qualifications, training, and accreditation; parent and family involvement; learning environment; licensing compliance and status; staff compensation; administrative policies and procedures; financial management; and program evaluation (5). It is generally accepted that quality child care can result in improved child outcomes (6–10), and research on QRISs and childhood outcomes demonstrates that highly rated programs have a positive effect on children's development (11,12). However, little is known about how states use their QRIS as a mechanism to encourage healthy nutrition, physical activity, and other obesity prevention strategies in child care, all of which are important components of healthy development for young children (13). The objective of our review was to describe the extent to which states' QRIS standards include obesity prevention content.

## Methods

We used a stepwise process to determine which states had a statewide QRIS in operation, first using an online public database, the QRIS Compendium (14). Second, because state participation in QRISs is rapidly expanding, we conducted independent web searches for each state that was reported to not have a QRIS to confirm that no state QRIS existed. Third, we collected information on QRIS standards from official state websites. For the 4 states without QRIS standards posted on official websites, we contacted the QRIS operating agency. We collected data from January through April 2015.

### Inclusion and exclusion criteria

Of the 50 US states and the District of Columbia, 38 states had a statewide QRIS operating during early 2015 with standards available for review. Twelve states and the District of Columbia were excluded from the sample for the following reasons: we were unable to determine whether the state had a QRIS in operation (Wyoming, South Dakota); the state was precluded from operating a QRIS through legislative action (Missouri); the QRIS was operating at a local level (California, Florida); or the QRIS was in a developmental or piloting phase (Alaska, Connecticut, District of Columbia, Hawaii, Kansas, Louisiana, Virginia, West Virginia). These criteria yielded a final sample of 38 states that had a QRIS with publicly available standards published between 2007 and 2015.

### Review methodology

Each state's QRIS standards were read by 2 researchers (N.A.G. and C.A.D.) in their entirety and compared with the 47 high-im-

pact obesity prevention components described in *Caring for Our Children: National Health and Safety Performance Standards; Guidelines for Early Care and Education Programs, 3rd Edition* (15). These 47 components (hereinafter referred to as PCO/CFOC) were identified as high impact through an expert review process (15) and are categorized into 4 domains: infant feeding (n = 11 components), nutrition (n = 21 components), physical activity (n = 11 components), and screen time (n = 4 components). The PCO/CFOC components have been used since 2010 by the National Resource Center for Health and Safety in Child Care and Early Education for an annual assessment of states' licensing regulations (16). Several studies used these components and a methodology similar to the one described here to assess the presence of obesity prevention content in state child care licensing and regulations (17–21).

If a state's QRIS standard contained language that matched either fully or partially with one or more of the 47 PCO/CFOC components, it was recorded as present. All discrepancies in recording were resolved through discussion and consensus. To ensure that no standards were overlooked, one reviewer (N.A.G.) read each state's standards a second time. Data were collected in an Excel database.

We also reviewed each state's QRIS standards for 6 topics beyond the PCO/CFOC components. These topics were based on the *Spectrum of Opportunities* and are complementary strategies to PCO/CFOC components. These include 1) participation or adherence to the Child and Adult Care Food Program (CACFP), 2) a facility-level self-assessment specific to nutrition, physical activity, screen time, breastfeeding, or obesity prevention (eg, a nutritional environment assessment tool), 3) action planning tools for obesity prevention-related areas (eg, an action plan for active physical play), 4) professional development training for obesity prevention-related topics (eg, a requirement that providers complete), 5) technical assistance from professionals with subject matter expertise relevant to obesity prevention (eg, a consultation from trained dietitians), and 6) family-engagement resources or activities related to obesity prevention (eg, a family resource center with nutrition information).

## Results

About one-quarter of states' QRIS (11 of 38) had no standards related to obesity prevention. Of the 27 QRISs that included obesity prevention standards, 20 had at least one standard that aligned with a PCO/CFOC component, and 21 had at least one standard that aligned with at least one of the 6 *Spectrum of Opportunities* topics (Table 1).

### **PCO/CFOC components**

Six states' QRIS included at least one standard that aligned with at least one PCO/CFOC component for infant feeding. Two of the 11 PCO/CFOC components for infant feeding were included in states' standards: feeding of breast milk for young infants (IA1, 5 states) and holding infants while bottle feeding (IB3, 1 state) (Table 2). The remaining 9 PCO/CFOC infant feeding components were not present in states' QRIS. For example, no state had standards for feeding infants on cue, allowing infants to stop feedings, developing a plan along with a parent or guardian for introducing age-appropriate foods, serving fruit juice to infants, or serving whole fruits to older infants (Table 2).

Eight states' QRIS included standards that aligned with at least one PCO/CFOC component for nutrition (Table 2). Fifteen of 21 PCO/CFOC components were addressed. The most common components were prohibiting the use of force or bribery to get children to eat (NH1, 5 states); serving fruits and vegetables (NB2 and NB3, 4 states); limiting oils and fats (NA1, 2 states); serving low-fat milk to children 2 years or older (NA5, 2 states); serving whole grains (NB1, 2 states); avoiding sugar (NG2, 2 states); and setting nutritional requirements for adults who eat meals with children (NE2, 2 states). Five PCO/CFOC components for nutrition were not included in any states' QRIS standards. For example, no QRIS standards addressed serving low-fat milk alternatives (eg, yogurt, cottage cheese), teaching children about portion sizes, or prohibiting the use of food as a reward or punishment.

Fifteen states' QRIS included standards that aligned with at least one PCO/CFOC component for physical activity. All 11 PCO/CFOC components for physical activity were addressed (Table 2). The most common PCO/CFOC component present in states' QRIS pertained to providing adequate space for inside and outside play (PA1, 9 states), providing 2 or 3 occasions of active play outdoors daily (PC1, 6 states), and encouraging caregivers to lead structured play (eg, activities or games) (PD1, 4 states). Fewer states' QRIS specified the amount of time toddlers and preschoolers should be moderately to vigorously active (PC2 and PC3, 2 states each), or had standards that required caregivers to promote children's active play and participate in children's active games (PA4, 2 states). PCO/CFOC components for infant physical activity were less common (PE1 and PE2, 1 state each), as were standards for training providers in topics related to physical activity (PA2, 1 state), developing written policies to promote physical activity (PA3, 1 state), and prohibiting withholding active play from children who misbehave (PA5, 1 state).

Eight states' QRIS included standards that aligned with at least one PCO/CFOC component for screen time (Table 2). Seven states' QRIS addressed not using screen time for children aged 2

or younger (PB1). Six states addressed allowing screen time only for educational or physical activity purposes for children aged 2 years or older (PB3), and 4 states had a standard for limiting screen time for children aged 2 years or older to no more than 30 minutes per week (PB2). Only 2 states' QRIS had standards prohibiting media use during meal or snack time (PB4) (Table 2).

### ***Spectrum of Opportunities standards***

Twenty-one states' QRIS had at least one standard aligning with the 6 *Spectrum of Opportunities* components, which went beyond the PCO/CFOC components (Table 3). Twelve states' QRIS standards referenced participating in or adhering to CACFP meal pattern requirements. Six states' QRIS standards included a facility-level self-assessment related to obesity prevention, of which 5 addressed multiple topic areas (eg, nutrition and physical activity). Four states had a QRIS standard for facility-level action planning focused on at least one obesity prevention strategy area (eg, physical activity). Ten states had professional development trainings for nutrition and/or physical activity as stand-alone QRIS standards, of which nutrition was the most common topic addressed. Six states' QRIS standards included technical assistance from a health consultant, child care health consultant, and/or nutritionist. Ten states had QRIS standards for engaging families through various strategies, such as providing education about nutrition and/or physical activity.

### **Other standards related to obesity prevention**

Although we examined only standards that aligned with the 47 PCO/CFOC components and the 6 *Spectrum of Opportunities* topics, we found that 17 states had other standards related to obesity prevention or promoting healthy lifestyles (Arkansas, Colorado, Delaware, Indiana, Massachusetts, Maryland, Michigan, Montana, Nebraska, New Jersey, New Mexico, Nevada, New York, Oregon, South Carolina, Texas, and Utah). For example, Colorado had a QRIS standard that awards points to programs that have a garden and serve fruits and/or vegetables from it for children to taste, and New York had a QRIS standard that awarded points to programs that adopt a formal obesity prevention program.

## **Discussion**

Our review found obesity prevention–related standards in 27 states' QRIS, 20 of which related to at least one PCO/CFOC component, and 21 of which related to a *Spectrum of Opportunities* topic. Twenty-two states had fewer than 5 standards related to a PCO/CFOC component, suggesting that states have the potential to embed more obesity prevention standards into their QRIS.

PCO/CFOC components related to physical activity were most common in states' QRIS standards, followed by screen time, nutrition, and infant feeding.

Most of the 27 states had QRIS standards related to the PCO/CFOC physical activity components; the most common QRIS standard was related to providing physical space for both inside and outside play. Few states had QRIS standards promoting physical activity (eg, number of minutes per day). Because physical activity is important not only in obesity prevention but also in the cognitive and physical development of young children (22), states could improve in this area.

Few states had QRIS standards addressing PCO/CFOC infant feeding components. These findings are consistent with those in a review of child care licensing and regulations for best practices in infant feeding (23). States could explore opportunities to embed infant feeding standards into their QRIS as a strategy to fill gaps or to build on existing standards.

Adherence to, or participation in, CACFP was a common standard. This is an encouraging finding because adhering to CACFP guidelines ensures that children are served nutritious meals and snacks. Furthermore, some evidence shows that programs that participate in CACFP have practices that align with several PCO/CFOC components, such as offering whole-grain foods and fruits and vegetables and having providers eat the same foods that are offered to children (24,25).

Much of the research on obesity prevention in states' ECE systems focuses on child care licensing and regulations and their practical implications (17–21). Our review also has practical implications, especially for advancing ECE obesity prevention in a state QRIS. First, using our review as a baseline assessment, states can monitor progress in QRISs, just as the National Resource Center reviews obesity prevention content in states' child care licensing and regulations (16,26). Second, states interested in establishing a QRIS can examine our data to identify viable options for their own state and to identify peer states for consultation. Third, because a QRIS can build on other state policy and environmental levers, such as child care licensing and regulations, readers can use our data in conjunction with other reports to get a more complete understanding of their state ECE systems' inclusion of PCO/CFOC standards (26,27). Finally, states revising their QRIS standards could consider using standards in *Caring for Our Children* as a way to include national best practices for obesity prevention.

Our review has several strengths. Several reports identify ECE as a key setting for early childhood obesity prevention (eg, Scientific Report of the 2015 Dietary Guidelines Advisory Committee [28], Surgeon General's Vision for a Healthy and Fit Nation 2010 [29]),

and our review provides insight into how states have included obesity prevention-related standards into their QRIS. Our review builds on previous work (30,31) on obesity prevention in QRISs by demonstrating what has occurred in several states and how a QRIS can be used to address obesity prevention in ECE. It also serves as the first detailed baseline report of states' work in QRISs as a mechanism for obesity prevention. As more states establish a QRIS, states could consider strengthening the language of standards to bring them closer to fully meeting PCO/CFOC components. For example, a state's QRIS standard that partially meets a PCO/CFOC component says, "breastfeeding is encouraged and the environment and program policies are designed to support this." Adding language about "making arrangements for mothers to feed their children comfortably on-site" would bring it closer to fully meeting the PCO/CFOC component (IA1). Because the methodology used in our review aligns with the monitoring of child care licensing and regulations, state public health departments, early learning stakeholders, and directors of state QRISs can use our findings in conjunction with other reports to get a more complete picture of how well their state's ECE system supports obesity prevention (26,27). Finally, our methodology could be used by other researchers interested in exploring the inclusion of other *Caring for Our Children* standards in state QRISs (eg, childhood mental health standards). *Caring for Our Children* has more than 600 standards with thousands of components on various health and safety topics, including infectious disease, positive behavior management, sun safety, oral health, and use of consultants in early childhood mental health and early education.

Our review has several limitations. We relied on publicly available QRIS materials from states' websites, and it is possible that the materials were not current. Second, a state's licensing regulations were not factored into the review even when the regulations were used as the basis of the lowest quality rating designation for the state (32). Third, the methodology relied on subjective interpretations of states' QRIS standards. Although we were careful in using a well-known framework for obesity prevention in child care settings and adapting a published methodology, reviewers relied on the written text of states' QRIS standards as the sole basis to determine whether each obesity prevention component was included (15). For example, if a standard referenced a "physical activity checklist," coders gave credit to the state for having a facility-level assessment that addressed obesity prevention. However, the content of facility-level assessment and action planning tools included in QRIS standards were not reviewed. This limitation extends to standards related to professional development and technical assistance.

QRISs have grown in popularity in the United States during the last decade, partially as a result of the Race to the Top Early

Learning Challenge (33) and other actions, such as the reauthorization of the Child Care Development Block Grant. With continued support of quality improvement initiatives for child care, states may continue to strengthen their QRIS. Although participation in a QRIS is currently voluntary for ECE providers in most states, with the exception that some states require ECE providers that receive state child care subsidy funds to participate, states are increasingly providing incentives and using other strategies to increase participation (30). For these reasons, a QRIS can be considered as a potential lever in a state's ECE system to embed obesity prevention standards and may provide a systematic way to improve obesity prevention policies and practices in many ECE settings.

Although we suggest QRIS is a viable option for embedding obesity prevention into a state's ECE system, we also note that various factors influence whether a state chooses to pursue the establishment of a QRIS or another mechanism, such as child care licensing and regulations, to improve ECE environments. Moreover, what is viable in one state may not be viable in another. A single strategy alone, such as a QRIS, is unlikely to improve the quality of ECE environments. Rather, a series of approaches that build on each other, such as those outlined in CDC's *Spectrum of Opportunities*, may be needed to achieve widespread change. As our review shows, a QRIS is one strategy that states are pursuing as part of a layered approach to set standards for higher-quality child care; however, long-term health outcomes and the prevention of obesity are influenced by many factors that extend beyond the child care setting (34).

CDC continues to provide support to states in their efforts to address obesity prevention in ECE through policy, systems, and environmental change, and a QRIS is one of several mechanisms states can pursue. State agencies can use findings from our review to better understand QRISs and opportunities to support obesity prevention in ECE.

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## References

1. Early care and education. Atlanta (GA): US Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Division of Nutrition, Physical Activity and Obesity; 2015. <https://www.cdc.gov/obesity/strategies/childcareece.html>. Accessed August 15, 2016.
2. State public health actions to prevent and control diabetes, heart disease, obesity and associated risk factors and promote school health. Atlanta (GA): US Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion; 2015. <http://www.cdc.gov/chronicdisease/about/state-public-health-actions.htm>. Accessed August 15, 2016.
3. The spectrum of opportunities for obesity prevention in the early care and education setting, CDC technical assistance briefing document. Atlanta (GA): US Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Division of Nutrition, Physical Activity and Obesity; 2015. [https://www.cdc.gov/obesity/downloads/Spectrum-of-Opportunities-for-Obesity-Prevention-in-Early-Care-and-Education-Setting\\_TAbriefing.pdf](https://www.cdc.gov/obesity/downloads/Spectrum-of-Opportunities-for-Obesity-Prevention-in-Early-Care-and-Education-Setting_TAbriefing.pdf). Accessed August 15, 2016.
4. Top ten questions about QRIS. QRIS compendium: a catalog and comparison of quality rating and improvement systems (QRIS); 2017. [www.qriscompendium.org/top-ten/question-1](http://www.qriscompendium.org/top-ten/question-1). Accessed January 4, 2017.
5. Overview of the QRIS resource guide. Washington (DC): US Department of Health and Human Services, Administration for Children & Families Office of Child Care, National Center on Child Care Quality Improvement; 2015. [https://qrisguide.acf.hhs.gov/files/QRIS\\_Resource\\_Guide\\_2015.pdf](https://qrisguide.acf.hhs.gov/files/QRIS_Resource_Guide_2015.pdf). Accessed August 30, 2016.
6. Muennig P, Schweinhart L, Montie J, Neidell M. Effects of a prekindergarten educational intervention on adult health: 37-year follow-up results of a randomized controlled trial. *Am J Public Health* 2009;99(8):1431–7.
7. Reynolds AJ, Temple JA, Ou SR. School-based early intervention and child well-being in the Chicago Longitudinal Study. *Child Welfare* 2003;82(5):633–56.

8. Camilli G, Vargas S, Ryan S, Barnett WS. Meta-analysis of the effects of early education interventions on cognitive and social development. *Teach Coll Rec* 2010;112(3):579–620. <http://www.tcrecord.org/content.asp?contentid=15440>
9. Hahn RA, Barnett WS, Knopf JA, Truman BI, Johnson RL, Fielding JE, et al. Early childhood education to promote health equity: a Community Guide systematic review. *J Public Health Manag Pract* 2016;22(5):E1–8.
10. National Institute of Child Health and Human Development Early Child Care Research Network. Early child care and children's development prior to school entry: results from the NICHD Study of Early Child Care. *Am Educ Res J* 2002;39(1):133–64.
11. Sabol TJ, Pianta RC. Validating Virginia's quality rating and improvement system among state-funded pre-kindergarten programs. *Early Child Res Q* 2015;30:183–98.
12. Tout K, Cleveland J, Weilin L, Starr R, Soli M, Bultinck, E. The parent aware evaluation: initial validation report. Minneapolis (MN): Child Trends; 2016. [http://s3.amazonaws.com/Omnera/VerV/s3finder/38/pdf/Parent%20Aware%20Validation%20Report\\_Final.pdf](http://s3.amazonaws.com/Omnera/VerV/s3finder/38/pdf/Parent%20Aware%20Validation%20Report_Final.pdf). Accessed August 15, 2016.
13. Tandon PS, Tovar A, Jayasuriya AT, Welker E, Schober DJ, Copeland K, et al. The relationship between physical activity and diet and young children's cognitive development: a systematic review. *Prev Med Rep* 2016;3:379–90.
14. QRIS Compendium. A catalog and comparison of quality rating and improvement systems (QRIS); 2017. <http://qriscompendium.org/>. Accessed August 15, 2016.
15. Preventing childhood obesity in early care and education: selected standards from caring for our children: national health and safety performance standards; guidelines for early care and education programs, 3rd Edition. Washington (DC): Academy of Pediatrics, American Public Health Association, and National Resource Center for Health and Safety in Child Care and Early Education; 2012. [http://cfoc.nrekids.org/StandardView/SpCcol/Preventing\\_Childhood\\_Obesity](http://cfoc.nrekids.org/StandardView/SpCcol/Preventing_Childhood_Obesity). Accessed August, 15, 2016.
16. Achieving a state of healthy weight: a national assessment of obesity prevention terminology in child care regulations 2010. Aurora (CO): National Resource Center for Health and Safety in Child Care and Early Education, University of Colorado Denver; 2011. [http://nrekids.org/default/assets/File/Products/ASHW/regulations\\_report\\_2010.pdf](http://nrekids.org/default/assets/File/Products/ASHW/regulations_report_2010.pdf). Accessed September 6, 2016.
17. Benjamin SE, Cradock A, Walker EM, Slining M, Gillman MW. Obesity prevention in child care: a review of U.S. state regulations. *BMC Public Health* 2008;8(1):188.
18. Story M, Kaphingst KM, French S. The role of child care settings in obesity prevention. *Future Child* 2006;16(1):143–68.
19. Kaphingst KM, Story M. Child care as an untapped setting for obesity prevention: state child care licensing regulations related to nutrition, physical activity, and media use for preschool-aged children in the United States. *Prev Chronic Dis* 2009;6(1):A11.
20. Benjamin SE, Taveras EM, Cradock AL, Walker EM, Slining MM, Gillman MW. State and regional variation in regulations related to feeding infants in child care. *Pediatrics* 2009;124(1):e104–11.
21. Slining MM, Neelon SE, Duffey KJ. A review of state regulations to promote infant physical activity in child care. *Int J Behav Nutr Phys Act* 2014;11(1):139.
22. Tandon PS, Tovar A, Jayasuriya AT, Welker E, Schober DJ, Copeland K, et al. The relationship between physical activity and diet and young children's cognitive development: a systematic review. *Prev Med Rep* 2016;3:379–90.
23. Benjamin SE, Taveras EM, Cradock AL, Walker EM, Slining MM, Gillman MW. State and regional variation in regulations related to feeding infants in child care. *Pediatrics* 2009;124(1):e104–11.
24. Liu ST, Graffagino CL, Leser KA, Trombetta AL, Pirie PL. Obesity prevention practices and policies in child care settings enrolled and not enrolled in the Child and Adult Care Food Program. *Matern Child Health J* 2016;20(9):1933–9.
25. Blaine RE, Davison KK, Hesketh K, Taveras EM, Gillman MW, Benjamin Neelon SE. Child care provider adherence to infant and toddler feeding recommendations: findings from the Baby Nutrition and Physical Activity Self-Assessment for Child Care (Baby NAP SACC) study. *Childhood obesity* 2015;11(3):304–13.
26. National Resource Center for Health and Safety in Child Care and Early Education. Achieving a state of healthy weight. 2017. <http://nrekids.org/index.cfm/products/achieving-a-state-of-healthy-weight1/>. Accessed June 22, 2017.
27. Summary of obesity prevention standards in state quality rating and improvement systems (QRIS) and licensing regulations. Washington (DC): Nemours Children's Health System; 2016. [https://d3knp61p33sjvn.cloudfront.net/2016/04/SummaryofObesityPreventionLicensingRegulationsandQRISstandards\\_040416.pdf](https://d3knp61p33sjvn.cloudfront.net/2016/04/SummaryofObesityPreventionLicensingRegulationsandQRISstandards_040416.pdf). Accessed June 22, 2017.

28. Scientific report of the 2015 Dietary Guidelines Advisory Committee: advisory report to the Secretary of Health and Human Services and the Secretary of Agriculture. US Department of Agriculture and US Department of Health and Human Services; 2015. <https://health.gov/dietaryguidelines/2015-scientific-report/PDFs/Scientific-Report-of-the-2015-Dietary-Guidelines-Advisory-Committee.pdf>. Accessed September 22, 2016.
29. Surgeon General's vision for a healthy and fit nation 2010. Rockville (MD): US Department of Health and Human Services; 2010. [http://www.ncbi.nlm.nih.gov/books/NBK44660/pdf/Bookshelf\\_NBK44660.pdf](http://www.ncbi.nlm.nih.gov/books/NBK44660/pdf/Bookshelf_NBK44660.pdf). Accessed September 6, 2016.
30. State quality rating and improvement systems: strategies to support achievement of healthy eating and physical activity practices in early care and education settings. Washington (DC): Nemours Children's Health System; 2016. [https://d3knp61p33sjvn.cloudfront.net/2016/07/State\\_QRIS\\_Strategies\\_to\\_Support\\_Achievement\\_of\\_Healthy\\_Eating\\_and\\_Physical\\_Activity\\_Practice\\_in\\_ECE\\_Settings-June2016.pdf](https://d3knp61p33sjvn.cloudfront.net/2016/07/State_QRIS_Strategies_to_Support_Achievement_of_Healthy_Eating_and_Physical_Activity_Practice_in_ECE_Settings-June2016.pdf). Accessed September 1, 2016.
31. State efforts to address obesity prevention in child care quality rating and improvement systems. Atlanta (GA): Altarum Institute; 2012. [http://altarum.org/sites/default/files/uploaded-related-files/QRIS-Report-22Feb12-FIN\\_0.pdf](http://altarum.org/sites/default/files/uploaded-related-files/QRIS-Report-22Feb12-FIN_0.pdf). Accessed September 1, 2016.
32. QRIS resource guide. Fairfax (VA): US Department of Health and Human Services, Office of Child Care (TA Network); 2015. <https://qrisguide.acf.hhs.gov/index.cfm?do=section&sid=3>. Accessed June 22, 2017.
33. Zellman GL, Perlman M, Le V, Setodji CM. Assessing the validity of the Qualistar early learning quality rating and improvement system as a tool for improving child-care quality. Santa Monica (CA): Rand Corporation; 2008. [http://www.rand.org/content/dam/rand/pubs/monographs/2008/RAND\\_MG650.pdf](http://www.rand.org/content/dam/rand/pubs/monographs/2008/RAND_MG650.pdf). Accessed June 22, 2017.
34. Shilder D, Iruka I, Dichter H, Mathias D. Quality rating and improvement systems: stakeholder theories of change and models of practice. 2015. <http://qrisnetwork.org/sites/all/files/resources/2016-02-10%2009%3A21/QRIS%203.0%20Report%20V11%202016.2.5%20FINAL.pdf>. Accessed June 20, 2017.

Tables

**Table 1. Summary of Information on Quality Rating and Improvement Systems With at Least One Standard That Aligns With PCO/CFOC Components<sup>a</sup> and/or Spectrum of Opportunities Components<sup>b</sup>, by State (n = 27)<sup>c</sup>, 2010–2015**

State	Name of QRIS (Date of Publication of Standards)	No. of PCO/CFOC Components <sup>a</sup> Present in QRIS Standards	No. of Spectrum of Opportunities Components <sup>b</sup> Present in QRIS Standards
Arkansas	Better Beginnings (2010)	1	2
Colorado	Colorado Shines (2014)	2	3
Georgia	Quality Rated (2012)	0	2
Idaho	Steps to Quality (unknown)	0	3
Iowa	Iowa's Quality Rating System (2011)	0	3
Indiana	Paths to Quality (2008)	4	0
Massachusetts	Massachusetts QRIS (2010)	1	1
Maryland	Maryland Excels (2014)	8	2
Maine	Quality for ME (unknown)	1	0
Michigan	Great Start to Quality (2013)	1	2
Minnesota	Parent Aware (2013)	0	2
Montana	Best Beginnings STARS to Quality (2014)	3	2
North Dakota	Bright and Early North Dakota (2012)	1	2
Nebraska	Step Up to Quality (unknown)	0	4
New Jersey	Grow NJKids (2014)	1	3
New Mexico	FOCUS (2015)	4	2
Nevada	Nevada Silver State Stars QRIS (2014)	4	4
New York	QUALITY Stars NY (2014)	10	2
Oklahoma	Oklahoma Reaching for the Stars (unknown)	3	0
Oregon	Oregon QRIS (unknown)	8	0
Pennsylvania	Pennsylvania Keystone STARS (2014–2015)	0	1
Rhode Island	BrightStars (2013)	1	0
South Carolina	ABC Quality (2012–2013)	15	3
Texas	Texas Rising Star (2012)	4	0
Utah	Care About Childcare (unknown)	10	2
Washington	Early Achievers (unknown)	0	1
Wisconsin	YoungStar (2014)	2	2

<sup>a</sup> Forty-seven obesity prevention components, referred to as PCO/CFOC, are described in *Caring for Our Children: National Health and Safety Performance Standards; Guidelines for Early Care and Education Programs, 3rd Edition* (15).

<sup>b</sup> Components (n = 6) are based on the Centers for Disease Control and Prevention's *Spectrum of Opportunities for Obesity Prevention in the Early Care and Education Setting* (3) and are complementary strategies to PCO/CFOC components.

<sup>c</sup> Thirty-eight states had a Quality Rating and Improvement System with publicly available standards published between 2007 and 2015; of these, 11 states had no Quality Rating and Improvement Systems standards aligning with PCO/CFOC components or the 6 additional *Spectrum of Opportunities* (3) components: Alabama, Arizona, Delaware, Illinois, Kentucky, Mississippi, North Carolina, New Hampshire, Ohio, Tennessee, Vermont. Twelve states and the District of Columbia were excluded from the review for various reasons: unable to determine whether the state had a QRIS in operation (Wyoming, South Dakota); precluded from operating QRIS through legislative action (Missouri); QRIS operating at a local level (California, Florida); and QRIS in a developmental or piloting phase (Alaska, Connecticut, District of Columbia, Hawaii, Kansas, Louisiana, Virginia, West Virginia).

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**Table 2. States That Have at Least One Standard That Aligns With PCO/CFOC Components<sup>a</sup>, by Standard, 2010–2015<sup>b</sup>**

Standard	State	No. of States
<b>Infant feeding (11 items)</b>		
IA1. Encourage/support breastfeeding by onsite arrangements for moms to breastfeed	Montana, New Jersey, New York, Nevada, Utah	5
IA2. Serve milk or formula until at least 12 months of age	0	0
IB1. Feed infants on cue	0	0
IB2. Do not feed infants beyond satiety/allow infant to stop the feeding	0	0
IB3. Hold infants while bottle feeding	Texas	1
IC1. Develop a plan for introducing age-appropriate solid foods in consultation with the child's parent/guardian and primary care provider	0	0
IC2. Introduce age-appropriate solid foods no sooner than 4 months of age, and preferably around 6 months of age	0	0
IC3. Introduce breastfed infants gradually to iron-fortified foods no sooner than 4 months, and preferably at 6 months	0	0
ID1. Do not feed an infant formula mixed with cereal, juice, or other foods	0	0
ID2. Serve whole fruits, mashed or pureed, for infants aged 7 months to 1 year	0	0
ID3. Serve no fruit juice to children younger than 12 months	0	0
<b>Nutrition (21 items)</b>		
NA1. Limit oils by choosing monounsaturated fats and polyunsaturated fats and avoiding <i>trans</i> fats, saturated fats, and fried foods	Maryland, South Carolina	2
NA2. Serve meats and/or beans, avoiding fried meats	South Carolina	1
NA3. Serve other milk equivalent products (yogurt, cottage cheese) using low-fat variants to children 2 years or older	0	0
NA4. Serve whole milk to children aged 12 to 24 months who are not on human milk, or serve reduced-fat milk to those at risk for hypercholesterolemia or obesity	Nevada	1
NA5. Serve skim or 1% milk to children aged 2 years or older	Nevada, South Carolina	2
NB1. Serve whole-grain breads, cereals, and pastas	Maryland, South Carolina	2
NB2. Serve vegetables (dark green, orange, deep yellow, and root, such as potatoes and viandas)	Maryland, Oregon, South Carolina, Utah	4
NB3. Serve fruits of several varieties, especially whole	Maryland, Oregon, South Carolina, Utah	4
NC1. Only 100% juice, no added sweeteners	0	0
NC2. Offer juice (100%) only during meal times	0	0
NC3. Serve no more than 4–6 ounces of juice per day to children aged 1–6 years	South Carolina	1
NC4. Serve no more than 8–12 ounces of juice per day to children aged 7–12 years	NA <sup>c</sup>	NA <sup>c</sup>
ND1. Make water available both inside and outside	Utah	1
NE1. Teach children appropriate portion sizes by using plates, bowls, and cups that are developmentally appropriate to nutritional needs	0	0
NE2. Adults eating meals with children eat items that meet standards	Montana, Utah	2
NF1. Serve small-sized, age-appropriate portions	Texas	1
NF2. Permit children to have 1 or more additional servings of nutritious foods that are low in fat, sugar, and sodium as needed to meet the caloric needs of the child; teach children	Texas	1

<sup>a</sup> Forty-seven obesity prevention components, referred to as PCO/CFOC, are described in *Caring for Our Children: National Health and Safety Performance Standards; Guidelines for Early Care and Education Programs, 3rd Edition* (15). The standards listed in this table have been abbreviated.

<sup>b</sup> The letter–number combinations (eg, 1A1) correspond to the letter–number combinations used in the coding system of the National Resource Center (16).

<sup>c</sup> Not applicable to children aged 0 to 5 years.

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(continued)

**Table 2. States That Have at Least One Standard That Aligns With PCO/CFOC Components<sup>a</sup>, by Standard, 2010–2015<sup>b</sup>**

Standard	State	No. of States
who require limited portions about portion size; monitor their portions		
<b>NG1.</b> Limit salt by avoiding salty foods (chips, pretzels)	Maryland	1
<b>NG2.</b> Avoid sugar, including concentrated sweets (candy, sodas, sweetened drinks, fruit nectars, flavored milk)	Maryland, South Carolina	2
<b>NH1.</b> Do not force or bribe children to eat	Indiana, Montana, Oregon, South Carolina, Texas	5
<b>NH2.</b> Do not use food as a reward or punishment	0	0
<b>Physical activity (11 items)</b>		
<b>PA1.</b> Provide adequate space, both inside and outside play	Colorado, Indiana, Massachusetts, Maine, North Dakota, Oklahoma, Oregon, Rhode Island, Utah	9
<b>PA2.</b> Provide orientation and annual training opportunities for caregivers/teachers to learn age-appropriate gross motor activities and games that promote physical activity	Arkansas	1
<b>PA3.</b> Develop written policies on the promotion of physical activity and the removal of potential barriers to physical activity participation	South Carolina	1
<b>PA4.</b> Require caregivers/teachers to promote children's active play and participate in children's active games at times when they can safely do so	Oregon, South Carolina	2
<b>PA5.</b> Do not withhold active play from children who misbehave	South Carolina	1
<b>PC1.</b> From birth to 6 years, provide 2 or 3 occasions daily of active play outdoors, weather permitting	Indiana, Michigan, New York, Oklahoma, South Carolina, Utah	6
<b>PC2.</b> For toddlers, provide 60–90 minutes per 8-hour day of moderate to vigorous physical activity	New York, Wisconsin	2
<b>PC3.</b> For preschoolers, provide 90–120 minutes per 8-hour day for moderate to vigorous physical activity	New York, Wisconsin	2
<b>PD1.</b> From birth to 6 years, provide 2 or more daily structured or adult-led activities or games that promote movement	Arkansas, Colorado, Nevada, New York	4
<b>PE1.</b> Daily supervised tummy time for infants	New York	1
<b>PE2.</b> Use infant equipment (swings, stationary centers, seats, bouncers) only for short periods of time if at all	South Carolina	1
<b>Screen time (4 items)</b>		
<b>PB1.</b> Do not utilize media (television, video, or DVD) viewing and computer with children younger than 2 years	Maryland, New Mexico, New York, Oklahoma, Oregon, South Carolina, Utah	7
<b>PB2.</b> Limit total media time for children aged 2 years or older to no more than 30 minutes per week	New Mexico, New York, Oregon, Utah	4
<b>PB3.</b> Use screen media with children age 2 years and older only for educational purposes or physical activity	Indiana, Maryland, New Mexico, New York, Oregon, Utah	6
<b>PB4.</b> Do not utilize television, video, or DVD viewing during meal or snack time	New Mexico, New York	2

<sup>a</sup> Forty-seven obesity prevention components, referred to as PCO/CFOC, are described in *Caring for Our Children: National Health and Safety Performance Standards; Guidelines for Early Care and Education Programs, 3rd Edition* (15). The standards listed in this table have been abbreviated.

<sup>b</sup> The letter–number combinations (eg, 1A1) correspond to the letter–number combinations used in the coding system of the National Resource Center (16).

<sup>c</sup> Not applicable to children aged 0 to 5 years.

**Table 3. States That Have at Least One Standard That Aligns With *Spectrum of Opportunities* Components<sup>a</sup>, by State (n = 21), 2010–2015**

State	Spectrum of Opportunities Component <sup>a</sup>					
	CACFP	Facility-Level Assessment Tools	Facility-Level Action Planning	Professional Development	Technical Assistance	Family Engagement
Arkansas	—	—	—	Nutrition, Physical activity	—	Nutrition, Physical activity
Colorado	—	—	—	Nutrition	Child care health consultant	Nutrition, Physical activity
Georgia	—	Nutrition, Physical activity	Nutrition, Physical activity	—	—	—
Idaho	—	Nutrition, Physical activity	Nutrition, Physical activity	—	Child care health consultant	—
Iowa	Yes	—	—	Nutrition	Child care health consultant	—
Maryland	Yes	—	—	—	—	Nutrition, Physical activity
Massachusetts	—	—	—	—	Child care health consultant	—
Michigan	Yes	—	—	—	—	Nutrition
Minnesota	Yes	—	—	Nutrition, Physical activity, Obesity prevention	—	—
Montana	Yes	—	—	Nutrition	—	—
North Dakota	Yes	Nutrition, physical activity	—	—	—	—
Nebraska	Yes	Nutrition, Physical activity, Breastfeeding, Screen time	—	Nutrition, Physical activity, Breastfeeding, Screen time	—	Nutrition, Obesity prevention
New Jersey	Yes	Nutrition, Physical activity, Breastfeeding, Screen time	—	—	—	Nutrition, Obesity prevention
New Mexico	—	—	Nutrition, Physical activity, Obesity prevention	Nutrition	—	—
Nevada	Yes	Nutrition	Nutrition, Physical activity	—	Child care health consultant, Nutritionist	—
New York	Yes	—	—	Obesity prevention	—	—
Pennsylvania	—	—	—	—	—	Nutrition, Physical activity
South Carolina	Yes	—	—	Nutrition, Physical activity	—	Physical activity
Utah	—	—	—	—	Child care health consultant	Nutrition, Physical activity
Washington	—	—	—	—	—	Nutrition, Physical activity
Wisconsin	Yes	—	—	Nutrition	—	—

Abbreviations: —, does not have component; CACFP, Child and Adult Care Food Program.

<sup>a</sup> Components (n = 6) are based on the Centers for Disease Control and Prevention's *Spectrum of Opportunities for Obesity Prevention in the Early Care and Education Setting* (3) and are complementary strategies to PCO/CFOC components. Forty-seven obesity prevention components, referred to as PCO/CFOC, are described in *Caring for Our Children: National Health and Safety Performance Standards; Guidelines for Early Care and Education Programs, 3rd Edition* (15).

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ORIGINAL RESEARCH

# Early Outcomes of State Public Health Actions' School Nutrition Strategies

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## Abstract

### Introduction

Since 2013, the State Public Health Actions to Prevent and Control Diabetes, Heart Disease, Obesity and Associated Risk Factors and Promote School Health (State Public Health Actions) program has been implemented to support and reinforce healthy choices and healthy behaviors among the US population. The Centers for Disease Control and Prevention's Division of Population Health's School Health Branch has been a critical component, ensuring that state health departments support schools in adopting nutrition standards and creating a supportive nutrition environment. The objective of this article was to describe early outcomes of the school nutrition strategies of State Public Health Actions.

### Methods

We examined the extent of progress for short-term performance measures and for school nutrition evaluation questions, using data secured from 51 grantees through the performance measures database and state evaluation reports.

### Results

During the first 4 years of the cooperative agreement, grantees demonstrated significant progress compared with year 2 for school nutrition performance measures. Collectively, grantees provided professional development and technical assistance to staff in 7,672 local education agencies and reached more than 29 million students. Success was also noted for several nutrition practices in schools.

### Conclusion

These early outcomes suggest that State Public Health Actions has had a positive impact on the nutrition environment of US schools. Systematically addressing areas for improvement could further expand the reach of these efforts during the remainder of the cooperative agreement.

## Introduction

State Public Health Actions to Prevent and Control Diabetes, Heart Disease, Obesity and Associated Risk Factors and Promote School Health (State Public Health Actions) is a 5-year cooperative agreement that supports state health departments in the promotion of healthy choices and healthy behaviors among the US population (1). The Centers for Disease Control and Prevention's (CDC's) Division of Population Health, School Health Branch seeks to prevent childhood obesity through healthy eating and physical activity policies and practices and through supporting students with chronic health conditions.

More than one-third of children and adolescents in the United States are overweight or obese (2). Because many students consume up to half of their daily calories at school (3), the school nutrition environment can affect children's diet and overall health. Schools are a priority setting for addressing healthy eating behaviors through access to healthy foods and beverages and obtaining consistent information about healthy eating (4–6). The school nutrition environment includes foods and beverages available through multiple venues (eg, school meal programs, vending machines, celebrations, fundraisers), messages about good nutrition that students see and hear, and opportunities for students to learn about and practice healthy eating behaviors (7). Although recent policy changes at the federal, state, and local levels have improved the school nutrition environment, continued progress on policy implementation is needed (8–10).

This article describes the early outcomes of the school nutrition strategies, specifically changes in school-level nutrition practices, of State Public Health Actions.



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## Methods

In June 2013, all 50 states and the District of Columbia were awarded funding under either the basic or enhanced component of State Public Health Actions (1). The basic component awarded funding to all states to support health promotion, epidemiology, surveillance activities, and targeted strategies. The competitive enhanced component awarded additional funding to 32 states to build on and extend the activities supported with basic funding to achieve greater reach and impact. In this study, we examined data from grantees that reported use of these funds to adopt nutrition standards and create supportive nutrition environments in schools. The required strategies focused on interventions that included providing professional development and technical assistance; establishing standards (including for sodium) for all competitive foods (ie, foods and beverages sold outside of the school meal programs); prohibiting advertising of unhealthy foods; and promoting healthy foods in schools, including those sold and served in school meal programs and other venues. Grantees are required to report component-specific performance measures annually and provide data on year 5 targets; states that receive enhanced funding are required to report outcomes. In addition, grantees that receive enhanced funding are expected to work with up to 15 local education agencies (LEAs) (ie, school districts). States identified LEAs, which represent a subset of all the LEAs in a state, on the basis of their own criteria; however, they were encouraged to select LEAs in areas disproportionately affected by chronic diseases and the risk factors that cause them, including those with students who have a high prevalence of overweight or obesity, have limited access to healthy foods and beverages, and do not obtain adequate physical activity. The analysis and findings presented in this article are a subset of a national evaluation (11), and approval was secured from the Office of Management and Budget (no. 0920–1059).

We conducted a document review of annual progress reports and analyzed quantitative performance measure data using a mixed-methods design. These data represented performance from July 1, 2013, through January 31, 2017. Data were obtained from 51 grantees that reported on basic performance measures; 32 of those grantees also reported on enhanced performance measures for enhanced states. School Health Profiles (Profiles) was the primary data source for all school-level performance measures. Profiles is a system of surveys that assess school health policies and practices among secondary schools in states, territories, tribal jurisdictions, and large urban school districts (12). Profiles uses random, systematic, equal-probability samples to produce data representative of schools with 1 or more of grades 6 through 12 in each site. Data were collected in spring 2014 and 2016. Profiles data were collected in the targeted LEAs identified in each of the 32 enhanced states. The primary data source for the policy-related performance

measures (ie, 2.3.03 and 2.3.05) was WellsAT 2.0, an interactive tool used to assess the quality of written local school-wellness policies (13). Grantees also developed their own data collection systems to track professional development and technical assistance. Only data from years 2 and year 4 were included for all measures.

In addition, we collected and analyzed year 3 state evaluation reports. These evaluation reports represented data collection from August 1, 2015, through July 31, 2016. Grantees submit annual evaluation reports that provide detailed findings derived from their state-level evaluation of interventions and strategies. All grantees submitted evaluation reports, of which 29 of the 32 enhanced grantees evaluated the implementation of the enhanced school nutrition strategy. Evaluation reports addressed core questions corresponding to level of implementation. Grantees self-identified as being in either the adoption or implementation phase for the school nutrition strategy. Grantees at the adoption stage reported findings in response to the following core questions: 1) “What state activities have been effective in promoting nutrition policy development and nutrition practice adoption among districts and schools?” and 2) “What are the major facilitators and barriers in helping districts and schools create a supportive nutrition environment, such as partnerships with the Department of Education? How were the barriers overcome?” Grantees at the implementation stage reported findings related to the following core questions: 1) “What critical factors or activities influence the successful implementation of nutrition policy and nutrition practice?” and 2) “To what extent has implementation of nutrition policies and nutrition practices increased access to healthier foods and beverages at school?” In their evaluation report, grantees provided summaries of the approach and strategies of the intervention, the facilitators and barriers to implementation of the strategies, the evaluation indicators, and the evaluation findings.

For analysis of the annual progress reports, year 2 and year 4 data for eligible states were aggregated. Reach estimates were calculated on the basis of the performance measure type (ie, count, numerator and denominator, and percentage). Measures reported as counts were summed as totals across eligible states. Measures reported as percentages were reported as means across eligible states. In addition, for each performance measure, the percentage change in the actual values reported from year 2 to year 4 were calculated. Next, to determine whether the percentage change for each measure was significant ( $P < .05$ ), the average percentage change (across all grantees) was compared with zero by using one-sample *t* tests. Achievements of basic component short-term measures are also described.

Primarily qualitative data were obtained from evaluation reports. We identified and summarized the key school nutrition evaluation findings for year 3. Thematic analysis was conducted to identify and classify patterns or themes across the evaluation reports in terms of the types of changes in the nutrition environment, facilitators, barriers, lessons learned, and recommendations reported. The analysis involved inductively coding the data, deductively identifying themes, visualizing the relationship between codes and themes, sorting and sifting themes to identify interrelationships, and constructing memoranda that summarized the themes. This method of analysis incorporated both the data-driven inductive approach of Boyatzis (14) and the deductive a priori template of codes approach outlined by Crabtree and Miller (15).

## Results

Data from the program's fourth year of implementation demonstrated reach of professional development and technical assistance, progress on the implementation of various evidence-based practices, and identification of factors related to effective nutrition policy and practice. Data were provided by 51 grantees (all 50 states and the District of Columbia).

### Performance measures

Data from the basic component show that 7,672 LEAs received professional development and technical assistance on strategies to promote the adoption of nutrition standards, affecting 29.3 million students in these LEAs (Table) and representing a significant increase of 3,771 LEAs from year 2. Among the 32 enhanced grantees with targeted work in up to 15 LEAs each, 609 LEAs received professional development on creating a supportive nutrition environment in schools, affecting approximately 3.7 million students at year 4. The increase between year 2 and year 4 was significant.

In the areas of nutrition policy and school nutrition practices among the 32 enhanced grantees, 59.5% of LEAs reported adopting and implementing policies to establish standards (including for sodium) for all competitive foods available during the school day, compared with 50.4% in year 2 (Table). Additionally, 58.5% of schools reported they do not sell less-healthy foods and beverages, a significant increase from year 2. In year 4 only 33.5% of LEAs reported adopting and implementing policies that prohibit all forms of advertising and promotion, while 56.9% of schools indicated they prohibited all forms of advertising and promotion for candy, fast food restaurants, or soft drinks. A little more than 13% of schools also reported they priced nutritious foods and beverages at a lower cost, and almost half of schools provided nutrition information to students or families, a significant increase from year 2. Eighty percent of schools increased accessibility of healthy

options by placing fruits and vegetables near the cafeteria cashier. The percentage of schools that allow students to have access to drinking water decreased slightly, from 58.6% in year 2 to 57.9% in year 4 (Table). Nearly one-third of schools offered fruits and nonfried vegetables when foods are offered at school celebrations, and 14.4% of schools allowed students to purchase fruits and vegetables from vending machines, or at the school store, canteen, snack bar, or as à la carte items, a decrease from 19.9% in year 2 (Table).

### State evaluation

Fifty-one state evaluation reports containing results of interventions designed to create supportive nutrition environments were analyzed. Fifty-seven percent of grantees evaluated the strategy focused on creating healthy school nutrition environments (12 in the adoption phase and 17 in the implementation phase). More than half of the 29 grantees evaluating this strategy reported the facilitators and barriers to creating supportive nutrition environments. Among them, 67% identified strong leadership, committed staff, formal partnerships, and engaging champions for school nutrition as key facilitators. The availability of professional development and technical assistance to support staff in the development, implementation, and evaluation of school nutrition interventions also was beneficial. Collectively they provided more than 780 professional development and technical assistance opportunities; 11 grantees reached more than 4,200 state, district, and school administrators; food service staff; and teachers. Other facilitators included communicating about school nutrition, offering incentives, and disseminating resources. Forty-one percent of grantees also found these facilitators influential in the successful implementation of nutrition policy and practice. Sixty percent of grantees reported barriers to creating a supportive nutrition environment, including inadequate capacity (eg, lack of appropriate facilities, staff), negative attitudes, perception of changing traditions (ie, snacks for celebrations), and lack of buy-in and support.

Grantees also described many activities that contributed to the perceived increase in access to healthier foods and beverages. For 75% of grantees, the implementation of nutrition practices and policies to increase access to healthier foods and beverages in schools was largely accomplished by changing and adopting district-level nutrition policies and practices for competitive foods, healthy school celebrations, events, or fundraisers; food and beverage procurement; and meal preparation and service. Many of these policy changes were enacted to better align with state and national nutrition standards such as the new Smart Snack regulations, but some also aimed to improve the consistency and quality of how food is presented to students, availability of information

about menu nutrition contents for parents and students, and access to healthier food options (ie, in vending machines and during meal service). Some of these policies also prohibited advertising and promotion of less nutritious foods and beverages on school property.

As a result of these policy changes, 66.7% of grantees saw practice changes implemented in schools and districts, including increased use of locally grown food (eg, via school gardens) and scratch cooking methods, thus improving the quality and nutritional value of school meals. Changes in local wellness policies also bolstered the development of school health improvement plans that targeted healthy eating habits; the consumption of fruits, vegetables, and healthy snacks; and use of evidence-based and comprehensive health education curricula that align with national and state standards to promote healthy behaviors among students in districts.

In addition, some districts and schools restricted food celebrations, marketing of unhealthy choices, and use of food and beverages as a reward. For example, one grantee reported that nutrition guidelines changed to require that healthy food options be made available at school celebrations, events, and/or fundraisers. Finally, grantees reported observing some improvements in the availability, quality, and selections of foods and beverages in food service lines and à la carte items among its targeted districts, and one grantee reported a 4% decline in the consumption of soda among high school students.

## Discussion

State Public Health Actions' school health strategies aim to provide a comprehensive approach to adopting nutrition standards and creating a supportive nutrition environment in schools through professional development and training of school staff, adoption and implementation of nutrition policies, and implementation of various evidence-based nutrition practices. The findings from this evaluation provide both a broad perspective and more details of school nutrition work in the United States. For example, significant progress has been made in reaching school nutrition and other school health professionals through professional development and technical assistance. This progress enables new knowledge, skills, and abilities among key stakeholders who are also often the implementers of school nutrition policies and strategies.

Outcome data for most school-level nutrition performance measures were favorable. Grantees implemented practices such as placing fruits and vegetables near the cafeteria cashier, where they are easy to access, and prohibiting all forms of advertising and promotion for candy, fast-food restaurants, or soft drinks. These are just 2 examples of no-cost or low-cost strategies that schools

can implement to create a supportive nutrition environment. Grantees also reported achieving significant increases in 2 evidence-based practices: not selling less-healthy foods and beverages (soda pop or fruit drinks, sport drinks, baked goods, salty snacks, candy) and providing information to students or families on the nutrition, caloric, and sodium content of foods available. Slight nonsignificant increases were observed in the percentage of local education agencies that adopted and implemented policies that prohibit all forms of advertising and promotion (eg, contests and coupons) of less-nutritious foods and beverages on school property, the percentage of schools that price nutritious foods and beverages at a lower cost while increasing the price of less nutritious foods and beverages, and the percentage of schools that offer fruits or nonfried vegetables when foods or beverages are offered at school celebrations. Surprisingly, decreases were observed in 2 evidence-based practices: allowing students to have access to drinking water and allowing students to purchase fruits and vegetables from vending machines or at the school store, canteen, snack bar, or as à la carte items. Although these decreases suggest an opportunity for improvement, these achievements collectively demonstrate the capacity of school nutrition nationwide (6).

These data also show that more than half of all targeted LEAs have adopted nutrition standards. These standards require schools and school cafeterias to offer more fruits, vegetables, whole grains, and fat-free or low-fat dairy products and limit sodium, added sugar, calories and unhealthy fat in competitive foods found in à la carte, vending machines, and other venues (16,17). The findings are promising, because the consumption of healthier foods by students may be influenced by implementing these nutrition standards that promote the availability of healthier options offered and purchased at school (18–20).

School nutrition policies, when implemented, support consistent and lasting change in schools. Although 56.9% of schools reported prohibiting all forms of advertising and promotion for candy, fast foods, or soft drinks, only 33.5% of LEAs adopted and implemented policies that prohibit all forms of advertising and promotion. This area is one that needs to be better understood. In practice, grantees are making progress in prohibiting advertising; however, ensuring that this practice is sustainable through the adoption of policy still needs to be improved.

Furthermore, federal legislation such as the Healthy Hunger Free Kids Act of 2010 has been a leverage point for State Public Health Actions grantees, including local wellness policy requirements, Smart Snacks in School, and school meal standards (8). State Public Health Actions grantees have not only supported LEAs and schools to implement these requirements but also helped them go above and beyond the requirements, as evidenced by the performance measures. For example, Smart Snacks in School standards

apply only to foods and beverages sold during the school day, whereas this cooperative agreement and its related performance measure addresses all competitive foods available during the day. Through legislation, there will be continued opportunities for grantees to support LEAs and schools in limiting or prohibiting advertising of unhealthy food and beverages, as local school wellness policy requirements now require LEAs to include information about marketing and advertising in their local wellness policies and only market foods that meet Smart Snacks standards.

Finally, state evaluations have allowed for exploration of facilitators, barriers, and outcomes that enable both CDC and grantees to identify future training, technical assistance, and policy development needs among LEAs and schools. For example, from grantees' evaluation reports, common facilitators have been identified, such as having strong leadership, committed staff, formal partnerships, and engaged champions. Other studies have found similar facilitators to those of grantees, suggesting that these elements support greater implementation of local wellness policies and environmental strategies to promote healthy food and beverages (21,22). These facilitators are important to not only identify but continue to support healthy school nutrition environments, policies, and practices. At the same time, grantees reported that barriers persist, such as negative perceptions (eg, of school meals, nutrition), lack of support and buy-in from key stakeholders (eg, administrators, parents), and lack of facilities and resources (eg, lack of free, filtered water; suitable space).

Although results are encouraging, our study has limitations. Many of the findings were derived from performance data from 32 enhanced grantees who were awarded funding on a competitive basis. These data, although representative of the LEAs selected, may not be generalizable to all LEAs in the United States because grantees' used their own criteria (eg, high need, existing relationships) to select LEAs. In addition, we used self-reported data that were not verified or corroborated by other data or observations. Furthermore, grantees who choose to evaluate the school nutrition strategy may represent more highly motivated grantees, so data from these reports should be interpreted cautiously. Despite these limitations, the data we used were collected by using quality surveillance and data collection systems.

To date, close to 8,000 LEAs and more than 29 million students, representing 57% of US school districts and 59% of students, have been reached by State Public Health Actions (16). Our findings demonstrate that through professional development and technical assistance grantees increased their capacity to implement evidence-based nutrition policies and practices in US schools. The work of grantees will likely continue to have an effect on school nutrition in the final year, as local school wellness policy requirements will be implemented, equipment and facilities grants from

the United State Department of Agriculture (USDA) will be available, and tools, resources, materials, and trainings will also be available through USDA, CDC, and other organizations. There will also be opportunities for grantees to support LEAs and schools in limiting or prohibiting advertising of unhealthy food and beverages. Through professional development, training, and local school wellness policy requirements, grantees will continue to work with LEAs to improve nutrition policy and implement evidence-based strategies that improve student nutrition and the school nutrition environment as a whole.

Finally, as grantees enter the final year of the cooperative agreement, they are required to develop impact statements. These impact statements will highlight the accomplishments of their work during the past 5 years. These impact statements can be used by grantees and CDC to garner support from funders and key decision makers for continued work in the area of school nutrition.

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## References

1. Park BZ, Presley Cantrell L, Hunt H, Farris RP, Schumacher P, Bauer UE. State Public Health Actions to Prevent and Control Diabetes, Heart Disease, Obesity, and Associated Risk Factors Program. *Prev Chronic Dis* 2017;160437.
2. Ogden CL, Carroll MD, Kit BK, Flegal KM. Prevalence of childhood and adult obesity in the United States, 2011–2012. *JAMA* 2014;311(8):806–14.
3. Briefel RR, Wilson A, Gleason PM. Consumption of low-nutrient, energy-dense foods and beverages at school, home, and other locations among school lunch participants and nonparticipants. *J Am Diet Assoc* 2009;109(2Suppl):S79–90.

4. Dietary Guidelines Advisory Committee. Scientific report of the 2015 Dietary Guidelines Advisory Committee: advisory report to the Secretary Health and Human Services and the Secretary of Agriculture. Washington (DC): US Department of Health and Human Services; 2015.
5. Institute of Medicine. Accelerating progress in obesity prevention: solving the weight of the nation. Washington (DC): The National Academies Press; 2012.
6. Centers for Disease Control and Prevention (CDC). School health guidelines to promote healthy eating and physical activity. *MMWR Recomm Rep* 2011;60(RR-5):1–76.
7. Comprehensive framework for addressing the school nutrition environment and services. Atlanta (GA): Centers for Disease Control and Prevention; 2016.
8. The Healthy Hunger-Free Kids Act of 2010. Public Law 2010. p. 111–296.
9. Welker E, Lott M, Story M. The school food environment and obesity prevention: progress over the last decade. *Curr Obes Rep* 2016;5(2):145–55.
10. Chiqui JF, Pickel M, Story M. Influence of school competitive food and beverage policies on obesity, consumption, and availability: a systematic review. *JAMA Pediatr* 2014; 168(3):279–86.
11. Vaughan M, Jernigan J, Pitt Barnes S, Shea P, Davis R, Rutledge S. Evaluating cross-cutting approaches to chronic disease prevention and management: developing a comprehensive evaluation. *Prev Chronic Dis* 2017;160499.
12. Centers for Disease Control and Prevention. School health profiles 2016. <http://www.cdc.gov/healthyyouth/data/profiles/index.htm>. Accessed September 14, 2016.
13. University of Connecticut, Rudd Center for Food Policy and Obesity. WellSAT 2.0. 2016. <http://www.wellsat.org/>. Accessed September 14, 2016.
14. Boyatzis R. Transforming qualitative information: thematic analysis and code development. Thousand Oaks (CA): Sage Publications; 1998.
15. Crabtree BF, Miller WL (editors). Doing qualitative research in primary care: multiple strategies. Second edition. Newbury Park (CA): Sage Publications; 1999.
16. Institute of Medicine. School meals: building blocks for healthy children. Washington (DC): The National Academies Press; 2010.
17. US Department of Agriculture, US Department of Health and Human Services. Dietary guidelines for Americans, 2010. Washington (DC): US Government Printing Office; 2010.
18. French SA, Story M, Fulkerson JA, Hannan P. An environmental intervention to promote lower-fat food choices in secondary schools: outcomes of the TACOS Study. *Am J Public Health* 2004;94(9):1507–12.
19. Jones SJ, Gonzalez W, Frongillo EA. Policies that restrict sweetened beverage availability may reduce consumption in elementary-school children. *Public Health Nutr* 2010; 13(4):589–95.
20. Snelling AM, Kennard T. The impact of nutrition standards on competitive food offerings and purchasing behaviors of high school students. *J Sch Health* 2009;79(11):541–6.
21. Larson N, Davey CS, Coombes B, Caspi C, Kubik MY, Nannery MS. Food and beverage promotions in Minnesota secondary schools: secular changes, correlates, and associations with adolescents' dietary behaviors. *J Sch Health* 2014;84(12):777–85.
22. Hager ER, Rubio DS, Eidel GS, Penniston ES, Lopes M, Saksvig BI, et al. Implementation of local wellness policies in schools: role of school systems, school health councils, and health disparities. *J Sch Health* 2016;86(10):742–50.

Table

**Table. Performance Measures Data of State Public Health Actions**

Performance Measure	Year 2 Actual	Year 4 Actual	Significance Test <sup>a</sup> ( <i>t</i> <sub>df</sub> ; <i>P</i> Value)
<b>Basic component</b>			
B.1.01. Number of local education agencies that received professional development and technical assistance on strategies to create a healthy school nutrition environment	3,901	7,672	<i>t</i> <sub>41</sub> = 2.66; .01
B.1.02. Number of students in local education agencies where staff received professional development and technical assistance on strategies to create a healthy school nutrition environment	17,600,600	29,313,953	<i>t</i> <sub>41</sub> = 1.40; .17
<b>Enhanced component<sup>b,c</sup></b>			
2.3.01. Number of local education agencies that received professional development and technical assistance on strategies to create a healthy school nutrition environment	378	609	<i>t</i> <sub>35</sub> = 2.54; .02
2.3.02. Number of students in local education agencies where staff received professional development and technical assistance on strategies to create a healthy school nutrition environment	2,862,354	3,695,833	<i>t</i> <sub>34</sub> = 2.26; .03
2.3.03. Percentage of local education agencies that have adopted and implemented policies that establish standards (including sodium) for all competitive foods available during the school day	50.4	59.5	<i>t</i> <sub>21</sub> = 1.62; .12
2.3.04. Percentage of schools that do not sell less healthy foods and beverages (soda pop or fruit drinks, sport drinks, baked goods, salty snacks, candy)	45.5	58.5	<i>t</i> <sub>46</sub> = 4.73; <.001
2.3.05. Percentage of local education agencies that have adopted and implemented policies that prohibit all forms of advertising and promotion (eg, contests and coupons) of less nutritious foods and beverages on school property	29.1	33.5	<i>t</i> <sub>18</sub> = 0.54; .60
2.3.06. Percentage of schools that prohibit all forms of advertising and promotion for candy, fast food restaurants, or soft drinks	55.1	56.9	<i>t</i> <sub>47</sub> = 1.35; .18
2.3.07. Percentage of schools that price nutritious foods and beverages at a lower cost while increasing the price of less nutritious foods and beverages	12.3	13.1	<i>t</i> <sub>46</sub> = 1.48; .15
2.3.08. Percentage of schools that provide information to students or families on the nutrition, caloric, and sodium content of foods available	50.4	54.7	<i>t</i> <sub>47</sub> = 3.05; .004
2.3.09. Percentage of schools that place fruits and vegetables near the cafeteria cashier, where they are easy to access	79.2	80.2	<i>t</i> <sub>47</sub> = 1.16; .25
2.3.10. Percentage of schools that allow students to have access to drinking water	58.6	57.9	<i>t</i> <sub>47</sub> = 0.96; .34
2.3.11. Percentage of schools that offer fruits or non-fried vegetables when foods or beverages are offered at school celebrations	32.8	34.1	<i>t</i> <sub>47</sub> = 1.59; .12
2.3.12. Percentage of schools that allow students to purchase fruits and vegetables from vending machines or at the school store, canteen, snack bar, or as à la carte items	19.9	14.4	<i>t</i> <sub>45</sub> = -0.09; .93

<sup>a</sup> Significance was set at *P* < .05.

<sup>b</sup> Measures reported as mean percentages to represent the average percentages across eligible states.

<sup>c</sup> For duplicate measures, the values are independent. Number of schools surveyed in year 2 was 1,337; number of schools surveyed in year 4 was 1,250.