PREVENTING CHRONIC DISEASE
PUBLIC HEALTH RESEARCH, PRACTICE, AND POLICY

PCD Collection: Nutrition and Obesity Policy Research and Evaluation Network (NOPREN)

PREVENTING CHRONIC DISEASE
PUBLIC HEALTH RESEARCH, PRACTICE, AND POLICY

NOPREN: NUTRITION AND OBESITY POLICY RESEARCH AND EVALUATION NETWORK

Networking to Improve Nutrition Policy Research

Sonia A. Kim, PhD; Heidi M. Blanck, PhD; Angie Cradock, ScD; Steven Gortmaker, PhD

Elevating the Impact of Nutrition and Obesity Policy Research and Evaluation

Sheila Fleischhacker, PhD, JD; Jennifer J. Otten, PhD, RD; Elizabeth A. Dodson, PhD, MPH; Sameer Siddiqi

Evaluating the Impact of the Healthy Beverage Executive Order for City Agencies in Boston, Massachusetts, 2011–2013

Angie L. Cradock, ScD; Erica L. Kenney, ScD; Anne McHugh, MS; Lisa Conley, JD, MPH; Rebecca S. Mozaffarian, MS, MPH; Jennifer F. Reiner; Steven L. Gortmaker, PhD

Drinking Water in California Child Care Sites Before and After 2011–2012 Beverage Policy

Lorrene D. Ritchie, PhD, RD; Sallie Yoshida, DrPH, RD; Sushma Sharma, PhD; Anisha Patel, MD, MSPH; Elyse Homel Vitale, MPH; Ken Hecht, JD

An Assessment of Nutrition Practices and Attitudes in Family Child-Care Homes: Implications for Policy Implementation

Alison Tovar, PhD, MPH; Patricia Risica, DrPH; Noereem Mena, MS, RD; Eliza Lawson, MPH; Angela Ankoma, MSW; Kim M. Gans, PhD

Getting Research to the Policy Table: A Qualitative Study With Public Health Researchers on Engaging With Policy Makers

Jennifer J. Otten, PhD, RD; Elizabeth A. Dodson, PhD, MPH; Sheila Fleischhacker, PhD, JD; Sameer Siddiqi, BS; Emilee L. Quinn, MPH

Nutrition-Related Policy and Environmental Strategies to Prevent Obesity in Rural Communities: A Systematic Review of the Literature, 2002-2013

Larissa Calancie; Jennifer Leeman, DrPH; Stephanie B. Jilcott Pitts, PhD; Laura Kettel Khan, PhD; Sheila Fleischhacker, PhD, JD; Kelly R. Evenson, PhD; Michelle Schreiner, MSN, RN; Carmen Byker, PhD; Clint Owens, MSN, RN; Jared McGuirt, MPH; Ellen Barnidge, PhD, MPH; Wesley Dean, PhD; Donna Johnson, PhD, RD; Jane Kolodinsky, PhD; Emily Piltch, MPH; Courtney Pinard, PhD; Emilee Quinn, MPH; Lauren Whetstone, PhD; Alice Ammerman, DrPH, RD

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Developing Local Board of Health Guidelines to Promote Healthy Food Access — King County, Washington, 2010-2012

Emilee Quinn, MPH; Donna B. Johnson, PhD, RD; James Krieger, MD, PhD; Erin MacDougall, PhD; Elizabeth Payne, MPH, RD; Nadine L. Chan, PhD, MPH

Spending at Mobile Fruit and Vegetable Carts and Using SNAP Benefits to Pay, Bronx, New York, 2013 and 2014

Andrew Breck, MPA; Kamila M. Kiszko, MPH; Courtney Abrams, MA; Brian Elbel, PhD, MPH

The Cleveland-Cuyahoga County Food Policy Coalition: "We Have Evolved"

Colleen C. Walsh, PhD; Morgan Taggart, MUPDD; Darcy A. Freedman, PhD; Erika S. Trapl, PhD; Elaine A. Borawski, PhD

PREVENTING CHRONIC DISEASE
PUBLIC HEALTH RESEARCH, PRACTICE, AND POLICY
Volume 12, E148 SEPTEMBER 2015

ESSAY

Networking to Improve Nutrition Policy Research

Sonia A. Kim, PhD; Heidi M. Blanck, PhD; Angie Cradock, ScD; Steven Gortmaker, PhD

Suggested citation for this article: Kim SA, Blanck HM, Cradock A, Gortmaker S. Networking to Improve Nutrition Policy Research. Prev Chronic Dis 2015;12:150329. DOI: http://dx.doi.org/10.5888/pcd12.150329.

PEER REVIEWED

Abstract

Effective nutrition and obesity policies that improve the food environments in which Americans live, work, and play can have positive effects on the quality of human diets. The Centers for Disease Control and Prevention's (CDC's) Nutrition and Obesity Policy Research and Evaluation Network (NOPREN) conducts transdisciplinary practice-based policy research and evaluation to foster understanding of the effectiveness of nutrition policies. The articles in this special collection bring to light a set of policies that are being used across the United States. They add to the larger picture of policies that can work together over time to improve diet and health.

Introduction

The dietary quality of many Americans is poor and, combined with low levels of physical activity, contributes to early death and disability from diseases such as obesity, diabetes, cardiovascular disease, and certain cancers (1). To improve diet, the public health community has recognized the need for a range of approaches that span the socioecological model and take into account the interaction between the environment and the individual in making food choices (2–5). A key notion to this interplay is that people's learned food preferences along with social, information, and food environments are powerful influences on dietary intake (5). Effective nutrition policies may affect these environments in various ways, including enabling people to acquire healthy food preferences or removing barriers to healthy choices (5). For example, early care and education, school, and worksite food standards can repeatedly expose people to healthy food offerings, a factor important for the development of food preferences (6). Although the potential of policy strategies to improve healthy food environments and human diet is recognized, this field is in its nascent stages (7).

In 2009, The Centers for Disease Control and Prevention's (CDC's) Division of Nutrition, Physical Activity, and Obesity created the Nutrition and Obesity Policy Research and Evaluation Network (NOPREN; www.nopren.org). NOPREN's goal is to foster understanding of the effectiveness of policies to improve the physical food environment and the food-related economic, social, and information environments. NOPREN members conduct transdisciplinary practice-based policy research and evaluation using a framework that includes policy identification, development, implementation and outcomes, and translation and dissemination, as previously described (8). Researchers consider a variety of policy levers (eg, legislation, regulation, executive orders, and zoning) at the national, state, territorial, tribal and community levels.

The initial NOPREN core of 5 funded Prevention Research Centers (PRCs) and their CDC technical advisors has expanded membership to realize the benefits of working as a network, thus leveraging expertise, funding, resources, and relationships. Additional members now include universities not funded by NOPREN, staff from state and local health departments, education and child health agencies, and nonprofit organizations. Key partners are Robert Wood Johnson Foundation's Healthy Eating Research (HER) Program and the National Collaborative on Childhood Obesity Research (NCCOR). NOPREN's technical advisors include staff members from CDC and the National Institutes of Health (8).

NOPREN members work collaboratively through multidisciplinary working groups that address priority areas such as access to drinking water, access to food in rural areas, the impact of policy research, food policy councils, school wellness programs, and early child care and education. Working group members share tools, develop topic-specific capacity, and conduct multisite coordinated research and evaluation. These collaborations are reflected in a collection of NOPREN articles, many of which are products of a working group.

An Overview

The articles in this special collection span multiple policy levels (national, state, local); types (executive order, guidelines and recommendations, legislation); and settings (urban and rural communities, early child care and education). They address several components of NOPREN's evaluation framework. Articles by Quinn et al (9) and Walsh et al (10) demonstrate in-depth understanding of policy development and adoption. Careful examination of policy implementation and its effects on the food and beverage environment are found in articles by Cradock et al (11) and Ritchie et al (12).

The transferability of policies from urban settings to rural communities (13) is discussed in the work of Calancie and colleagues. The translation, communication, and dissemination of policy research and best practices (14) are addressed by Otten et al. Making use of diverse methodologies (eg, systematic review, qualitative case design, quantitative survey analysis), these studies provide a broader understanding of the potential role of policy as a strategy to support healthier diets.

Policy Development and Adoption

Researchers at the University of Washington used a qualitative case study design to examine the development and reach of an innovative policy approach to healthy food access adopted by a local board of health (9). The King County Local Board of Health (in Washington State) developed guidelines for healthy vending, using a newly adopted policy mechanism that allowed for greater specificity without the complexity of a regulation (9). Other communities may benefit from understanding the array of policy tools being used and the feasibility and benefits of these tools.

The importance of considering local context emerged as a theme from a case study by Walsh and colleagues of the role of the Cleveland-Cuyahoga County Food Policy Coalition (CCCFPC) in 4 policy efforts to improve Cleveland's urban food environment (10). Researchers found that the stimulus for the policies originated with citizens, and the CCCFPC was instrumental in getting those citizens' needs heard. The CCCFPC's role in educating policy makers and its relationships with diverse partners were key elements in the adoption of these policies (10).

Policy implementation

Development and adoption of a policy are often early steps toward creating healthy environments but may not guarantee complete adherence to a policy. Therefore, implementation of policies and their resulting effects on the food and beverage environment should be carefully considered as part of policy research and evaluation.

Using a pre/post natural experimental design, Cradock and colleagues examined the impact of Boston's Healthy Beverages Executive Order (HBEO) on the availability of healthy beverages in Boston City agency locations (11). The HBEO, which took effect in 2011, required Boston agencies to eliminate the sale of sugar-sweetened beverages on city property. Investigators found that 2 years after the HBEO was implemented, the average proportion of sugary beverages available per access point had significantly decreased, and city agencies were more than 4 times as likely to offer only healthier beverages as they were before the HBEO, but not all retail points were in full compliance (11). Similarly, Ritchie et al found that the provision of water to children by California-licensed childcare providers increased after the implementation of federal and state policies addressing the issue (12). However, not all childcare providers were compliant, demonstrating that policy adoption is important but not sufficient to the creation of healthier environments. These studies emphasize the need for monitoring implementation and adherence to policies.

Another aspect of policy evaluation is understanding whether a policy addresses the needs and circumstances of the target population. A 2008 New York City policy established 1,000 permits for mobile fruit-and-vegetable vendors (aka Green Carts) to operate in neighborhoods with the least availability of healthful foods (15). Many residents in these low-income neighborhoods rely on Supplemental Nutrition Assistance Program (SNAP) benefits for food purchases. Beginning in 2010, the New York State Department of Health funded electronic benefit transfer machines so that residents could use their SNAP benefits at the carts. Researchers from New York University found that customers using SNAP benefits at Green Carts spent on average $3.86 more per transaction than those who paid with cash, suggesting that the policy did affect the intended population (15).

Translation, Communication, and Dissemination

NOPREN's evaluation framework includes activities related to the translation, communication, and dissemination of policy-relevant research. These activities may include characterizing the potential for transferability of policies; translating and disseminating best practices for policy implementation; and ensuring that research findings are communicated to relevant stakeholders.

Little is known in the US public health community about how evidence from nutrition research is used in policy development and how researchers communicate their findings to policy makers (14). Otten and colleagues addressed this gap through interviews with public health and nutrition researchers, finding a wide range of practices, barriers (mainly in academic settings), and facilitators (including the "desire to make a difference," collaborations, and mentorship) (14).

Results from an examination of the nutrition-related practices and attitudes of child care providers among licensed family child care homes (FCCH) in Rhode Island by Tovar and colleagues (16) demonstrate the need for increased cultural sensitivity in such settings. The authors suggest that culturally and linguistically relevant trainings that are tailored for FCCHs (rather than to child care centers) are needed to make certain that all children receive adequate nutrition (16). They also point out that training on policies and practices that enable children to learn healthy food preferences and eating behaviors must be expanded if dietary changes are to be equitable and sustainable (16).

As discussed by Calancie et al (13), much of the policy research and evaluation on nutrition and obesity has been done in urban settings. However, rural residents often face disparities in obesity-related health outcomes and risk factors (17–19). NOPREN's Rural Food Access Working Group examined the implementation and adaptation of nutrition and obesity policies for rural settings (13). This assessment illuminates strategies for overcoming barriers to healthy food availability in rural areas.

Conclusions

NOPREN conducts research relevant to developing a culture of smart food policy. NOPREN's expansion of working groups, including a new Hunger Safety Net group in 2015, and strategic partnerships are responses to the need for policy research in emerging areas of importance. NOPREN serves as a forum where members can learn the latest theories and research in the field, share and collaborate on tools and methods, and develop capacity to conduct policy research relevant to practitioners and policy makers and responsive to communities most in need. This collection of articles on policy research brings to light policies that are being tried across the country and adds to our knowledge about which policies can work to improve the US diet.

Acknowledgments

No author has any financial disclosures. The authors thank Linda Barnes, Suzianne Garner, and Paulette Murphy for their support. Funding for this project was provided in part by cooperative agreement with CDC (Prevention Research Center U48DP001946, including NOPREN). The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of CDC.

Author Information

Corresponding Author: Sonia A. Kim, PhD, 4770 Buford Hwy NE, MS F-77, Atlanta, GA 30341. Telephone: 770-488-5156. Email: Skim@cdc.gov.

Author Affiliations: Sonia A. Kim, Heidi M. Blanck, Division of Nutrition, Physical Activity, and Obesity, Centers for Disease Control and Prevention, Atlanta, Georgia; Angie Cradock, Steven Gortmaker, Harvard T. H. Chan School of Public Health, Boston, Massachusetts.

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PREVENTING CHRONIC DISEASE
PUBLIC HEALTH RESEARCH, PRACTICE, AND POLICY
Volume 12, E59 APRIL 2015

ESSAY

Elevating the Impact of Nutrition and Obesity Policy Research and Evaluation

Sheila Fleischhacker, PhD, JD; Jennifer J. Otten, PhD, RD; Elizabeth A. Dodson, PhD, MPH; Sameer Siddiqi

Suggested citation for this article: Fleischhacker S, Otten JJ, Dodson EA, Siddiqi S. Elevating the Impact of Nutrition and Obesity Policy Research and Evaluation. Prev Chronic Dis 2015; 12:150142. DOI: http://dx.doi.org/10.5888/pcd12.150142.

Increasingly, public policy is recognized as a high-impact and robust approach for accelerating progress toward reducing and managing nutrition-related chronic diseases such as obesity (1). In various jurisdictions, policy makers enact courses of action, regulatory measures, laws, and policies and set funding priorities designed to improve access to healthier food and beverage options (2). Public policy, however, is often the least understood strategy for creating supportive nutrition environments for population health impact. Research has predominantly focused on understanding individual behavior change rather than evaluating approaches to environmental, policy, and system-level change (1,3,4). More attention has been given recently to approaches that could potentially strengthen our understanding of policy including empirical public health law and policy; research, dissemination, and implementation of science; and public health policy evaluation and research (5). Nevertheless, little is known about whether or how nutrition and obesity policy research and evaluation findings influence policy pathways or whether these findings are consistently and systematically used in formulating public policy.

To explore the evidence as well as promising practices in this area, the Nutrition and Obesity Policy Research and Evaluation Network (NOPREN) Policy Research Impact Working Group (PRIWG) formed in 2011. NOPREN is a thematic Prevention Research Center network created in 2009 by the Centers for Disease Control and Prevention (CDC), Division of Nutrition, Physical Activity, and Obesity, to conduct transdisciplinary nutrition and obesity-related policy research and evaluation across a policy continuum (4). NOPREN participants leverage expertise, funding, and resources across the network and have led the formation of working groups to help coordinate and enhance efforts in areas of common interest and need. We reflect here on the process and potential of PRIWG to improve understanding about and build connections between researchers and policy makers and to explore how to better use these connections in conducting and communicating nutrition and obesity policy research, from initial idea generation through findings dissemination.

Two NOPREN members (J.J.O. and E.A.D.) created PRIWG and recruited fellow NOPREN participants. One of the first PRIWG undertakings is published in this issue of *Preventing Chronic Disease* (6). Briefly, to enhance understanding about the state of public health researcher practices and beliefs and the barriers and facilitators to communicating and engaging with policy makers, 18 semi-structured interviews were conducted with public health nutrition and obesity researchers who are highly involved in communicating research to policy makers. A wide variation in practices and beliefs emerged for communicating and engaging with policy makers. The study authors concluded that this may reflect the absence of several related but key supports for researchers regarding policy communication. Specifically, the authors discussed the lack of consensus on a common terminology or set of best practices or guidelines for communicating with policy makers, the lack of systematically designed training or mentorship, and the limited evidence on how research gets used in policymaking.

To further the PRIWG goal of identifying suggestions for improving how researchers engage with policy makers to get research into policy pathways, PRIWG aims to secure support to use these findings to inform the development of a larger, online survey of the field at large about knowledge, practices, experiences, and challenges of communicating and engaging with policy makers. In addition, PRIWG has established a transdisciplinary subgroup that is working to identify peer-reviewed articles that provide insights on how nutrition and obesity policy research gets used by elected officials in the United States. We also plan to identify any factors that influence the role of policy makers in helping to shape the research agenda and that could strengthen the design of policy-relevant studies. That is, we are exploring as best we can, with existing literature specific to nutrition and obesity policy research, the bidirectional researcher–policy maker relationship. Preliminary find-

ings from the review of articles indicate that few researchers and funding sources are tackling this area of research; even fewer have a particular focus on nutrition and obesity policy research issues and opportunities.

As of 2014, PRIWG is sharing evidence gathered and exploring possible collaborative projects with the National Collaborative on Childhood Obesity Research (NCCOR) Get Research Used Workgroup (GRU). NCCOR brings together 4 of the nation's leading funders —the CDC, National Institutes of Health (NIH), Robert Wood Johnson Foundation, and US Department of Agriculture — to improve the efficiency, effectiveness, and application of childhood obesity research and to halt — and reverse — childhood obesity (http://nccor.org/about/index). NCCOR focuses on efforts that have the potential to benefit children, teens, their families, and the communities in which they live. A special emphasis is placed on the populations and communities in which obesity rates are highest and rising the fastest. GRU grew out of recommendations put forth by the NCCOR External Scientific Panel, which serves as a liaison between NCCOR and the extramural community, informing NCCOR on new science and ideas and on connections to extramural research, practice, and policy (http://nccor.org/about/nesp). NCCOR External Scientific Panel members in 2012 and 2013 acknowledged that most research around childhood obesity probably does not get used and that childhood obesity researchers need to increase their capacity and skills to ensure their work reaches and resonates with key audiences. The panel recognized there were few incentives for researchers to actively work toward the translation and dissemination of their research and even fewer resources to help them. Therefore, GRU aims to empower researchers to translate and actively disseminate their results and findings and is considering, where needed, to develop resources designed to build researchers' skills around policy research translation.

PRIWG's next steps will be built on the notion that effective engagement with policy makers is not simply communicating and disseminating the end result of a research study but an active and bidirectional process from study conception to dissemination. Cultivating these relationships will require sensitivity to any institutional or funding source anti-lobbying guidance that may encourage translation and dissemination but prohibit advocacy activities (one federal example is US Office of Management and Budget Circular A-122). Moreover, developing strategic and systematic approaches to enhance how researchers engage with policy makers to get research considered and prioritized during the policymaking process will most likely require collaboration, tweaking, and tailoring to fit the particular nuances of the research and the needs of the researchers, policy makers, constituents, and stakeholders. Consideration must also be given to the role of intermediaries and disseminating organizations, such as advocacy groups, for facilitating the uptake of research into policy pathways (7).

Engaging with a policy maker or disseminating organization in any jurisdiction requires building trust and takes time — a precious commodity, especially for junior researchers. Like the NCCOR External Scientific Panel, we appreciate that there is limited and inconsistent preprofessional training or continued professional training for academic researchers on how to effectively engage with policy makers and few incentives encouraging researchers to do so. Brownson and colleagues have identified numerous factors hindering the translation of scientific evidence into public policy such as differences in decision making and persuasion among researchers and policy makers, ambiguous findings, and the need to balance objectivity and advocacy (8,9). At the same time, Brownson and colleagues have put forth solution-oriented suggestions for more effectively communicating findings to policy makers, including publishing scientific articles particularly focused on policy-relevant issues, reporting characteristics related to implementation and external validity, and taking additional actions across the advocacy continuum such as developing short policy summaries. Another suggestion put forth by Brownson and colleagues focuses on improved training and capacity building of students and professionals. Possible informal and formal learning strategies would first cover how to design and conduct rigorous quantitative and qualitative policy-relevant research and then how to get this research used. Other didactic and practicum educational offerings could focus on how to engage in partnerships with disseminating organizations and policy makers and communicate concisely and in straightforward language in both written and oral policy-relevant modes, mediums, and communication channels. Equally important, researchers could benefit from training and capacity building on how to best identify in their domain and for their relevant jurisdiction(s) the most effective way in real time to frame nutrition and obesity research that resonates with their relevant policy maker(s) (10).

Before training and capacity building along the pipeline of training from graduate school to senior investigators can be employed most effectively, a need exists to stimulate big picture and systematic thinking around ways to elevate the impact of nutrition and obesity policy research. Informed by and built on our formative transdisciplinary activities, PRIWG aims to work further on examining how to most effectively infuse policy research and evaluation work into policy pathways, convene thought leaders on this subject, canvass researcher and policy maker needs, and collect stories of both success and challenge. PRIWG also plans to draw on domains such as tobacco control and other disciplines such as

public administration that have made substantial progress in promoting information dissemination and evidence uptake. Thus, PRIWG has developed a collaborative group and approach to move forward on its ultimate goal of identifying how best to elevate the impact of research and evaluation into policy pathways to make and improve on policies that support access to healthier food and beverage options and promote healthier food choices.

Acknowledgments

We appreciate the invaluable feedback from Rachel Ballard-Barbash, Heidi Blanck, Kelly Evenson, Van Hubbard, Sonia Kim, Robin McKinnon, Mari Nicholson, Prabhu Ponkshe, Daniel Rodriguez, and Demia Wright. The authors declare no conflicts of interest. The content is solely the responsibility of the authors and does not necessarily represent the official views of CDC or NIH.

Author Information

Corresponding Author: Sheila Fleischhacker, PhD, JD, Senior Public Health and Science Policy Advisor, NIH Division of Nutrition Research Coordination, National Institutes of Health, Department of Health and Human Services, Two Democracy Plaza, Room 635, 6707 Democracy Blvd, MSC 5461, Bethesda, MD 20892-5461. Telephone: 301-594-7440. Email: sheila.fleischhacker@nih.gov.

Author Affiliations: Jennifer J. Otten, University of Washington School of Public Health, Seattle, Washington; Elizabeth A. Dodson, Brown School and Prevention Research Center in St Louis and Washington University in St Louis, St Louis, Missouri; Sameer Siddiqi, Johns Hopkins University Bloomberg School of Public Health, Baltimore, Maryland. At the time this essay was conceived, Mr. Siddiqi was with the Applied Research Program, Division of Cancer Control and Population Sciences, National Cancer Institute, Bethesda, Maryland.

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PREVENTING CHRONIC DISEASE
PUBLIC HEALTH RESEARCH, PRACTICE, AND POLICY
Volume 12, E147 SEPTEMBER 2015

ORIGINAL RESEARCH

Evaluating the Impact of the Healthy Beverage Executive Order for City Agencies in Boston, Massachusetts, 2011–2013

Angie L. Cradock, ScD; Erica L. Kenney, ScD; Anne McHugh, MS; Lisa Conley, JD, MPH; Rebecca S. Mozaffarian, MS, MPH; Jennifer F. Reiner; Steven L. Gortmaker, PhD

Suggested citation for this article: Cradock AL, Kenney EL, McHugh A, Conley L, Mozaffarian RS, Reiner JF, et al. Evaluating the Impact of the Healthy Beverage Executive Order for City Agencies in Boston, Massachusetts, 2011–2013. Prev Chronic Dis 2015;12:140549. DOI: http://dx.doi.org/10.5888/pcd12.140549.

PEER REVIEWED

Abstract

Introduction
Intake of sugar-sweetened beverages (SSBs) is associated with negative health effects. Access to healthy beverages may be promoted by policies such as the Healthy Beverage Executive Order (HBEO) established by former Boston mayor Thomas M. Menino, which directed city departments to eliminate the sale of SSBs on city property. Implementation consisted of "traffic-light signage" and educational materials at point of purchase. This study evaluates the impact of the HBEO on changes in beverage availability.

Methods
Researchers collected data on price, brand, and size of beverages for sale in spring 2011 (899 beverage slots) and for sale in spring 2013, two years after HBEO implementation (836 beverage slots) at access points (n = 31) at city agency locations in Boston. Nutrient data, including calories and sugar content, from manufacturer websites were used to determine HBEO beverage traffic-light classification category. We used paired *t* tests to examine change in average calories and sugar content of beverages and the proportion of beverages by traffic-light classification at access points before and after HBEO implementation.

Results
Average beverage sugar grams and calories at access points decreased (sugar, −13.1 g; calories, −48.6 kcal; p<.001) following the implementation of the HBEO. The average proportion of high-sugar ("red") beverages available per access point declined (−27.8%, p<.001). Beverage prices did not change over time. City agencies were significantly more likely to sell only low-sugar beverages after the HBEO was implemented (OR = 4.88; 95% CI, 1.49–16.0).

Discussion
Policies such as the HBEO can promote community-wide changes that make healthier beverage options more accessible on city-owned properties.

Introduction

Intake of sugar-sweetened beverages (SSBs) is associated with increased risk of type 2 diabetes (1), coronary heart disease (2,3), and excess weight gain (4). Decreasing SSB consumption could reduce the prevalence of obesity and obesity-related diseases (5). Although overall SSB consumption has declined over the last decade (6), low-income Americans of all ages are more likely to be heavy SSB consumers than their higher-income counterparts (7).

On average, Americans consume approximately 150 kcals per day from SSBs, the equivalent of just over one 12-ounce serving per day (6). Recently, nutrition standards for school lunch and breakfast programs established by the Healthy Hunger-Free Kids Act of 2010 helped to ensure the availability of healthy choices at school (8). Policies specifying the provision of only healthy beverage options in school settings have been linked with decreased overall beverage consumption among students (9). However, SSBs are widely available in other community locations (10–14), indicating that other setting-specific policies could promote wider access to healthy beverage options.

Many voluntary community and organizational initiatives include healthy beverage campaigns, which set nutrition standards for beverages sold or provided in various settings (15). Pilot initiatives to increase access to healthy beverages in vending machines by inserting nutrition standards into vending contracts in 3 Delaware state agency buildings were successful several weeks after initiation (13). However, in recreational settings and health services organizations, issuing voluntary, recommended nutrition guidelines did not result in consistently healthy beverage and food offerings (16,17), particularly when nutrition standards were not incorporated into the contracting processes (18). Outcome evaluations of healthy beverage promotion policies are limited.

In April 2011, Boston's former mayor, Thomas M. Menino, issued the Healthy Beverage Executive Order (HBEO), which went into effect in October 2011 (19). This executive order directed city departments to eliminate the sale of SSBs on city property and to adhere to the City of Boston's HBEO standards in vending machines and city-managed food or beverage services programs. The HBEO standards were developed by the Boston Public Health Commission in response to the HBEO and outlined the requirements for beverages that could be sold (19). Calorically sweetened beverages, including some energy drinks, sports drinks, sweetened tea, and coffee drinks, were allowed if they contained less than or equal to 1 gram of sugar per fluid ounce. These standards also addressed portion size for certain categories of beverages (eg, milk, milk substitutes) and product mix (ie, diet or other noncalorically sweetened beverages must make up no more than one-third of total offerings). The objective of this study was to evaluate whether access to healthy beverages had increased in Boston city agencies 2 years after the HBEO was issued.

Methods

Study design

This policy evaluation uses a pre–post natural experimental design (20) to evaluate the impact of the HBEO on changes in healthy beverage availability in Boston city agencies. Beverage access data were collected by trained data collectors before (March–September 2011) and after (March–November 2013) the HBEO was issued. Additional data were collected in local recreation sites not subject to the HBEO in July–August 2011 and June–July 2013.

The HBEO directed Boston City agencies to eliminate SSBs from city-funded events and vending machines and from cafés or cafeterias on city property. It also restricted purchase of SSBs with city funds and prohibited certain types of industry marketing on city property (eg, banners, vending machine graphics) that promoted products that did not qualify for sale under HBEO standards (19). The HBEO also directed the formation of the Healthy Options Coordinating Committee (HOCC). The HOCC included representatives of relevant city departments and, under the leadership of the Boston Public Health Commission, coordinated implementation of the HBEO, conducted an inventory of beverage points of purchase and existing beverage contracts and policies, and provided communication and educational materials about the HBEO standards (19). These communication and education materials were included in the healthy beverage toolkit (21). The toolkit contained information about beverage standards and resources for implementing the HBEO requirements in Boston city agencies and other worksite settings in Boston. The toolkit included point-of-decision consumer educational materials that used a traffic-light system to identify categories of beverages (ie, red designates "drink rarely, if at all," yellow designates "drink occasionally," and green designates "drink plenty" or "healthy choice.") (Box). The Boston Public Health Commission also provided city agencies with brochures, posters, and other promotional and education materials that used these traffic-light identifiers (21). The HOCC met 5 times over 6 months. It created sample standard contract language regarding the healthy beverage standards that agencies could incorporate easily in city contracts. Additional technical assistance was provided regarding specific venues that were subject to the HBEO. Other opportunities included free workshops focused on the implementation of nutrition policy change, including such topics as working with contractors and vendors, technical assistance on legal issues, procurement policies, and special dietary needs.

Box. Boston Public Health Commission's Point-of-Purchase Traffic-Light Classification System for Beverages[a]

Beverage Color Classification	Criteria	Examples
Red: drink rarely, if at all	Over 12 g sugar per 12 oz	• Regular soda • Energy drinks (regular) • Sports drinks (regular) • Pre-sweetened coffee and tea drinks • Juice drinks with added sugar • Whole or 2% milk
Yellow: drink occasionally	6 g to 12 g of sugar per 12 oz or contains artificial sweeteners	• Diet soda • Diet iced tea • 100% fruit juice (in small portions) • Low-calorie sports drinks • Sweetened soymilk (in small portions) • Flavored 1% milk (in small portions) • Other low-sugar drinks • Energy drinks (artificially sweetened and/or containing ≤1 g sugar/oz) • Sports drinks (artificially sweetened and/or containing ≤1 g sugar/oz)
Green: drink plenty	0 to 5g of sugar per 12oz	• Water • Seltzer water • 1% or skim milk (in small portions) • Unsweetened soymilk (in small portions)

[a] Boston Public Health Commission. Healthy Beverage Toolkit: Boston Public Health Commission; 2011. http://bphc.org/whatwedo/healthy-eating-active-living/healthy-beverages/Documents/HealthyBeverageToolkitFinal.pdf.

Sample

Beverage access points in Boston city agencies. To assess changes in access to healthier beverages, we generated a list of city properties (n = 115) that served as access points (vending machines, cafés, or cafeterias where beverages could be purchased) in Boston city agencies. Schools were excluded because their beverage policy prohibited the sale of SSBs (9). Individual City of Boston parks were evaluated as part of a separate survey described below. We identified agency contacts and scheduled appointments to tour each facility. Fire departments (n = 36 properties) and police departments (n = 12 properties) agreed to participate in implementing the policy but declined to participate in the assessment protocol. Of the remaining 67 properties, 27 were public libraries, 37 were community centers, and 3 were administrative buildings. Data collectors visited these 67 city properties at baseline in 2011 (before the implementation of the HBEO). Of these, 28 city properties were identified, representing 45 beverage access points. At follow-up in 2013, seven properties (6 community centers and 1 library) representing 4 access points had closed, and data collectors visited the remaining 60 properties. In addition, 4 properties had removed 10 vending machines representing 10 access points. This yielded a total reduction of 14 access points from baseline, leaving 31 beverage access points. The 14 access points that closed were not included in the longitudinal analysis. Therefore, the longitudinal analysis included 22 properties representing 31 access points that were present at both baseline and follow-up (Figure).

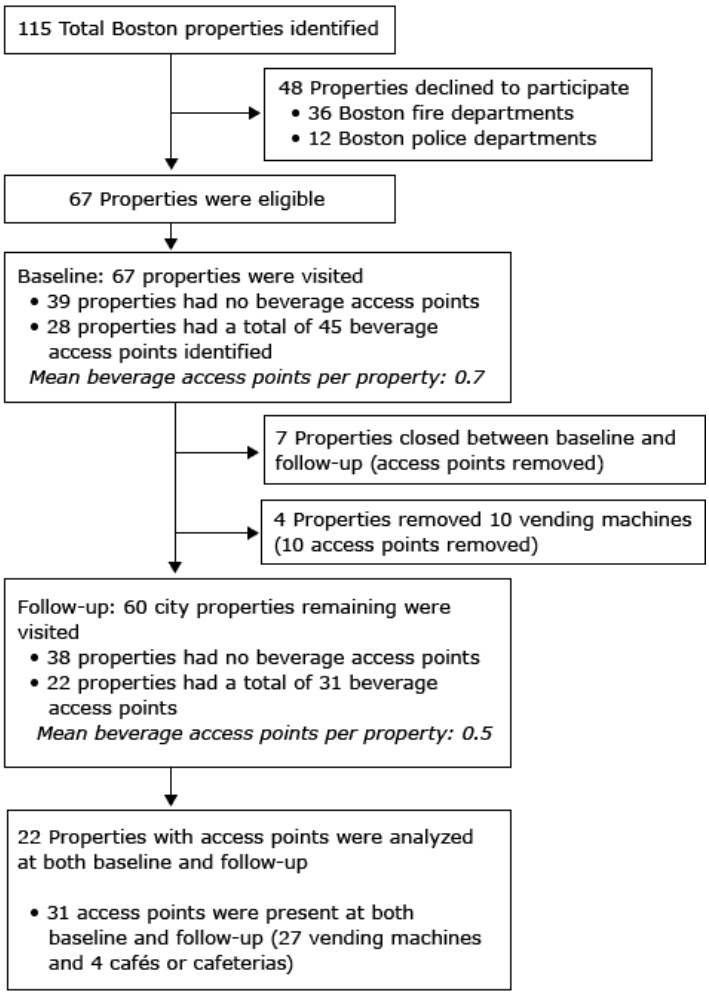

Figure. Boston city properties that participated in the evaluation of the Healthy Beverage Executive Order, 2011–2013.

Beverage access points in Boston parks and recreational facilities. From June through July 2011, data were collected on water access and beverages for sale at parks and recreational facilities operated by the Boston Parks Department (a Boston city agency) and by the Massachusetts Department of Conservation and Recreation (DCR). From July through August 2013, researchers revisited these parks and recreational facilities. The accessibility of seasonal recreational facilities and beverage access points differed at baseline and follow up. Longitudinal analyses therefore include 5 locations with beverages available at both baseline and follow up, consisting of 4 Boston Parks Department locations and 1 DCR location. Only Boston Parks were subject to the HBEO; therefore, the 1 DCR recreational facility served as a control location.

Measures

Beverages at access points on city properties. Research assistants located beverage access points on each city property and used a standard protocol to record the location within the agency building (eg, floor, building number, nearest office) and the brand, type, flavor, size, and price of each beverage available. Digital photographs of access points were used to document brand marketing and to identify beverage slot facings (ie, selection slots or spaces on the shelf facing the consumer) in vending machines and in cafeteria or café coolers and refrigerated cases. Researchers collected data on the price, brand, and size of beverages for 899 beverage slots in spring 2011 and 836 beverage slots in spring 2013, 2 years after the HBEO was issued.

Beverages at access points in parks and recreational facilities. Data collection in parks and recreation facilities employed an abbreviated protocol recording the brand, type, flavor, size, and price of each unique beverage (without photos). Researchers collected data on the price, brand, and size of 51 beverages at baseline in 2011 and 93 beverages at follow-up in 2013.

Beverage nutrient information. Researchers collected nutrient and ingredient information for each beverage from manufacturers' websites or by contacting manufacturers. When brand-specific information was not available (eg, brewed coffee, tea), standard nutrient information by beverage type was obtained from the US Department of Agriculture nutrient database (22). The nutrient variables included total energy (in kcals), sugar (in grams) per serving and where applicable, noncaloric sweetener type (artificial or natural noncaloric).

Analysis

Traffic light beverage and access point classifications. Researchers classified beverages and beverage slot facings found at baseline and follow-up according to the traffic light categorization developed by the Boston Public Health Commission (21) and standards outlined in the HBEO standards (19). Within each access point, researchers calculated key outcomes consisting of the proportion of green, yellow, and red beverages available and the average beverage calories (kcal), sugars (g), and price (USD) by using the slot facings data. Researchers also classified access points by other relevant criteria: 1) contained no red beverages, 2) contained a beverage mix of no more than 1/3 artificially sweetened yellow beverages, and 3) contained a mix of beverages where at least 2/3 of the available beverages were green or yellow and were not artificially sweetened, and 4) marketing no red beverages. To enable comparison, all prices were reported in 2011 dollars (23).

The primary outcomes were the changes in the average proportion of beverages classified as red, yellow, or green at each access point. Secondary outcomes were changes in the average calories, sugar content, and price by access point. Paired *t* tests assessed differences in the primary and secondary outcomes at each access point, before and after the HBEO was issued. We used logistic regression to determine the change in the likelihood of selling any red beverages at baseline versus follow-up. We also compared outcomes from the access points that were removed at follow up with the longitudinal sample by using *t* tests to evaluate potential selection bias resulting from loss to follow-up. For data available from parks and recreational facilities, we calculated the proportion of beverages available by traffic light classification and the average calories, sugar content, and price. Significance was set at $P < .05$ and analyses were conducted by using SAS statistical software version 9.3 (SAS Institute, Inc).

Results

Twenty-two Boston city properties contained 31 beverage access points (27 vending machines and 4 cafés or cafeterias) present at both baseline and follow-up (Figure). These points contained 899 beverage slot facings before implementation of the HBEO and 836 after implementation. The mix of beverages changed at access points after the implementation of the HBEO (Table 1). At baseline, access points contained an average of 26.8% green, 32.7% yellow, and 40.5% red beverage facings. There was a small, nonsignificant change in the percentage of green beverages facings at follow-up, but yellow beverage facings increased by 26.1 (<.001) and red beverage facings decreased by 27.8 ($P <$ .001) after the implementation of the HBEO. When stratified by access point type (ie, vending versus café or cafeteria), access to green beverages in cafeterias or cafes increased by 9.6% ($P = .03$), whereas yellow beverage access increased in vending machines by 28.4% ($P < .001$). Red beverage access in vending machines decreased by 28.9% ($P < .001$) and in cafés or cafeterias by 20.4% ($P = .02$).

The average calories per beverage sold within access points decreased between baseline and follow-up by 48.6 kcal, from 88.1 kcal to 39.5 kcal, $P < .001$ (Table 2). Baseline calories of beverages from cafes or cafeterias (136.7 kcal) were higher than calories of beverages in vending machines (80.9 kcal). The average sugar content of beverages from either source also decreased between baseline and follow-up by 13.1 g, from 22.8 g to 9.7 g ($P < .001$). Sugar content was higher at baseline for beverages sold in cafés or cafeterias (32.8 g) than for beverages sold from vending machines (21.3g). Beverage prices did not differ between baseline and follow-up ($P = .96$).

At baseline, 5 access points did not sell any beverages designated "red". At follow-up, 15 access points had eliminated all red beverages, and access points were significantly more likely to offer no red beverages (OR = 4.88; 95% CI, 1.49–16.0, $P = .009$) than at baseline. There was no change in the number of access points offering one-third or fewer beverages with artificial sweeteners designated "yellow" (N = 17). The number of access points meeting the HBEO marketing criteria (ie, marketing only healthy beverages) was the same at baseline and follow-up (28 access points, 90.3%). The access points that had been closed or removed at follow-up had higher-priced beverages at baseline than those access points available at both time points ($1.29 vs $1.07, $P = .005$).

In comparisons of recreational facilities, an average of 61.1% of 45 beverage offerings at 4 access points in City of Boston properties were classified as red in 2011, and 30.4% of 81 beverage offerings were classified as red at follow-up in 2013. In the single DCR site, beverages designated red constituted 83.3% of 6 offerings at baseline and 83.3% of 12 offerings at follow-up. The site-level average calories per beverage offering at Boston recreation sites was 123.3 kcal (SD, 44.9) at baseline and 83.3 kcal (SD, 64.9) at follow-up, whereas the average calories per beverage offered at access points in the DCR site were 140.2 kcal at baseline and 122.1 kcal at follow-up.

Discussion

This study suggests that policies supporting access to healthy beverages on city-owned properties can make healthier beverage options more accessible to city residents and employees at those locations. After the HBEO was issued, the availability of healthier beverage options increased significantly in vending machines, cafeterias, and cafés on city properties. City agencies were also significantly more likely to offer only healthier beverages for sale after the executive order was issued. We observed declines in the sugar content and calories in beverages available for sale at city properties alongside the 28% average decline in the proportion of high-sugar (red) beverages available for sale at city properties in Boston with no change in the price. We found no change in availability of healthy beverage choices in the DCR comparison recreation site in Boston that was not subject to the HBEO during the same time period.

This work supports the findings of a growing number of studies that suggest that policies and healthful vending initiatives can affect local access to healthy options in community settings (13,18,24). However, specific policy content may affect implementation, sustainability, and impact. Although Boston properties were more likely to be free of less healthy (ie, red) beverages after the HBEO restricted their sale, not all properties met the executive order's standard. Implementation differed by access point; it was lower among cafeterias and cafés on city properties than at vending machine points. In prior studies, binding procurement contract provisions, a limited choice of available options from contracted vendors that meet nutrition standards, and concerns about competitive sales environments or loss in profit were barriers to full implementation of nutrition guideline initiatives (17,25). To facilitate implementation and sustainability in Boston, future contracts could be negotiated with inclusion of HBEO criteria. In prior studies, the timely inclusion of nutrition standards in procurement contracts was noted as a factor in the successful implementation of a policy promoting healthy beverage options (18). Additionally, policies requiring 100% healthy beverages may facilitate compliance because of their focus on promoting healthy choices better than a predetermined mix of options (eg, 50% healthy) that require ongoing monitoring for product mix compliance.

This study had limitations. We lacked data on procurement policies, consumer impact, and beverage sales, which limited our assessment of effects on product-specific or category-specific procurement and sales. However, studies of similar labeling and education programs alongside policies promoting greater access to healthy options have demonstrated increased purchasing of healthy options. For example, in prior studies in hospital cafeterias, educational labeling programs were associated with significantly increased purchasing of healthy options. When accompanied by increased accessibility of healthy choices, purchase of healthy options again increased and purchases of less healthy options declined (26,27). At follow-up in Boston cafés and cafeterias, the average price of beverages designated green ($1.47) was substantively lower than that of the less healthy options available ($1.86). Differential pricing of healthy beverages below that of less-healthy beverages can promote increased purchases of healthier beverages in cafeteria settings (28). Additionally, upgrading vending machines to healthy options only has been associated with increased average monthly per-machine sales (24).

Other limitations are that we assessed beverage availability in these settings but did not collect data among control site locations in other business vending or cafeteria locations. However, we did not observe increases in the availability of healthy beverage choices in the DCR recreational facility we visited that was not subject to the HBEO. Additionally, some agencies declined to participate in the beverage access assessment protocol, so we lacked data on these locations.

Following the mayor's announcement of the HBEO, 10 Boston-area hospitals also opted to make healthy beverages conveniently accessible to their employees and patrons. As city officials review and revise the HBEO standards, they should consider the facilitators of implementing healthy beverage policies, such as contractual agreements with vendors that incorporate new standards, limiting exemptions, and providing additional technical assistance and capacity for compliance-monitoring and feedback (17,18). Monitoring efforts could use existing frameworks for both foods and beverages sold in publicly funded institutions (29).

Community-wide access to healthier beverage alternatives can be promoted by policies such as the HBEO, which directed Boston city properties to eliminate the sale of SSBs. Two years after the executive order was issued, healthier beverage options were more accessible to city residents and employees in vending machines and in cafeterias and cafés on city properties. Additionally, city agencies were more likely to offer only healthier beverages for sale after the executive order was issued with no increase in beverage prices. During the same time period, increased access to healthy options was not found in a DCR facility in Boston that was not subject to the policy.

Acknowledgments

Support for this project was provided in part by a cooperative agreement with the Centers for Disease Control and Prevention (CDC), Prevention Research Center grant no. U48DP001946, including the Nutrition and Obesity Policy Research and Evaluation Network. This work is solely the responsibility of the authors and does not represent official views of CDC.

Author Information

Corresponding Author: Angie L. Cradock, ScD, Department of Social and Behavioral Sciences, Harvard T. H. Chan School of Public Health, 677 Huntington Avenue, Boston, MA 02115. Telephone: 617-384-8933. Email: acradock@hsph.harvard.edu.

Author Affiliations: Erica L. Kenney, Rebecca S. Mozaffarian, Jennifer F. Reiner, Steven L. Gortmaker, Department of Social and Behavioral Sciences, Harvard T. H. Chan School of Public Health, Boston, Massachusetts; Anne McHugh, Chronic Disease Prevention and Control, Boston Public Health Commission, Boston, Massachusetts; Lisa Conley, Intergovernmental Relations, Boston Public Health Commission, Boston, Massachusetts.

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Tables

Table 1. Beverages Available on Boston City Properties by Access Points (N = 31) and Traffic-Light Classification System[a] Before and After Issuance of the Healthy Beverages Executive Order, March–September 2011 Through March–November 2013

Access Points	Green Beverages, % (SD)[b]				Yellow Beverages, % (SD)[b]				Red Beverages, %, (SD)[b]			
	Baseline	Follow-up	Average Change	*P* Value[b]	Baseline	Follow-up	Average Change	*P* Value[b]	Baseline	Follow-up	Average Change	*P* Value[c]
Total access points (N = 31)	26.8 (21.3)	28.5 (20.2)	1.7 (19.6)	.64	32.7 (21.8)	58.9 (23.3)	26.1 (24.7)	<.001	40.5 (24.4)	12.7 (18.1)	−27.8 (24.5)	<.001
Vending machines (N = 27)	28.8 (22.1)	29.3 (21.5)	0.5 (20.7)	.91	33.1 (23.3)	61.5 (23.1)	28.4 (25.4)	<.001	38.1 (25.2)	9.2 (16.2)	−28.9 (25.9)	<.001
Cafeteria or café (N = 4)	13.1 (1.5)	22.7 (5.1)	9.6 (4.7)	.03	30.4 (6.2)	41.2 (18.2)	10.9 (12.3)	.17	56.5 (5.7)	36.1 (13.9)	−20.4 (8.3)	.02

Abbreviation: SD, standard deviation.

[a] Green beverages = drink plenty (water, seltzer water, skim or 1% milk); yellow beverages = drink occasionally (diet soda, low-calorie or low-sugar drinks, or 100% juice); red beverages = drink rarely, if at all (regular sodas, energy or sports drinks, or fruit drinks).

[b] Totals may differ slightly because of rounding.

[c] *P* values are the results of paired *t* tests.

Table 2. Nutritional Quality and Price of Beverages Available on Boston City Properties by Access Points (N = 31) and Traffic-Light Classification System[a] Before and After Issuance of the Healthy Beverages Executive Order, March–September 2011 through March–November 2013

	Green Beverages, Mean (SD)		Yellow Beverages, Mean (SD)		Red Beverages, Mean (SD)		Total Beverages, Mean (SD)			
Access Point	Baseline	Follow-up	Baseline	Follow-up	Baseline	Follow-up	Baseline	Follow-up	Average Change	*P* Value[b]
Average calories per beverage (kcal)	1.7 (6.4)	0.9 (3.4)	41.5 (39.1)	28.6 (26.9)	184.3 (41.5)	174.2 (54.7)	88.1 (47.7)	39.5 (38.4)	−48.6 (44.9)	<.001
Vending machine	0 (0)	0 (0)	38.2 (41.1)	23.6 (19.2)	180.2 (44.0)	171.3 (61.1)	80.9 (46.8)	32.4 (33.9)	−48.6 (47.5)	<.001
Cafeteria or café	12.1 (14.0)	7.2 (7.6)	60.9 (16.2)	61.1 (48.2)	206.7 (4.2)	182.8 (33.7)	136.7 (12.0)	87.5 (35.9)	−49.2 (24.6)	.03
Average sugar content per beverage (g)	0.2 (0.8)	0.1 (0.4)	9.5 (8.8)	6.7 (5.8)	48.4 (11.3)	44.0 (12.9)	22.8 (12.4)	9.7 (9.4)	−13.1 (12.0)	<.001
Average sugar content, vending machine beverage	0.0 (0.1)	0 (0)	9.1 (9.3)	5.8 (4.6)	47.8 (12.2)	44.5 (14.5)	21.3 (12.6)	8.2 (8.8)	−13.1 (12.8)	<.001
Average sugar content, cafeteria or café beverage	1.5 (1.7)	0.8 (0.9)	12.0 (4.3)	12.8 (9.8)	51.4 (3.0)	42.6 (7.2)	32.8 (4.2)	19.7 (7.7)	−13.1 (3.8)	.006
Average price per beverage, $[c]	1.25 (0.24)	1.25 (0.26)	1.38 (0.29)	1.37 (0.25)	1.39 (0.29)	1.47 (0.32)	1.34 (0.26)	1.34 (0.25)	0 (0.16)	.96
Average price per beverage, $[c], vending machine	1.23 (0.20	1.22 (0.25)	1.32 (0.26)	1.32 (0.19)	1.32 (0.24)	1.34 (0.17)	1.29 (0.21)	1.29 (0.19)	0 (0.15)	.95
Average price per beverage, $[c], cafeteria or café	1.41 (0.38)	1.47 (0.29)	1.76 (0.20)	1.72 (0.34)	1.76 (0.28)	1.86 (0.36)	1.72 (0.27)	1.71 (0.33)	0 (0.25)	.99

Abbreviation: SD, standard deviation.

[a] Green beverages = drink plenty (water, seltzer water, skim or 1% milk); yellow beverages = drink occasionally (diet soda, low-calorie or low-sugar drinks, or 100% juice); red beverages = drink rarely, if at all (regular sodas, energy or sports drinks, or fruit drinks).

[b] *P* values are the results of paired *t* tests.

[c] Price data for 2009 baseline values are inflation-adjusted to 2011 to allow for direct comparison.

PREVENTING CHRONIC DISEASE
PUBLIC HEALTH RESEARCH, PRACTICE, AND POLICY
Volume 12, E89 JUNE 2015

ORIGINAL RESEARCH

Drinking Water in California Child Care Sites Before and After 2011–2012 Beverage Policy

Lorrene D. Ritchie, PhD, RD; Sallie Yoshida, DrPH, RD; Sushma Sharma, PhD; Anisha Patel, MD, MSPH; Elyse Homel Vitale, MPH; Ken Hecht, JD

Suggested citation for this article: Ritchie LD, Yoshida S, Sharma S, Patel A, Vitale EH, Hecht K. Drinking Water in California Child Care Sites Before and After 2011–2012 Beverage Policy. Prev Chronic Dis 2015;12:140548. DOI: http://dx.doi.org/10.5888/pcd12.140548.

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Abstract

Introduction
Drinking water is promoted to improve beverage nutrition and reduce the prevalence of obesity. The aims of this study were to identify how water was provided to young children in child care and to determine the extent to which water access changed after a federal and state child care beverage policy was instituted in 2011 and 2012 in California.

Methods
Two independent cross-sectional samples of licensed child care providers completed a self-administered survey in 2008 (n = 429) and 2012 (n = 435). Logistic regression was used to analyze data for differences between 2008 and 2012 survey responses, after adjustment for correlations among the measurements in each of 6 child care categories sampled.

Results
A significantly larger percentage of sites in 2012 than in 2008 always served water at the table with meals or snacks (47.0% vs 28.0%, $P = .001$). A significantly larger percentage of child care sites in 2012 than in 2008 made water easily and visibly available for children to self-serve both indoors (77.9% vs 69.0%, $P = .02$) and outside (78.0% vs 69.0%, $P = .03$). Sites that participated in the federal Child and Adult Care Food Program had greater access to water indoors and outside than sites not in the program. In 2012 most (76.1%) child care providers reported no barriers to serving water to children. Factors most frequently cited to facilitate serving water were information for families (39.0% of sites), beverage policy (37.0%), and lessons for children (37.9%).

Conclusion
Water provision in California child care improved significantly between samples of sites studied in 2008 and 2012, but room for improvement remains after policy implementation. Additional training for child care providers and parents should be considered.

Introduction

On any given day, more than one-quarter of young children in the United States do not drink plain water (1) and some children may not be adequately hydrated (2). Inadequate hydration can impair cognitive and physical functioning (3–5). Consuming sugar-sweetened beverages for hydration may put children at risk for obesity (6), whereas substituting plain, zero-calorie water for caloric beverages may reduce energy intake (7) and weight (8). As the prevalence of pediatric obesity has steeply risen in recent decades, children's intake of sugar-sweetened beverages has increased and water intake has been low (9,10). Accordingly drinking water was identified by the Centers for Disease Control and Prevention as critical for improving population nutrition and reducing obesity (11).

Currently several policies exist to support healthy beverages as part of federal obesity prevention efforts (12). As mandated by the federal Healthy, Hunger-Free Kids Act (HHFKA) of 2010, free drinking water must be available to students at lunchtime in schools that participate in the National School Lunch Program (13). Similarly, as of October 2011, drinking water must be available to children throughout the day, including at meal times, in child care sites that participate in the federal Child and Adult Care Food Program (CACFP) (14), the child care equivalent of the federal school nutrition programs. Numerous states also have enacted legislation to improve water access in child care settings (15). The California Healthy Beverages in Childcare Law, enacted in 2010 and implemented beginning January 2012, extends water provision to all licensed child care settings to ensure that drinking water is readily available throughout the day, including at meals and snack-times (16).

Although early childhood is an optimal time to establish beverage behaviors that track into later life (17,18), surprisingly little is known about water provision in child care settings. In 2008, before the federal and state policies were enacted, we conducted a statewide survey of child care providers in California to investigate the beverages served to children aged 2 to 5 years in child care. In 2012 we repeated the survey after both the federal and state policies on water provision went into effect. Using data from 2008 and 2012, the primary aims of this study were to 1) compare water access before and after the policies were enacted; 2) compare differences in water provision by type of child care in 2012; and 3) describe how water was provided to young children in child care and identify barriers and facilitators to serving water in 2012.

Methods

Design

Two independent cross-sectional samples of licensed child care providers in California completed a self-administered survey (paper or online) in 2008 and 2012. All procedures involving human participants were approved by the Committee for the Protection of Human Subjects at the University of California, Berkeley.

Sample selection

Identical methods were used in 2008 and 2012 as described previously (19). A stratified random sample of 1,484 child care sites was selected in late 2011 from state databases of all (over 50,000) licensed child care settings in California. Six strata of child care settings were examined on the basis of 2 factors presumed to influence the beverage environment: whether the setting is a center or family home and whether or not a participant is in CACFP. An approximately equivalent number of sites was selected in both 2008 and 2012 from each strata: Head Start centers (CACFP participation required), state preschools (required to follow CACFP nutrition standards but can choose whether to participate in CACFP or the National School Lunch Program), other centers participating in CACFP, non-CACFP centers, family child care homes participating in CACFP, and non-CACFP family child care homes.

Survey instrument

Survey questions were adapted from a previous survey (20) or newly developed for study aims and are available online (21). New survey questions were reviewed by experts for content validity and pretested for readability, comprehension, and length of completion with staff of child care sites participating in another research project. Surveys were translated into Spanish by a bilingual research staff member and checked for accuracy and readability by a second bilingual research staff member; discrepancies in translation were discussed and resolved. Each survey took approximately 20 minutes to complete.

In both 2008 and 2012, questions were asked about how often drinking water was provided to children at the table with meals or snacks and about the availability of self-serve drinking water indoors and outside. Included in the 2012 survey only was a frequency checklist, which asked respondents to record the types of water served to children aged 2 to 5 years on the day preceding the survey. Types of water included plain bottled water (no added flavors or sweeteners); bottled water with flavors, vitamins, or sweeteners added; and tap water. Respondents were instructed to include water provided by the child care site as well as water brought by parents and to indicate whether served at a meal (breakfast, lunch, dinner) or a snack. In 2012, additional questions also were asked about the site's source of water, how drinking water was made available to children both indoors and outside, and factors influencing water provision.

Sample recruitment and data collection

Methods were the same in 2008 and 2012. Selected child care sites were mailed postcards, in English and Spanish, inviting 1 or more staff familiar with foods and beverages served at the site to complete an online survey. A reminder letter, a hard copy of the survey, and a stamped return envelope were mailed 2 months later to nonrespondents. Up to 3 follow-up telephone calls were made to unresponsive sites approximately 1 month after reminder postcards were sent. Family home providers could complete the survey in English or Spanish.

Data analysis and statistical power

Of the 456 completed surveys in 2012 (30% response), 8 were excluded as sites caring only for children under 2 years old and 13 were excluded for incomplete data on site characteristics and beverages served. In 2008 the response rate was similar (31%). Of family home providers, 12% in 2012 and 16% in 2008 completed the survey in Spanish. No more than 5% of responses were missing for any survey item; imputation of missing data was not performed and nonresponses were not included in the denominator. Because we were interested in comparing child care categories rather than obtaining population estimates, sample weights were not used.

Data were analyzed using SAS version 9.3 (2011, SAS Institute, Inc). Differences between categories were determined by using χ^2 tests or logistic regression for categorical variables and analysis of variance for continuous variables. Water provision was compared by the 6 categories of child care sites, by CACFP participation, and whether a child care center or family day care home. Adjustments for multiple comparisons were made using the Tukey-Kramer test. Binary measures (ie, whether or not water was provided) were created and logistic regression was used to analyze for differences between 2008 and 2012, adjusting for differences between each category (ie, Head Start, state preschool, other CACFP center, non-CACFP center, CACFP home, non-CACFP home). A significance level $P < .05$ was used for all statistical tests.

Results

The final sample consisted of 429 child care sites in 2008 and 435 child care sites in 2012, representing data on 31,990 children in child care in California in 2008 and 34,413 in 2012 (Table 1).

In 2012 child care sites were 2.36 times more likely to provide water at meals or snacks than sites in 2008 (95% confidence interval [CI], 1.75–3.13; $P = .001$). A larger percentage of sites served water all of the time at the table with meals or snacks in 2012 than in 2008 (47.0% vs 28.0%, $P = .001$) (Figure 1). We found no differences in the percentage of sites always serving water at the table between CACFP and non-CACFP sites or between centers and homes.

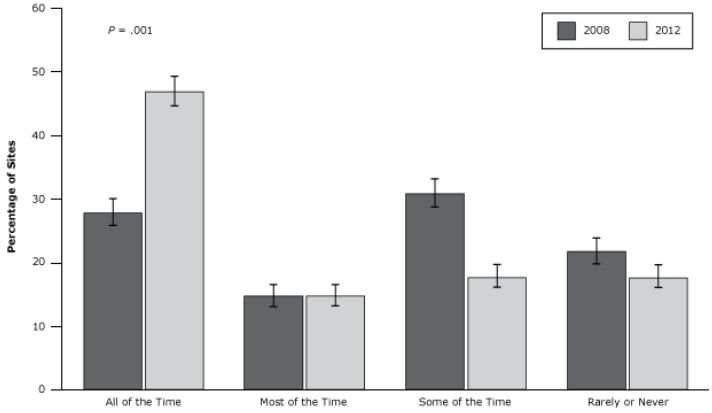

Figure 1. Frequency of providing drinking water at the table with meals or snacks in 2008 and 2012. Logistic regression adjusted for correlations among measurements in each of the 6 child care categories (Head Start, state preschool, other CACFP center, non-CACFP center, CACFP home, non-CACFP home). Sums of responses for each year are slightly less than 100% (96% for 2008; 98% for 2012) because of missing responses. Standard error bars are shown. Abbreviation: CACFP, Child and Adult Care Food Program.

In 2012 nearly half (47.6%) of providers reported that children were allowed unlimited self-serve water, whereas 20.5% of sites provided water only upon request by children. A total of 5.8% provided water only after children had finished their milk or juice, whereas 4.1% provided water only after children finished their meal or snack.

A larger percentage of child care sites made water easily and visibly available for children to self-serve both indoors (77.9% vs 69.0%; odds ratio [OR] = 1.47, 95% CI, 1.08–1.98, $P = .02$) and outside (78.0% vs 69.0%; OR = 1.59, 95% CI, 1.17–2.17, $P = .03$) in 2012 compared with 2008. In 2012, more CACFP than non-CACFP sites had water easily available indoors and outside ($P = .03$). Although most centers (73.1%) made water easily available to children to serve themselves indoors and outside in 2012, less than half of homes (44.8%) reported doing so ($P < .001$).

Various methods were used by child care sites in 2012 to make water available for children indoors and outside. Nonrefrigerated fountains or faucets; filtered or unfiltered fountains or faucets; large bottles, coolers, or dispensers; and serving pitchers were the most commonly reported; individual-sized disposable and reusable water bottles were less common (Figure 2).

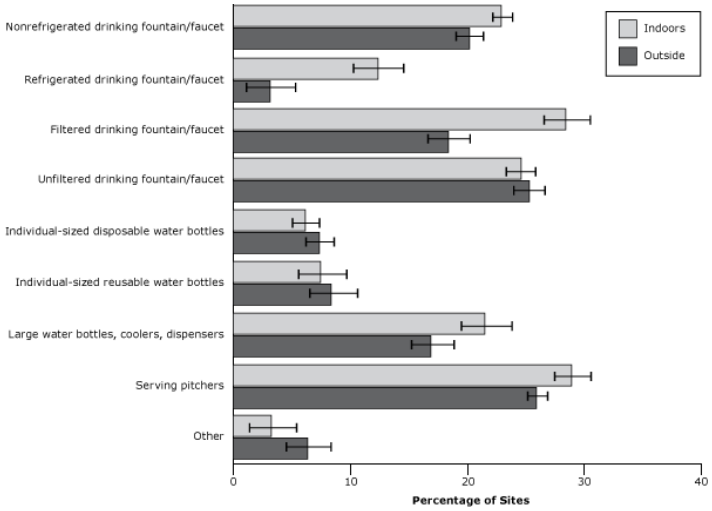

Figure 2. Methods used to make drinking water available for children indoors and outside the site in 2012. Respondents were asked to check all answer options that applied so responses for indoors and outside sum to more than 100%. These data were not collected from child care providers in the 2008 sample. Standard error bars are shown.

In 2012 most sites (71.0%) provided tap water, and approximately half served bottled water (Table 2). More centers than family day care homes provided tap water ($P = .01$). Although more CACFP sites than non-CACFP sites tended to provide all types of water at meals and snacks, none of the differences were significant.

When providers were asked in 2012 if they ever use additions to water to encourage children to drink water, most indicated they did not; plain water was the most popular water choice. A minority (17.0%) used additions such as fruit slices, fruit juice, sugar-free powders, or other ingredients such as herbs; no sites reported adding sugar powders.

In 2012 most child care providers reported no barriers to serving water to children (76.1%). A minority reported issues that made provision of water difficult, including a perceived government rule against serving water with meals and snacks (3.4%); lack of CACFP reimbursement for water (3.0%); unavailability of water in site locations (indoors or outside) (3.0%); cost of bottled water, filters, or cups (2.1%); and concerns that children will drink less milk or eat less food if served water (2.1%). Less than 1% of providers agreed that any of the following were barriers to serving water: bad taste of water, concern about fluoridation, water safety concerns, environmental impacts (eg, use of disposable cups or bottles), children's dislike of drinking water, concern that children would need to use the restroom more often, or lack of enough drinking fountains or faucets on site. Most providers (76.1%) did not know the source of the tap water at their site; 14.9% indicated ground water, 3.9% indicated a municipal water source, and 5.1% did not respond to this question.

The 3 factors most frequently cited by providers that facilitate serving more water to children were information for families (39.0% of sites), beverage policy (37.0%), and lessons for children (37.9%). Other factors cited as helping with increased water provision were parent and family support (27.1%) and training for child care providers (23.0%).

Discussion

This is the first study to conduct an evaluation of the impact of federal and state drinking water policy in child care in the United States. The CACFP regulation states that "Throughout the day, including at meal times, water should be made available to children to drink upon their request, but does not have to be available for children to self-serve" (19). The California beverage policy specifies that all licensed child care "make clean and safe drinking water readily available and accessible for consumption throughout the day" (21). We chose to focus on availability of water for children to self-serve indoors and outdoors in addition to water provision with meals and snacks, on the basis of the assumptions that child care providers have limited time to serve water to children individually upon request and that children aged 2 to 5 years may not ask for water even when thirsty. Neither policy prescribes these practices. After policy implementation, we found significant improvement in the proportion of sites that always served water at

the table with meals or snacks; almost half of providers offered self-serve water at the table. Significant improvement was also found in the proportion of sites that made water easily and visibly available for children to serve themselves indoors and outside. Lastly, sites used various methods for making water available, with filtered fountains, faucets, and pitchers being the most common indoors and outdoors.

Few studies of water availability in child care sites have been conducted. In a study of 40 CACFP centers in Connecticut conducted before the HHFKA, 84% had water accessible in classrooms and one-third had water accessible during physical activity periods (inside or outdoors) from a combination of adult-accessible and child-accessible sources; water was not served at the table at any of the lunches (1). In our study, before beverage policy we found a slightly lower proportion of sites (69%) that had water easily available for self-service indoors. Our inclusion of CACFP and non-CACFP sites as well as centers and family child care homes may help to explain differences between findings of our study and those of the Connecticut study.

To our knowledge, this is the first study to compare drinking water in CACFP and non-CACFP sites, and we found that more CACFP sites than non-CACFP sites had water available indoors and outdoors. CACFP sites have also been shown to serve healthier foods than non-CACFP, likely because of reimbursement for food costs and additional training (19). Unlike non-CACFP sites that are covered only by state water policy, CACFP sites in California are covered by both federal and state policy, which may contribute to their better policy implementation. CACFP sites also receive more monitoring and technical assistance than non-CACFP sites. We previously showed that CACFP sites were indeed more likely to know about child care beverage policy (22).

Although beverage policy appeared to have a positive impact on water access in sampled California child care sites, a third of sites in 2012 reported having drinking water available to children some of the time or rarely or never. The 2012 survey data were collected less than a year after federal and state policies were implemented, and therefore water provision may improve as providers gain familiarity with policy requirements. However, additional efforts may be needed to ensure policy implementation across all child care settings. Interestingly, child care providers reported few barriers to serving water. The main barriers cited included a perceived government rule against water with meals or snacks (even though no such rule exists), unavailability of water in some locations, and cost.

Ideally, young children should learn to quench their thirst with water instead of sugar-sweetened beverages. Some providers were concerned that children would "fill up" on water and drink less milk or eat less if served water at the table with meals or snacks. There is little evidence to support the idea that water replaces caloric intake in adults and no evidence among young children (3). Although the US Department of Agriculture does not prohibit serving water with meals or snacks as part of CACFP, its memorandum on CACFP water policy states, "caregivers should not serve young children too much water before and during meal times; excess water may lead to meal displacement, reducing the amount of food and milk consumed by the children" (19). Research is needed to examine the question of displacement of calories with water consumption.

Child care providers reported that parent and child education on serving water was more important than the need for their own training. However, providers may not know what they do not know. In a previous study we reported that in 2012 only 60% of providers were aware of beverage policy (22). Therefore, provider training in addition to parent training may increase knowledge about water policy and strategies. Indeed, one outcome of our study was a recently enacted California state policy to ensure that newly licensed child care providers receive nutrition training (23). This policy, which goes into effect in January 2016, amends child care licensing laws to ensure that an additional hour of training on childhood nutrition is added to the 15 hours currently required on preventive health and safety. Future efforts should ensure that existing child care providers also receive this training.

This study has several limitations. Findings might have been different if the survey had had a higher response rate or if the same sites had been followed from prepolicy to postpolicy. Because of the high turnover rate of child care sites and providers, a pre–post study design was not possible. In addition, our data rely on self-reported practices by child care providers and do not quantify what children actually consumed. Providers may have not have understood the meaning of self-serve and "easily and visibly available." Possible bias or misreporting could not be verified without onsite observations. Finally, differences in findings between 2008 and 2012 may be due to other factors (eg, the national Drink Up campaign) besides policy.

We found that water access in California child care settings improved after the enactment of federal and state policies, yet there is a continuing need to determine optimal ways to provide water in child care settings (24). Empowering parents and providers through education and training may help ensure that children have access to water and also instill a lifelong habit of choosing water when thirsty before "empty calorie" beverages such as fruit drinks and other sugar-sweetened beverages. Reversal of the obesity epidemic depends on a reduction in calorie intake relative to caloric needs, and promoting water, which has zero calories, could be an effective strategy. Future studies should evaluate the impact of beverage policy in child care settings on children's consumption patterns, caloric intake, and weight status. We also need to identify best practices for the implementation and monitoring of water access policy so that the intent of the law, reduced childhood obesity, is achieved.

Acknowledgments

We thank the Robert Wood Johnson Foundation for funding this research (Healthy Eating research grant no. 69298) and Mary Story and Karen Kaphingst for their support. Thanks also to Ellen Braff-Guajardo, Kumar Chandran, and the late Sarah Samuels for study conception and design, to Paula James and Ed Mattson for survey critique, to Sally Smyth, Shelly Mandel, Sheila Stern, Lauren Goldstein, Temika Green, Shauna Pirotin, Jessica Jew, Claudia Olague, and Nayeli Cerpas for assistance with conducting the study and to Suzanna Martinez and Sheila Stern for manuscript review. Finally we are indebted to the many busy child care staff for participating.

Author Information

Corresponding Author: Lorrene D. Ritchie, PhD, RD, Nutrition Policy Institute, Division of Agriculture and Natural Resources, University of California, 1111 Franklin St, Ste 10123, Oakland, CA 94607. Telephone: 510-987-0523. Email: Lorrene.Ritchie@ucop.edu.

Author Affiliations: Sallie Yoshida, Sarah Samuels Center for Public Health Research and Evaluation, Oakland, California; Sushma Sharma, Atkins Center for Weight and Health, University of California, Berkeley, California; Anisha Patel, School of Medicine, University of California, San Francisco, California; Elyse Homel Vitale, California Food Policy Advocates, Oakland, California; Ken Hecht, Nutrition Policy Institute, Division of Agriculture and Natural Resources, University of California, Oakland, California. Dr Sharma is now affiliated with Dallas-Fort Worth Hospital Council Foundation, Irving, Texas.

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Tables

Table 1. Sample Sizes for Study of Licensed Child Care Providers in California, 2008 and 2012

Category	2008 Sample (n = 429)	2012 Sample (n = 435)
Centers	326	301
Head Start centers participating in CACFP	66	78
State preschools participating in CACFP or the equivalent	68	93
CACFP centers	104	48
Non-CACFP centers	88	82
Family day care homes	103	134
CACFP homes	65	93
Non-CACFP homes	38	41
Children aged 2 to 5 y	31,990	34,413

Abbreviation: CACFP, Child and Adult Care Food Program.

Table 2. Child Care Categories Serving Different Types of Water at Any Meal or Snack on the Day Before the Survey and Comparisons by CACFP Participation and Whether a Child Care Center or Family Day Care Home, 2012[a]

Water Type[b]	Child Care Category[c], %							Comparison[d]	
	All (n = 435)	Head Start (n = 78)	State Preschool (n = 93)	CACFP Center (n = 48)	Non-CACFP Center (n = 82)	CACFP Home (n = 93)	Non-CACFP Home (n = 41)	CACFP vs non-CACFP[b] (*P* Value)	Center vs Home[b]
Any type	91.0	82.1	87.1	79.2	93.9	86.0	92.7	CACFP > Non-CACFP (.08)	Center < Home (.09)
Bottled, plain	43.4	36.0[e]	21.5[f]	29.2[e, f]	47.6[g]	67.7[h]	61.0[g, h]	CACFP > Non-CACFP (.08)	Center < Home (.07)
Bottled, flavors, vitamins, or sweeteners added	14.9	14.1[g]	9.7[f]	10.4[e, f]	12.2[e]	19.4[g, h]	26.8[h]	CACFP > Non-CACFP (.10)	Center < Home (.09)
Tap	71.0	76.9[e]	86.0[f]	77.1[e]	73.2[e, f]	53.8[g]	53.7[g, h]	CACFP > Non-CACFP (.07)	Center > Home (.01)

Abbreviation: CACFP, Child and Adult Care Food Program.

[a] Data were not collected from child care providers in the 2008 sample.

[b] Providers were asked to mark all types of water served among the following options: plain bottled, flavored or sweetened bottled, tap or faucet.

[c] Values that do not share a common superscript (e, f, g, or h) across a row are significantly different by Tukey-Kramer adjustment for multiple comparisons, whereas values that do share a common superscript are not significantly different.

[d] Comparisons by logistic regression.

PREVENTING CHRONIC DISEASE
PUBLIC HEALTH RESEARCH, PRACTICE, AND POLICY
Volume 12, E88 JUNE 2015

ORIGINAL RESEARCH

An Assessment of Nutrition Practices and Attitudes in Family Child-Care Homes: Implications for Policy Implementation

Alison Tovar, PhD, MPH; Patricia Risica, DrPH; Noereem Mena, MS, RD; Eliza Lawson, MPH; Angela Ankoma, MSW; Kim M. Gans, PhD

Suggested citation for this article: Tovar A, Risica P, Mena N, Lawson E, Ankoma A, Gans KM. An Assessment of Nutrition Practices and Attitudes in Family Child-Care Homes: Implications for Policy Implementation. Prev Chronic Dis 2015;12:140587. DOI: http://dx.doi.org/10.5888/pcd12.140587.

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Abstract

Introduction
Family child-care homes (FCCHs) provide care and nutrition for millions of US children, including 28% in Rhode Island. New proposed regulations for FCCHs in Rhode Island require competencies and knowledge in nutrition. We explored nutrition-related practices and attitudes of FCCH providers in Rhode Island and assessed whether these differed by provider ethnicity or socioeconomic status of the enrolled children.

Methods
Of 536 licensed FCCHs in Rhode Island, 105 randomly selected FCCH providers completed a survey about provider nutrition attitudes and practices, demographics of providers, and characteristics of the FCCH, including participation in the federal Child and Adult Care Food Program (CACFP). No differences between CACFP and non-CACFP participants were found; responses were compared by provider ethnicity using χ^2 tests and multivariate models.

Results
Nearly 70% of FCCHs reported receiving nutrition training only 0 to 3 times during the past 3 years; however, more than 60% found these trainings to be very helpful. More Hispanic than non-Hispanic providers strongly agreed to sitting with children during meals, encouraging children to finish their plate, and being involved with parents on the topics of healthy eating and weight. These differences persisted in multivariate models.

Discussion
Although some positive practices are in place in Rhode Island FCCHs, there is room for improvement. State licensing requirements provide a foundation for achieving better nutrition environments in FCCHs, but successful implementation is key to translating policies into real changes. FCCH providers need culturally and linguistically appropriate nutrition-related training.

Introduction

Close to one-third of US children aged 2 to 5 years are overweight or obese. Clear disparities are observed by ethnicity; 17% of Hispanic children in this age group are obese compared with 3.5% of their non-Hispanic white counterparts (1). Contributing to the obesity epidemic are unhealthy eating patterns, including high consumption of energy-dense snack foods and low consumption of fruits and vegetables (2). These patterns are troubling, given that early childhood is a critical period during which dietary intake patterns and eating habits are developed (3). Although parents play a critical role in shaping children's food preferences and determining their physical and social environments, the child-care setting (nonparental care either at a center or family child-care home [FCCH]) and its providers (those who care for children in child-care settings) are also important in shaping healthy behaviors. Child-care providers can affect children's healthy eating habits through appropriate feeding practices and attitudes and by influencing the access and availability of healthy foods and beverages in child-care environments (the physical and social conditions at the child-care setting) (4). Therefore, fostering effective strategies to help child-care providers establish healthy eating habits and promote healthy environments among disadvantaged populations is critical.

Creating healthy child-care environments is of great importance, because almost 60% of children in the United States younger than 6 are enrolled in some type of nonparental care each week, and nearly 50% of enrolled children identify as Hispanic (5). Policies and regulations ensure healthy nutrition environments in child-care settings (6), and practical professional training and education of child-care providers is needed to translate policies into healthy practices. Most recent training programs and interventions to improve healthy behaviors focused on child-care centers (7); however, 2 million US children (25%) and 21,000 Rhode Island children (28%) in nonparental care attend an FCCH (8), a child-care setting where children are cared for by child-care providers in their homes rather than in a center. Regulations for licensed FCCHs are different, and in most cases less stringent, than those for free-standing child-care centers (9). Moreover, time spent in FCCH settings during infancy is associated with increased body mass index (BMI) *z*-scores at 3 years of age, and time spent in child-care centers is not (10).

In Rhode Island, recently proposed updated regulations for both child-care centers and FCCHs would require more provider knowledge and competencies, including more nutrition education. For FCCHs, these proposed regulations would include increasing the required hours of provider professional development related to the new competency requirements. These regulations are still under review; however, given that more nutrition training will likely be required, it is important to know how to tailor the content and format of these trainings so that they meet the needs of FCCH providers.

Given the lack of research on FCCHs, understanding provider's nutrition-related practices and attitudes and exploring variation across contexts is important. With this information, more appropriate trainings relevant to nutrition-related regulatory policies in FCCHs can be developed. The goal of this study was to explore nutrition-related practices and attitudes of FCCH providers in Rhode Island and assess whether these differed by provider ethnicity or socioeconomic status of the enrolled children.

Methods

Key informant interviews were conducted during summer 2012 with child-care stakeholders from Rhode Island, including FCCH providers and state agency representatives, to inform the development of a statewide survey with Rhode Island FCCH providers. Previous literature on similar evaluation instruments was also reviewed (11–13). On the basis of this formative research, a survey instrument was developed to administer to Rhode Island FCCH providers. The instrument contained 12 home-specific questions including the respondents' background in education and child-care and whether the center participated in the US Department of Agriculture's Child and Adult Care Food Program (CACFP), a federal program that provides reimbursement for healthful meals and snacks served to low-income children and adults, and BrightStars, the Rhode Island child-care provider quality rating system (14), both of which include nutrition standards. The survey also included 62 food or nutrition attitude or practice-related questions. Selected food questions were adapted from the California Child-Care Food Assessment's *Survey of Child Care Providers of 2–5 Year Old Children* (12). For the purpose of this article, we include questions relating to nutrition training, child feeding practices and attitudes, and parental involvement (Table).

We set a goal of obtaining 100 completed surveys from the 536 licensed FCCHs in Rhode Island. Because the feasibility and cost of reaching all 536 licensed FCCHs was prohibitive, we determined that reaching 100 licensed providers was an adequate number from which to draw conclusions. Calls were made to batches of 10 to 15 numbers at a time, which were called until a final disposition was determined before working on a new batch of numbers. This method ensured that all numbers received the same attention and minimized the bias from assessing only early responders. The team stopped calling new batches when the goal of 100 completed surveys was close to being reached, which happened as we completed the twelfth batch. Our sample from the 12 batches included 360 providers; 243 of these were eligible (still in business, spoke English or Spanish). FCCH providers who were reached were offered to take the survey by telephone, online, or receive it as a paper document to be returned in the mail. The study was reviewed and approved by the institutional review board at Brown University, Providence, Rhode Island.

Chi-square statistics were calculated to determine differences in reported practices and attitudes by CACFP and provider ethnicity status in separate analyses. Few of the items differed by CACFP status, so the multivariate analysis focused on ethnic differences. Multivariate models were constructed by using SAS version 9.3 (SAS Institute, Inc) as generalized linear models using a logit link function and indicating that the response options were multinomial. Because of small numbers in some cells, response options were collapsed for some variables (Table). Final models included CACFP status as an adjustment for both program participation and as a proxy indicator of socioeconomic status of the provider and children being served.

Results

A total of 105 FCCH providers, representing 43% of the eligible FCCHs called, completed a survey in either Spanish (35%) or English (65%). Ineligible homes (33% of the overall sample

called) were those in which the telephone number was not working or the home was no longer a child-care home provider. Of the responding providers, 39% identified as Hispanic, 43% as non-Hispanic white, and 3% as non-Hispanic black. Providers estimated the families of children in their care as 43% Hispanic, 46% non-Hispanic white, 7% non-Hispanic black, and 2% Asian. Half (50%) of responding providers indicated that they participated in CACFP, and 34% reported participating in BrightStars.

Nearly 70% of providers reported receiving nutrition training only 0 to 3 times during the past 3 years; however, more than 60% of them found these trainings to be very helpful. They also reported that it would be very helpful to have more nutrition training specific for FCCHs (Table). Most providers strongly agreed that they sit with children during snacks and meals (67.3%) and were highly motivated to serve healthy foods to children (71.8%). Approximately three-quarters, however, agreed or strongly agreed that they encourage children to finish all the food on their plate (74.7%). Most providers (90%) disagreed or strongly disagreed that the children in their care were involved in nutrition-related plans and activities.

Several significant differences were observed by provider ethnicity, even after adjustment for CACFP status. Hispanic providers reported receiving more nutrition training during the past 3 years than did non-Hispanic providers (46.2% vs 23.8%) and were more likely to find the training very helpful (91.9% vs 45.1%) (Table). More Hispanic providers reported strongly agreeing to sitting with children during snacks and meals than did non-Hispanic providers (80.0% vs 59.4%, $P = .02$), but more Hispanic providers also reported strongly agreeing to encourage children to finish food on their plate than did non-Hispanic providers (80.0% vs 12.7%, $P < .001$). Hispanic providers also reported less child involvement in nutrition-related plans and activities than did non-Hispanic providers (56.4% vs 35.5%, $P = .04$) (Table).

More non-Hispanic than Hispanic providers strongly agreed or agreed with the statement that "parents say their children will eat certain foods at daycare and not at home" (88.9% vs 61.1%). More Hispanic than non-Hispanic providers strongly agreed with the following statements: "I believe it is important to communicate with parents/families regarding nutrition" (87.8% vs 46.9%) and "I discuss with parents/families if lunches or snacks sent in are not healthy" (66.7% vs 20.4%). Hispanic FCCH providers also felt more comfortable than non-Hispanic providers in passing information on to parents and families about good nutrition practices (70.0% vs 45.2%) and encouraging breastfeeding (79.0% vs 59.6%). More Hispanic than non-Hispanic providers strongly agreed that they were comfortable discussing a child's weight problem with parents or families (56.4% vs 22.8%) (Table).

Discussion

The goals of this study were to explore provider practices and attitudes related to nutrition in a sample of Rhode Island FCCH providers and to assess if practices differed by ethnicity of the provider. Overall, we found that positive practices were displayed related to feeding, such as sitting with the children during meals and snacks and eating the same foods as the children, which provide an opportunity to model appropriate behaviors and positive feeding practices with children (15). However, we also found providers commonly encouraged children to finish all the food on their plates, which may interfere with a child's internal cues for satiety and hunger, possibly contributing to the development of obesity (16). Controlling feeding practices are associated with the development of unhealthy eating behaviors and childhood obesity (16). Training for FCCH providers should address responsive child-feeding practices (17), including allowing children to control the amount of food they eat without pressure or control, modeling healthy eating, and serving meals family-style.

Although we hypothesized that nutrition practices may differ by CACFP program participation as a proxy for socioeconomic status, we found that this was not the case. However, provider ethnicity was a predictor of certain nutrition practices, suggesting a possible cultural influence among these providers. More Hispanic than non-Hispanic providers reported sitting with children while they ate, but Hispanic providers also reported being more likely to encourage children to finish all the food on their plate and less likely to involve children in nutrition education. Hispanic providers also reported more communication with parents about children's diet and weight. Results from several studies have shown that feeding practices differ by ethnicity (18). For example, some studies indicate that Hispanic parents are less likely to set limits around meal times compared with other racial/ethnic groups, although results are mixed (19). Although most of these studies were conducted with parents instead of child-care providers, one study found that Hispanic providers were more involved than non-Hispanic providers with what the children were doing during mealtimes and exhibited more demanding practices such as making children eat all the food on their plate (20). Another study also supports our findings in that Hispanic providers (both home- and center-based) were more likely to encourage children to finish meals (21). Given that many FCCHs serve ethnic minority children and are run by ethnically diverse providers (in Rhode Island, more than 40% of FCCH providers are Spanish-speaking), these findings highlight possible cultural differences and underscore the need for policies and trainings to be culturally relevant. Our findings also indicate the importance of training non-Hispanic providers about responsive feeding, including sitting with children

during meals. Further research is needed to better understand providers' feeding practices and explore how continuing education and training can be delivered so that providers can learn how to improve feeding practices in culturally appropriate ways. In child-care centers, training providers in nutrition practices has improved provider knowledge, center policies, and children's diet quality and weight status (6,22), but more research is needed on such interventions with FCCHs.

Our data also showed that more Hispanic providers than non-Hispanic providers felt comfortable communicating with parents about healthy foods and a healthy weight. Although evidence suggests that parents who use an FCCH appreciate a more intimate relationship with providers (20), our results suggest that in this population there are ethnic variations and that Hispanic providers may feel a closer relationship with parents. Hispanics tend to be more collectivistic, family-oriented, and focused on maintaining smooth and positive social interactions than non-Hispanic whites (23). These cultural norms may allow for a more open discussion between parents and FCCH providers about children's eating habits and weight status. Having this open line of communication is important for Hispanic parents, because they frequently do not recognize their children as overweight and may have a more favorable view of childhood obesity, which may prevent them from seeing their child's weight as problematic (24). Both Hispanic providers and parents may be less concerned about preventing childhood obesity and more concerned about their child eating enough (25). Future research should examine these issues and explore ways to facilitate better communication about nutrition between providers and parents, especially among non-Hispanic providers. A previous study found that providers reported the need for better communication and cooperation with parents (26). Prior studies have also emphasized the need to influence both the home and the child-care environment to successfully engage in obesity prevention, because children spend time in both these environments (27,28). One study has shown the promise of including parents and home-based activities as part of child-care–based interventions in reducing BMI *z*-scores in young children (29). Therefore, future work should use an ecological approach when exploring the interactions between home and child-care environments and how positive obesity prevention practices and environments can be consistent across both settings.

Regardless of provider ethnicity, our findings suggest the need for effective policies and supportive trainings and resources to improve the nutrition environments of FCCHs. Many expert groups (30–32) have emphasized the establishment of quality prevention policies as a foundation for improving the food, physical activity, breastfeeding, and screen-time environments in child-care settings (33). However, creating policies alone is not enough (30). Policies are more likely to succeed with trainings and education for child-care providers (34), and few studies have documented FCCH provider training. We found that most FCCH providers do not frequently participate in nutrition training, which is similar to the findings of Trost et al who found that less than 50% of staff in FCCHs received annual training on nutrition (35). Although provider participation in Rhode Island FCCH trainings is low, interest is high; more than 50% of FCCH providers in this study indicated that they were interested in further training, especially training that is focused on their specific needs. Such training should include practical examples of how to implement changes in food and physical activity environments, as well as motivational examples of successful changes in FCCHs with compelling role models. These trainings should also educate providers on responsive feeding practices and how they could involve children in food preparation and education.

Our study has limitations. First, we used self-reported data, which were not validated and may have been influenced by socially desirable responses. However, this bias would have affected the entire sample and would not explain the ethnic differences we observed. A few studies have addressed the issues of self-report and social desirability bias by direct observation of child-care practices; this approach is more objective but time-consuming and cost-intensive. Second, providers who did not respond to the survey despite many attempts may have represented a more time- or resource-constrained group, and those we did reach may have been more health-conscious, which may have introduced selection bias. However, the high proportion of FCCHs reached (43% of those randomly chosen and eligible) indicates that this bias is likely small. Finally, we did not have data on child race/ethnicity and income; rather, participation in CACFP was used as a proxy indicator of socioeconomic status of the provider and children being served.

In conclusion, we found that, although positive practices exist in the FCCHs surveyed, there is room for improvement. It is important for FCCHs to follow practices that are consistent with the 2011 national recommendations for child-care policies and practices to reduce childhood obesity (36). Rhode Island recently proposed strengthening its regulations for child-care centers and FCCHs (including health and nutrition) (14), although these regulations are still under review. However, even if such policies and regulations are strengthened, FCCH providers are unlikely to follow them without adequate training and resources. Our findings will inform the development of new trainings that incorporate information of the recently proposed regulations. These trainings can also be enhanced to include information on responsive feeding and parent communication and ensure that they are culturally and linguistically appropriate for ethnically diverse FCCH providers. Our res-

ults will be communicated to state and local agencies and organizations such as the Department of Children, Youth and Families; Rhode Island Department of Education; the Center for Early Learning Professionals; and Ready to Learn Providence to enable such stakeholders to work together to translate policies, regulations, or quality rating systems into practical and effective trainings that are appropriate for different racial and ethnic groups.

Acknowledgments

We thank Heather Butler Feliz and Emma Lamothe who collected the data and initiated the data analysis. This study was funded by cooperative agreement no. 5U58DP001385 from Centers for Disease Control and Prevention, awarded to the Rhode Island Department of Health.

Author Information

Corresponding Author: Alison Tovar, PhD, MPH, Department of Nutrition and Food Sciences, University of Rhode Island, Kingston, Rhode Island 02881. Telephone: 401-874-9855. Email: alison_tovar@mail.uri.edu.

Author Affiliations: Patricia Risica, Kim M. Gans, Institute for Community Health Promotion, Brown University School of Public Health, Providence, Rhode Island, and Human Development and Family Studies Department and Center for Health, Intervention, and Prevention, University of Connecticut, Storrs, Connecticut; Noereem Mena, Department of Nutrition and Food Sciences, University of Rhode Island, Kingston, Rhode Island; Eliza Lawson, Chronic Disease Prevention and Control Initiative, Rhode Island Department of Health, Providence, Rhode Island; Angela Ankoma, Office of Minority Health, Rhode Island Department of Health, Providence, Rhode Island.

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Table

Table. Provider Responses Related to Nutrition Training, Feeding Practices, and Attitudes About Parent Involvement

Question	All Providers, %				Non-Hispanic Providers, %				Hispanic Providers, %				Hispanic, Crude	Hispanic, Adjusted for CACFP
Nutrition Training														
No. of times	0–3		4–7		0–3		4–7		0–3		4–7		β (*P*)	β (*P*)
How often have you received training on nutrition in the past 3 years?	67.6		32.4		76.2		23.8		53.9		46.2		−1.0 (.02)	−1.1 (.02)
Level of helpfulness	N/S		Very		N/S		Very		N/S		Very		β (*P*)	β (*P*)
How helpful did you find the class(es)?	35.2		64.8		54.9		45.1		8.1		91.9		−2.6 (<.001)	−2.4 (<.001)
How helpful do you think it would be to have more training focused on home based child-care programs?	42.4		57.6		63.8		36.2		12.2		87.8		−2.5 (<.001)	−2.5 (<.001)
Level of agreement	SA	A	D	SD	SA	A	D	SD	SA	A	D	SD	β (*P*)	β (*P*)
I regularly attend nutrition education classes.	41.2	30	24.7	4.1	27.6	25.9	39.7	6.9	61.5	35.9	24.7	4.1	−1.4 (.001)	−1.1 (.03)
Provider Feeding Practices[a]														
I sit with the children during snacks and meals.	67.3	29.8	1.0	1.9	59.4	35.9	1.6	3.1	80.0	20.0	0	0	−1.0 (.03)	−1.1 (.02)
I rarely eat the same foods and have the same drinks as the children.	9.8	24.5	40.2	25.5	6.4	33.3	39.7	20.6	15.4	10.3	41.0	33.3	−0.46 (.22)	−0.65 (.11)
I am highly motivated to serve healthy foods to the children.	71.8	28.2	—	—	58.7	41.3	—	—	92.5	7.5	—	—	2.2 (.001)	1.9 (.006)
Children are encouraged to finish the food on their plate.	38.8	35.9	18.5	6.8	12.7	49.2	28.6	9.5	80.0	15.0	2.5	2.5	−3.3 (<.001)	−3.1 (<.001)
Children are involved in nutrition-related plans, books, and activities.	2.0	7.9	46.5	43.5	3.2	8.0	53.2	35.5	0	7.7	35.9	56.4	−0.86 (.04)	−0.94 (.04)
Children are involved in cooking and hands-on food activities.	6.8	8.7	56.3	28.2	7.9	9.5	52.4	30.2	5.0	7.5	62.5	25.0	0.39 (.50)	0.42 (.49)
Children like to try new foods.	19.8	53.5	18.8	7.9	15.9	46.0	25.4	12.7	26.3	65.8	7.9	0	−0.64 (.21)	−0.5 (.30)
Attitudes About Parents/Parent Involvement[a]														
Parents/families demand that their children be served healthy foods.	22.8	45.5	21.8	9.9	9.7	53.2	25.8	11.3	43.6	33.3	15.4	7.7	0.68 (.14)	0.66 (.17)
From conversations with	18.2	58.6	19.2	4.0	12.5	60.9	20.3	6.3	28.6	54.3	17.1	0	0.56 (.29)	0.24 (.66)

Abbreviations: A, agree; CACFP, Child and Adult Care Food Program; D, disagree; N/S, not/somewhat; SA, strongly agree; SD, strongly disagree.

[a] Response options for some variables were collapsed because of small numbers; more information about collapsing of variables can be obtained from the corresponding author.

(continued)

Table. Provider Responses Related to Nutrition Training, Feeding Practices, and Attitudes About Parent Involvement

Question	All Providers, %				Non-Hispanic Providers, %				Hispanic Providers, %				Hispanic, Crude	Hispanic, Adjusted for CACFP
parents/families and children, it seems that parents know about healthy foods to serve to children.														
From conversations with parents/families and children, it seems that parents reinforce nutrition education at home.	10.3	52.6	28.9	8.3	5.0	56.7	28.3	10.0	18.9	46.0	29.7	5.4	0.14 (.75)	0.09 (.84)
It seems that parents/ families are concerned about the quality of fruits and vegetables.	16.0	50.0	24.5	9.6	6.9	51.7	27.6	13.8	30.6	47.2	19.4	2.8	0.9 (.06)	0.86 (.09)
When parents/families bring outside meals for their children, the food brought in is often healthy.	7.2	48.2	24.1	20.5	8.9	48.2	26.8	16.0	3.7	48.2	18.5	29.6	−0.21 (.65)	0.05 (.92)
Parents/families regularly ask what their child has eaten.	27.7	45.5	20.8	5.9	20.6	47.6	23.8	7.9	39.5	42.1	15.8	2.6	0.72 (.15)	0.43 (.42)
A parent has stated that their children will eat certain foods at daycare and not at home.	40.4	38.4	14.1	7.1	42.9	46.0	4.8	6.4	36.1	25.0	30.6	8.3	−1.6 (.002)	−1.5 (.005)
I believe it is important to communicate with parents/ families regarding nutrition.	63.5	31.7	4.8	—	47.6	46.0	6.3	—	87.8	9.8	2.4	—	−1.9 (<.001)	−1.5 (.003)
I discuss with parents/ families if lunches or snacks sent in are not healthy	38.9	41.1	16.7	3.3	20.4	50.0	24.0	5.6	66.7	27.8	5.6	0	−1.3 (.001)	−1.3 (<.001)
It seems to me that parents/ families give up too easily when trying to feed healthy food to their children.	35.7	39.8	19.4	5.1	23.3	46.7	23.3	6.7	55.3	29.0	16.2	2.6	−0.36 (.32)	−0.33 (.38)
I am comfortable passing information on to parents/ families about good nutrition practices.	54.9	43.1	2.0	—	45.2	51.6	3.2	—	70.0	30.0	0	—	1.0 (.01)	1.0 (.02)
I am comfortable encouraging parents/ families to breastfeed their infants.	67.8	20.0	7.8	4.4	59.6	19.2	13.5	7.7	79.0	21.0	0	0	1.2 (.003)	1.2 (.008)
I am comfortable discussing a child's weight problem with parents/families.	36.5	37.5	20.8	5.2	22.8	36.8	31.6	8.8	56.4	38.5	5.1	0	0.74 (.05)	0.59 (.12)

Abbreviations: A, agree; CACFP, Child and Adult Care Food Program; D, disagree; N/S, not/somewhat; SA, strongly agree; SD, strongly disagree.
[a] Response options for some variables were collapsed because of small numbers; more information about collapsing of variables can be obtained from the corresponding author.

PREVENTING CHRONIC DISEASE
PUBLIC HEALTH RESEARCH, PRACTICE, AND POLICY
Volume 12, E56 APRIL 2015

ORIGINAL RESEARCH

Getting Research to the Policy Table: A Qualitative Study With Public Health Researchers on Engaging With Policy Makers

Jennifer J. Otten, PhD, RD; Elizabeth A. Dodson, PhD, MPH; Sheila Fleischhacker, PhD, JD; Sameer Siddiqi, BS; Emilee L. Quinn, MPH

Suggested citation for this article: Otten JJ, Dodson EA, Fleischhacker S, Siddiqi S, Quinn EL. Getting Research to the Policy Table: A Qualitative Study With Public Health Researchers on Engaging With Policy Makers. Prev Chronic Dis 2015; 12:140546. DOI: http://dx.doi.org/10.5888/pcd12.140546.

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Abstract

Introduction
Little attention has been given to how researchers can best provide evidence to policy makers so that it informs policy making. The objectives of this study were to increase understanding about the current state of public health nutrition and obesity researcher practices, beliefs, barriers, and facilitators to communicating and engaging with policy makers, and to identify best practices and suggest improvements.

Methods
Eighteen semistructured interviews were conducted from 2011 to 2013 with public health nutrition and obesity researchers who were highly involved in communicating research to policy makers. Interviews were transcribed verbatim, coded, and analyzed to identify common themes.

Results
Study participants described wide variation in practices for communicating and engaging with policy makers and had mixed beliefs about whether and when researchers should engage. Besides a lack of formal policy communication training, barriers noted were promotion and tenure processes and a professional culture that does not value communicating and engaging with policy makers. Study participants cited facilitators to engaging with policy makers as ranging from the individual level (eg, desire to make a difference, relationships with collaborators) to the institutional level (eg, training/mentorship support, institutional recognition). Other facilitators identified were research- and funding-driven. Promising strategies suggested to improve policy engagement were more formal training, better use of intermediaries, and learning how to cultivate relationships with policy makers.

Conclusion
Study findings provide insights into the challenges that will need to be overcome and the strategies that might be tried to improve communication and engagement between public health researchers and policy makers.

Introduction

Much has been written about the importance of ensuring that research evidence is used to inform decisions such as those made in public health policy (1–3). A 2012 National Academy of Sciences report, *Using Science as Evidence in Public Policy*, states, "Science, when it has something to offer, should be at the policy table" (4). Yet the peer-reviewed public health literature has devoted little attention to understanding and improving the ways in which researchers get their work into policy pathways.

Various studies have identified many factors that hinder the translation of research evidence into public health policy, such as differences in decision making and persuasion among researchers and policy makers, ambiguous findings, and the need to balance objectivity and advocacy (5–7). A substantial literature also exists on techniques for communicating evidence-based information to policy makers; examples include developing short policy summaries and effectively framing research to resonate with policy makers (8–12). However, gaps in knowledge exist about which

techniques work best when and with whom, and whether, why, and how evidence is actually used.

Important to all of the above is what researchers know and believe about engaging with policy makers and what supports them in and prevents them from effectively getting research evidence into policy pathways. However, little research exists about the current state of public health researcher practices for engaging with policy makers. What are the facilitators and barriers to policy engagement and communication? How should their work be actively communicated to policy makers? What are ways to improve the links between researchers and policy makers? The purpose of this study was to explore these questions through key informant interviews with public health researchers involved in communicating research to policy makers.

Methods

Members of the Policy Research Impact Working Group (PRIWG) identified qualitative key informant interviews as the method best suited to begin exploring the topic (13–16). PRIWG is part of the Centers for Disease Control and Prevention–funded Nutrition and Obesity Policy Research and Evaluation Network (NOPREN, www.hsph.harvard.edu/nopren/). PRIWG exists to better understand connections between researchers and policy makers and to explore methods and best practices for researchers to make use of these connections in conducting and communicating their research.

On the basis of a literature review and PRIWG expertise, we created a semistructured interview guide that included 15 open-ended items to elicit insights from participants organized around 4 domains: 1) experience with and reasons for engaging with policy makers; 2) training, support, motivation, and barriers for communicating with policy makers; 3) assessment of what is needed to better support engaging with policy makers, including understanding how policy is formed or what constituencies want; and 4) views for improving the link between researchers and policy makers beyond the usual one-way direction of dissemination. For the purposes of the interviews, "policy makers" were defined broadly to include federal, state, or local decision makers. The interview guide was reviewed by PRIWG members who were not involved in its creation, piloted with 2 test participants, and refined for clarity on the basis of this feedback. The institutional review boards of Washington University in St Louis and University of Washington approved the study.

Key informant interviews

PRIWG members were asked by study authors to recommend researchers who met 2 criteria: 1) their research aligned with NOPREN-relevant topics or was aimed at informing nutrition/obesity policy and 2) they were known for their leadership in working to translate and disseminate their work to policy makers. The original list included 20 participants from which 10 were recruited (November 2011–February 2012) and 4 declined. Because themes from these first 10 interviews were diverse and preliminary analysis did not show saturation of themes, a second wave of interviewees (n = 8, 2 declined) was recruited from January to November 2013 (17). These informants were drawn from the original list plus a snowball sample accrued via original informants' interviews to optimize sample diversity.

All participants were initially contacted via email. The study purpose was explained and individuals were invited to schedule a 1-hour telephone interview. Up to 3 contact attempts were made per participant. All telephone interviews (30–60 minutes long) were conducted by lead authors (J.O., E.D.). Interviews were audio recorded and transcribed verbatim.

Two independent coders used focused qualitative data analysis techniques to systematically analyze interview transcripts (18). The use of focused coding enabled coders to analyze transcripts using the same set of thematic categories. The coders determined these categories jointly and in accordance with primary research aims. To ensure accuracy, all transcripts were coded in duplicate.

Results

In total, 18 key informants participated in the study. Participants held primarily senior academic positions, were geographically diverse (2 Southeast, 8 Midwest, 4 Northeast, 4 West) and had expertise in public health, obesity, and nutrition. Six participants were invited but declined or did not respond to requests for participation.

The following summarizes the main themes that emerged from interviews: ways researchers communicate and engage with policy makers; factors that drive researchers to engage with policy makers; facilitators and barriers to communicating and engaging with policy makers; perspectives on and suggestions for improving the link between researchers and policy makers.

Ways researchers communicate and engage with policy makers

Participants described a broad range of ways they communicate and engage with policy makers (Table 1), including means of information sharing and soliciting perspectives from policy makers.

Factors driving researchers to engage with policy makers

The factors driving participants to engage with policy makers varied but generally fell into 3 categories: 1) Some stated that they were recognized experts in a policy-relevant topic, such as studying policy-affected environments like schools or daycare centers. As such, they described that they did not drive the relationship or strategic thinking about the policy implications of their research but rather that their expertise was sought by policy makers. One participant expressed, "Policy makers look for experts in topics but not experts in policy."

2) Others shared an orientation to their work that led them to deliberately shape their research agendas to inform policy, stating that they think of their research agenda in terms of policy relevance: As one participant described, "We think of our research in terms of moving public debate. The policy world helps define the question. We consider: is it helpful in informing public opinion, in filling the knowledge gap, in the way attorneys interpret the law? You've got to think this way to make a difference in this world."

3) Participants cited collaborations and relationships as the reason they became and remain involved in actively communicating with policy makers. One participant explained, "The projects . . . have really started with collaboration with people in the policy realm and sort of having them say, this is what we need. We need some evidence, we need some support."

Facilitators and barriers to communicating and engaging with policy makers

Facilitators

Participants identified several key facilitators and incentives that bolstered their policy communication efforts (Table 2). For example, they described the support for and requirements of policy engagement made by research funders, the role of institutional value placed on communicating research to policy makers, personal desire to make a difference, and opportunities for training or mentorship.

Participants cited several funders who as part of a grant application offered researchers monetary support or required them to engage with policy makers or encouraged policy communication in addition to typical dissemination through published manuscripts. These funders required researchers, when appropriate, to orient research in policy-informing ways, engage with communities, and develop well-defined dissemination plans. Some funders provided training and external experts to support these efforts.

Institutional support or culture was cited by participants as a key facilitator. Several participants stated that their institutions were discussing or developing promotion processes that would count communication and dissemination activities beyond the published manuscript and give credit for relationship-building activities.

Many participants discussed a desire to make a difference as a motivator for the policy communication work in which they engaged, noting that when policy makers make decisions, "some evidence is better than none."

Finally, training or mentorship and work in positions outside of academia allotted a minority of participants the opportunity to learn how to engage with policy makers and why it might be beneficial or align with their personal or institutional values. However, most participants had no prior training or mentorship and most generally reported that they "learned by doing it."

Barriers

Participants commented predominantly on barriers to policy communication that they observed in the field-at-large rather than those they faced personally. Barriers cited included an unsupportive culture, lack of training or "know-how," perceived lack of payoff, and insufficient time (Table 2).

Participants consistently expressed that most research institutions do not highly value communication with policy makers and that many issues related to promotions and academic culture sustain this standard, such as promotion processes that recognize peer-reviewed publications and grants but do not take into account policy communication. Similarly, participants noted that funders often ignore this aspect of the research process.

Participants mentioned lack of training as a major barrier, indicating that because policy-related requests for research evidence often occur during times of controversy or heated decision making, researchers can feel ill-prepared and blindsided by external agendas or unfamiliar with policy-related factors that might be important in framing research evidence.

In addition, participants perceived a lack of payoff for policy work and felt that the complexity of policy making made it hard to identify or quantify the impact of their efforts. For example, participants frequently cited the media as a guaranteed way to shape and amplify one's research messages but said that policy communication may never come to fruition, might be just a one-on-one conversation that does not produce policy change, and that the complexity of policy making may make it difficult for a policy change to directly cite a researcher's contribution.

Finally, barriers related to time frequently emerged singularly and in connection with other themes. Participants repeatedly noted that given time limitations, they often had to choose priorities that their institutions or funders valued and that this may be a particular constraint for researchers without tenure.

Perspectives on and suggestions for improving the link between researchers and policy makers

Perspectives

Participants took mixed stances on whether and which researchers should be communicating with policy makers. Many felt strongly that all researchers should be able to articulate how their work is relevant to policy makers and be able to put it into a broader health context.

Similarly, participants expressed concern that most researchers do not understand the value of getting involved in policy work. One participant expressed, "But you have to realize: People make [policy] decisions based on no evidence, or financially invested parties drive the decisions. Isn't some evidence better than none, even if not conclusive? I would like to see people realize the value of getting involved."

Other participants felt that only a particular subset of applied and public health researchers should be communicating with policy makers, noting: "I don't think everyone should be thinking this. I think there's a group that should be motivated and well-informed and working . . . to help translate research into policy."

Finally, some participants did not feel it was realistic for researchers to be communicating with policy makers given the system within which they operate and their differing incentive structures. This group felt that being trained how to do rigorous science was more important than figuring out what policy makers need.

> My sense is that there are a lot of really smart people who think a lot about . . . moving a policy item from step A to step B to step C. So, I haven't spent a lot of my time and energy figuring that out for any particular issue because I feel that the real added value that I can have is bringing really strong research to the table. Once that's there, there are a lot of other people to help think through how to best understand the policy and politics process in terms of potentially unpacking that information.

Suggestions

> [I]n public health we always talk about system thinking and the importance of a systems-based approach, and yet we think about communicating with policy makers as an individual behavior and an activity that people need to . . . have some training, and just . . . if they only had better training they'd do a better job. We need to design a system . . . for success, design a system that provides rewards.

Regarding skills and elements needed to engage in productive policy communication, participants recommended that researchers

- Learn how to be effective communicators and relationship builders with policy makers.
- Know their audience. However, participant definition of this theme varied. The different ways participants described "knowing policy makers" ranged from knowing the forces that shape policy and policy makers to knowing the nitty-gritty of how policy operates and its locus-of-control and leverage points, to knowing how to frame issues in ways that are meaningful to policy makers and their constituents.
- Become a good resource or expert in some field or topic.
- Find opportunities to practice policy communication and engagement.

Participants emphasized that researchers should not be doing this work alone and should engage intermediaries (ie, groups or individuals, such as professional societies and nongovernment organizations that aim to improve the knowledge shared between networks or individuals, particularly between those who produce and use a knowledge set). Intermediaries were cited as being able to help guide researchers on policy priorities or questions that need to be answered by policy makers and the appropriate timeline for such research. In addition, intermediaries often have relationships with key policy makers and are experts at packaging information for them.

Repeatedly, participants emphasized the importance of cultivating relationships with policy makers over time. "I think the more direct that connection is, the more they [policy makers] are willing to engage, and it becomes a two-way street. The work has been most fruitful when it has been that two-way." Although individuals can nurture these relationships on a one-to-one basis, there was a general sense that a more systematic approach to this process could be developed that included avenues for more regular interactions and opportunities for ongoing communications and to teach researchers how to enhance these relationships.

Discussion

Policies have been cited as a useful tool for permanently and effectively changing public health behaviors — often more than

many public health programs (4,6). This underscores the importance of using evidence, when available, to inform policy-making processes (4). Yet, little is known about how, why, or when researchers communicate and engage with policy makers, what is or is not working, or opportunities to improve on these practices.

This exploratory study, while addressing only one piece of the policy-making process, fills a research gap. The qualitative nature of this study provides an initial understanding about the complexity of nutrition and obesity researcher practices, beliefs, barriers, and facilitators to communicating and engaging with policy makers. Study findings provide insights into the challenges that will need to be overcome and the strategies that might be tried to improve this pathway.

Wide variation emerged in practices for communicating and engaging with policy makers along with mixed beliefs about whether and when researchers should be doing this, even among a sample of researchers who were recruited for their high levels of involvement in policy communication. This variation may reflect the absence of several related but key supports for researchers regarding policy communication: the lack of consensus on a common terminology or set of best practices or guidelines for communicating with policy makers, the lack of systematically designed training or mentorship, and the limited evidence on how research gets used in policy making (19).

Participants shared insights on possible ways to overcome barriers to policy communication with strong drivers and supports. The barriers noted occurred mostly within the academic setting (eg, a lack of formalized training and a promotion process and professional culture that does not value the practice). Nevertheless, participants cited facilitators that often overcame these barriers ranging from individual-level (eg, desire to make a difference, relationships with collaborators) to institutional-level (eg, training/mentorship support, support from the institution), and research-driven (eg, relevant topic, funder support).

Participants also agreed that the link between researchers and policy makers could be improved and suggested promising strategies such as more formal training, better use of intermediaries, and cultivating relationships. Participants in this study consistently and repeatedly underscored the need for more systematic exploration and discussion about how to guide infrastructure and training to better support researcher communication and engagement with policy makers.

To our knowledge, this is the first study to explore the current state of public health researcher practices, beliefs, barriers, and facilitators to communicating and engaging with policy makers, using qualitative interviews with researchers who are highly involved in communicating research to policy makers. This study is not without limitations. First, although diversity in geography and experience levels was sought, coverage was incomplete. Thus, the generalizability of these findings and recommendations is limited by the academic and policy research environments that were represented. Second, this exploratory study focused on researchers highly involved in communicating research to policy makers and therefore may not capture perspectives of researchers who choose not to communicate or engage with policy makers and in whom patterns of practice may differ substantially.

Future research in this area should include a synthesis of current guidelines for researchers about communicating and engaging with policy makers and to what extent these guidelines reflect our findings about what researchers are currently doing; a broader understanding of current practices in a more diverse sample; and a thorough analysis of the training that exists for researchers within and outside the research setting.

Acknowledgments

We thank the interviewees who offered their time and energy to the project and appreciate the invaluable feedback from the members of the NOPREN PRIWG. NOPREN is funded by the Centers for Disease Control and Prevention (CDC). This work was supported by cooperative agreement no. U48/DP001903 from CDC, the Prevention Research Centers Program and the National Cancer Institute at the National Institutes of Health (NIH grant no. 1R01CA124404-01). The content is solely the responsibility of the authors and does not represent the official views of CDC or NIH.

Author Information

Corresponding Author: Jennifer Otten, PhD, RD; Assistant Professor, University of Washington, School of Public Health, Nutritional Sciences Program, Box 353410, Seattle, WA 98115. Telephone: 206-221-8233. Email: jotten@uw.edu.

Author Affiliations: Elizabeth A. Dodson, Brown School and Prevention Research Center in St Louis, Washington University in St Louis, St Louis, Missouri; Sheila Fleischhacker, The National Institutes of Health (NIH), Bethesda, Maryland; Sameer Siddiqi, Bloomberg School of Public Health, Johns Hopkins University, Baltimore, Maryland; Emilee L. Quinn, Center for Public Health Nutrition, University of Washington, Seattle, Washington. At the time of this study, Sameer Siddiqi was with the NIH, Bethesda, Maryland.

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Tables

Table 1. How Researchers Communicate and Engage With Policy Makers

Ways Researchers Communicate and Engage With Policy Makers	Description of Approach
Direct interaction	Either unsolicited, such as when researchers initiate legislative visits, telephone calls, emails, or texts with policy makers or their staff when relevant issues arise; or solicited, such as when researchers receive calls on specific issues, are invited to do briefings or testimony, are asked to review drafts of bills, or are asked to inform policy evaluation design
Indirect interactions	Included but not limited to presentations or targeted dissemination about research to federal, state, and local agencies, the media, nonprofit groups, advocacy groups, community groups, or at professional meetings/conferences where key players may be present
Targeted dissemination products	Creating and sending or distributing letters, peer-reviewed manuscripts, policy briefs, fact sheets, one-pagers, or bullet points to policy makers and their staff
Professional membership groups	Included being part of working groups that developed outputs such as policy statements; advocating for the use of practices or evidence from the field-at-large through sign-on letters, action alerts, or legislative visits
Membership in blue ribbon groups or panels	Often designed to inform policy at large, such as Institute of Medicine groups; transition teams; and task forces, cabinets, or roundtables formed by federal, state, or local policy makers to focus on a specific problem or task
Planned engagement	Included inviting policy makers to speak to academic audiences in academic settings; helping inform research development, design, or translation; writing support letters for grants of mutual topic interest; and engaging in partnerships around initiatives

Table 2. Facilitators and Barriers to Policy Communication and Engagement Between Public Health Researchers and Policy Makers

Thematic Category	Participant Remarks
Facilitators	
Support for and requirements of policy engagement made by research funders	"The funders need to fund it, and so some of that's happening in the obesity area."
	"Tobacco was a reference point for NCI and NIH to fund research about policy change as opposed to only about etiology of obesity or determinants of energy balance and that kind of stuff."
	"[A foundation] pushed me to do it [learn how to communicate with policy makers]. [The foundation] provided consultants and support for doing this and learned from folks in tobacco field."
Support for and recognition of policy communication by academic institutions	"We actually . . . have to support junior faculty and give them credit for these kinds of relationship-building activities because it's not an overnight process . . . it's a 20- or 25-year process. And yet if we keep them cooped up inside working on secondary data sets the whole time and they don't break out, they don't get that exposure . . . they're not going to be in a place to really make an impact later."
Personal desire to "make a difference"	"I learned how to do it partly out of impatience. I was tired of doing research and not having it go anywhere or lead to anything."
Training and mentorship	"How I learned it was after I was in the office and different people came in and presented their information, because they wanted some kind of legislation crafted or modified. And they were making their argument to the staff so that the senator would look at it. There was a major difference in the quality of that. And the people who came in and could sell it, and to me, they had a good database, evidence base for it and it was timely. And you could see impact, you could see why it needed to be done, why it was important. . . . Then usually those things moved more rapidly, as far as getting things out the door right away. . . . So it was the timing of things and it was how they presented it."
	"They took me and walked me through, and had me meet people, and told me what kind of testimony worked and what kind of testimony didn't work. And so I think that mentoring is important."
Barriers	
Unsupportive academic or institutional culture	"[T]he reward system in the academy rewards the investigator for having a novel idea, and for knowledge production for its own sake much more than it rewards answering questions."
	"[T]his is really important, I think, for junior faculty to understand . . . that the extent to which you put in your promotion packet your interest in advocacy, your interest in effectively communicating results, and more importantly, any time you spend doing it, then they'll look and say, 'Well, you were taking away from the time you should've been developing a really nationally recognized research career, getting grants or developing a teaching program.' So not only is it not [counted?], but I think it can only be a negative within most of traditional university tenure track. So that's why I get back to your question, which is, do you think there should be training for how to work with policy makers? I think for the traditional academic, that's pretty far down as far as main motivators for measures of success."
Lack of training or "know-how"	"I had no training, no mentors. I developed it over the years by doing it."
	"Our health policy management students go, and they'll shadow kind of the health lobbyists, and that's great. I mean that's the best way to learn. And I think the researchers typically don't have that partnership, and that's why it's hard for them."
Perceived lack of payoff	"You can read the paper every day and see, this study says this, and it does get you a lot of buzz, and really a few meetings with policy makers gets nothing near that level of impact."
	"For example, we just spent a few years putting together a series of papers on obesity that is supposed to speak to obesity policy. I actually think that was a much better way to spend time than to spend a lot of time with policy makers, because at the end of the day we had a day-long press conference in [city] with about 70 media outlets. We had a huge media splash . . . and then subsequently 3 different articles in the *New York Times*, and that gives you much more of an ear of policy makers than talking with policy makers and meeting with them."
Time constraints	"Faculty are not going to have the time. They just need to know HOW to communicate. Faculty don't have time for nitty-gritty. Faculty are really busy, especially right now in tough economic times. The reality is that there are too many other pressures. They are not going to have the time to do this."

Abbreviations: NCI, National Cancer Institute; NIH, National Institutes of Health.

PREVENTING CHRONIC DISEASE
PUBLIC HEALTH RESEARCH, PRACTICE, AND POLICY
Volume 12, E57 APRIL 2015

SYSTEMATIC REVIEW

Nutrition-Related Policy and Environmental Strategies to Prevent Obesity in Rural Communities: A Systematic Review of the Literature, 2002–2013

Larissa Calancie; Jennifer Leeman, DrPH; Stephanie B. Jilcott Pitts, PhD; Laura Kettel Khan, PhD; Sheila Fleischhacker, PhD, JD; Kelly R. Evenson, PhD; Michelle Schreiner, MSN, RN; Carmen Byker, PhD; Clint Owens, MSN, RN; Jared McGuirt, MPH; Ellen Barnidge, PhD, MPH; Wesley Dean, PhD; Donna Johnson, PhD, RD; Jane Kolodinsky, PhD; Emily Piltch, MPH; Courtney Pinard, PhD; Emilee Quinn, MPH; Lauren Whetstone, PhD; Alice Ammerman, DrPH, RD

Suggested citation for this article: Calancie L, Leeman J, Jilcott Pitts SB, Khan LK, Fleischhacker S, Evenson KR, et al. Nutrition-Related Policy and Environmental Strategies to Prevent Obesity in Rural Communities: A Systematic Review of the Literature, 2002–2013. Prev Chronic Dis 2015;12:140540. DOI: http://dx.doi.org/10.5888/pcd12.140540.

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Abstract

Introduction
Residents of rural communities in the United States are at higher risk for obesity than their urban and suburban counterparts. Policy and environmental-change strategies supporting healthier dietary intake can prevent obesity and promote health equity. Evidence in support of these strategies is based largely on urban and suburban studies; little is known about use of these strategies in rural communities. The purpose of this review was to synthesize available evidence on the adaptation, implementation, and effectiveness of policy and environmental obesity-prevention strategies in rural settings.

Methods
The review was guided by a list of Centers for Disease Control and Prevention *Recommended Community Strategies and Measurements to Prevent Obesity in the United States,* commonly known as the "COCOMO" strategies. We searched PubMed, Cumulative Index of Nursing and Allied Health Literature, Public Affairs Information Service, and Cochrane databases for articles published from 2002 through 2013 that reported findings from research on nutrition-related policy and environmental strategies in rural communities in the United States and Canada. Two researchers independently abstracted data from each article, and resolved discrepancies by consensus.

Results
Of the 663 articles retrieved, 33 met inclusion criteria. The interventions most commonly focused on increasing access to more nutritious foods and beverages or decreasing access to less nutritious options. Rural adaptations included accommodating distance to food sources, tailoring to local food cultures, and building community partnerships.

Conclusions
Findings from this literature review provide guidance on adapting and implementing policy and environmental strategies in rural communities.

Introduction

Residents of rural communities in the United States experience disproportionately high rates of obesity and other nutrition-related chronic diseases than do urban and suburban residents (1–3). Addressing rural health disparities is a key objective of *Healthy People 2020* (4). Research suggests that less healthy eating patterns contribute to these disparities (5). Poverty in rural areas and a paucity of healthy retail food outlets limit access to healthy foods and contribute to less healthy diets (5–7). Policy and environmental strategies (eg, zoning policies that facilitate the location of farmers markets in underserved areas) can help increase access to healthy foods and beverages and thereby increase opportunities for making healthy food choices (8–10). Additional advantages of strategies that target change at the levels of policy and environment include lower per-person costs and greater potential for long-term sustainability than strategies that target change at the individual level (8,11).

The evidence in support of nutrition-related policy and environmental strategies is based largely on urban and suburban studies; thus, little is known about their use in rural communities. Rural communities may have distinct cultures and infrastructures that limit the transferability of strategies from nonrural contexts (12–15). Rural areas may also lack financial and human resources necessary to adopt and implement policy and environmental changes that work in an urban context. Still, rural areas may have assets, such as greater collaboration across public and private sectors, which may lead to strong obesity prevention partnerships (15).

The purpose of this study was to synthesize the evidence on the adoption, implementation, and effectiveness of nutrition-related policy and environmental obesity-prevention strategies in rural settings. The review was guided by the Centers for Disease Control and Prevention's (CDC) *Recommended Community Strategies and Measurements to Prevent Obesity in the United States,* commonly known as the "COCOMO" strategies (16), which are widely used in public health (17). This study focused on COCOMO's 10 nutrition-related strategies (Table 1). Our a priori hypothesis was that some but not all of the COCOMO strategies had been implemented in rural areas and that implementation required adaptations to the rural context.

Methods

We conducted a systematic review of the literature to identify, extract, and integrate findings from empirical research on the use of nutrition-related policy and environmental strategies for obesity prevention in rural communities. The review was conducted by members of the Rural Food Access Work Group of the CDC-funded Nutrition and Obesity Policy Research and Evaluation Network (NOPREN), a nationwide network of more than 15 funded and affiliated partners that identifies and prioritizes a policy research agenda to improve access to healthy, affordable foods in rural communities (6). This project included the Policy Identification, Policy Evaluation, and Translation, Communication, and Dissemination of Research concepts from the NOPREN policy continuum (18).

Data sources

PubMed, Cumulative Index of Nursing and Allied Health Literature, Public Affairs Information Service, and Cochrane databases were searched for articles published between January 1, 2002, and June 30, 2013, in English, that reported findings from formative, process, or outcome research on nutrition-related policy and environmental strategies in rural settings. To be comprehensive and capture strategies in addition to those of COCOMO, we searched broadly for nutrition-related policy and environmental strategies applied to obesity prevention. Each search was conducted by using the following terms: rural AND (nutrition or food) AND (community or environment or policy) AND (obesity or overweight or "chronic disease"). In addition to using the search term "rural," the search was repeated in each database by using predominantly rural states as search terms. The predominantly rural states were identified using the Rural-to-Urban Continuum Codes, the Office of Management and Budget maps, or the Rural Assistance Center's Frontier map where substantial portions of the state are frontier. The search included relevant references cited in each of the identified studies and in prior reviews of the literature on nutrition-related policy and environmental strategies. NOPREN colleagues also recommended relevant articles.

Study selection

At least 2 members of the research team screened titles and abstracts and then reviewed the complete text of relevant articles to select articles for inclusion. To be included, the article had to report findings from empirical formative, process, or outcome research related to policy or environmental obesity-prevention strategies in rural communities in the United States or Canada. The term "rural" was broadly defined so as to allow for inclusion of any study in which authors described the setting as "rural,"

"non-metro," "small town," or "remote" or a study conducted in counties that the Health Resources and Services Administration characterized as rural in 2005 (19). Policy and environmental strategies included, but were not limited to, the 10 nutrition-related COCOMO strategies (Table 1). Although the original COCOMO strategies applied to public service venues, for this study's purpose COCOMO strategies were expanded to apply to any setting (eg, worksites). Articles that included both rural and urban communities were included only if they reported rural-specific findings.

Data were abstracted from each article by using a standardized form. The form included information about study population (eg, race/ethnicity, socioeconomic status), setting, geographic location, approaches used to adapt the intervention or its implementation to a rural setting, design, methods, and findings. All 17 data abstractors were trained using a strategy similar to that employed by the US Department of Agriculture (USDA) Center for Nutrition Policy and Promotion Nutrition Evidence Library (20). Similar to the USDA's process, 2 members of the team independently abstracted data, compared abstractions, and then resolved discrepancies by consensus for each article.

Data from the consensus abstraction forms were integrated using data matrices. Four members of the research team reviewed the matrices to identify themes, and tables and narratives were created summarizing data related to those themes.

Results

The search identified 663 articles, and 33 articles (reporting the findings from 29 studies) met inclusion criteria after exclusions (Figure) (Table 2). Findings are reported as follows: 1) study locations, settings, and study approach; 2) types of policy and environmental obesity prevention strategies used; 3) approaches to adapting and implementing nutrition-related policy and environmental strategies for obesity prevention in rural areas; and 4) intervention effects on policy, environment, behavioral, and health outcomes (as a part of Policy Evaluation).

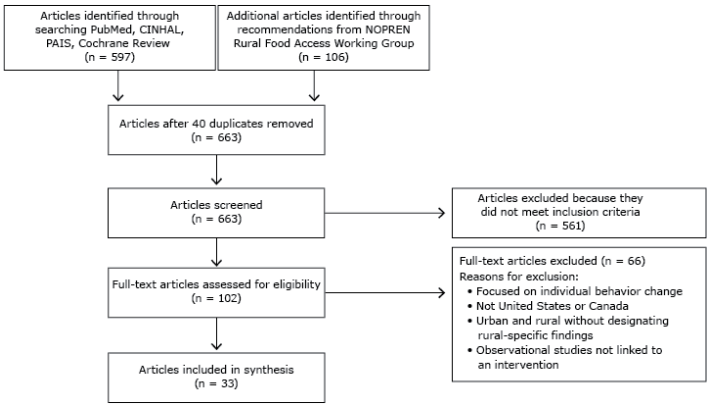

Figure. Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) flow diagram for study inclusion is a systematic review of nutrition-related policy and environmental strategies for obesity prevention applied in rural communities. Abbreviations: CINAHL, Cumulative Index of Nursing and Allied Health Literature; PAIS, Public Affairs Information Service; NOPREN, Nutrition and Obesity Policy Research and Evaluation Network.

1. Study locations, settings, and approach

Of the 29 studies included, 4 took place in Canada (14%) and 25 in the United States (86%) (Table 2). Approximately one-third of the studies (n = 10, 34%) were conducted with American Indian tribes or with First Nations of Canada. The most common settings were schools (n = 13, 45%), small retail food outlets (n = 10, 34%), worksites (n = 5, 17%), and farmers markets (n = 5, 17%). Small retail food outlets were the setting for 70% of studies with American Indian tribes or First Nations (n = 7). About one-third (n = 11, 37%) of the studies took place in multiple settings. Half of the studies (n = 15, 52%) reported findings from formative or process evaluations and did not include outcome data. Fourteen studies (48%) reported findings from an outcome evaluation.

2. Types of nutrition-related policy and environmental strategies used

The COCOMO strategy used most often was strategy 1, "increase availability of healthier food and beverage choices" (Table 3). That is, strategy 1 was used in 22 studies (76%), followed by strategy 7, "restrict availability of less healthy foods and beverages" (n = 11, 38%). The strategies used least frequently were strategy 8, "institute smaller portion size options in public service venues" (n = 1, 3%), and strategy 9 "limit advertisements of less healthy foods and beverages" (n = 1, 3%). None of the studies sought to improve the geographic availability of supermarkets (strategy 3).

3. Approaches to adapting and implementing nutrition-related policy and environmental strategies in rural areas

The literature reviewed yielded 3 themes related to strategy adaptation and implementation in rural communities (Table 3).

Accommodate long distances to food sources when implementing strategies. In 11 studies, investigators discussed how the design and implementation of interventions in rural communities accommodated long distances between food suppliers and retailers and between retailers and consumers. For example, several studies noted that long distances can increase food costs and limit the availability of foods that have limited shelf lives or are sensitive to long transit times (30,39,42). As a result, stores involved in store-based interventions may have trouble stocking the foods promoted through the intervention (40). These challenges are compounded when communities are remote and may rely on specialized transportation, such as annual barge deliveries or food mail programs as seen in a First Nations community in the Canadian Arctic (39). Efforts to address these challenges include strengthening networks between food producers, distributors, and retail food outlets (42). Adaptations also may be required to reduce the distance customers need to travel from their residences to grocery stores and farmers markets (15,23,53) or from worksites to restaurants serving healthy foods or other retail food options (27). For example, farmers markets may increase access by changing the locations where they sell produce (24,37).

Tailor strategies to distinct cultures and food preferences. Investigators of 5 studies identified the need to adapt rural interventions to include specific types of foods. For example, 3 studies reported integrating traditional foods into intervention materials (30,39,48). Another study reported on the importance of understanding cultural values and practices, such as Southern approaches to food preparation (54). The importance of culture was particularly salient in the research conducted with American Indian tribes. For example, 1 study highlighted the importance of engaging tribal leaders, recognizing the history of relationships among tribes, and identifying tribe-specific governance structures, priorities, resources, and champions (29).

Build strong local partnerships when implementing strategies. In 3 studies, investigators noted the importance of partnerships with groups that assist with the redemption of federal food and nutrition assistance program benefits, such as the Agricultural Extension Service (15,24) and Electronic Benefit Transfer administration organizations (28), and parks and recreation departments, hospitals, and health departments (44). Although strong local partnerships are often beneficial in suburban and urban settings, partnerships may be particularly important to leveraging limited resources in rural settings. Also, partnerships may naturally develop in rural communities where social and professional networks are likely to overlap at times because of small populations (55).

4. Intervention effects on policy, environment, behavioral, and health outcomes

Sixteen studies included data on the effectiveness of nutrition-related policy and environmental strategies (Table 4). Most studies (n = 11, 38%) used a quasi-experimental pretest/posttest design with no comparison group. Studies were conducted in 9 settings (communities, health facilities, schools, worksites, faith institutions, farmers markets, small stores, restaurants, and public health departments); some studies occurred in multiple settings.

Twelve of the studies (41%) reporting outcomes documented healthier food environments and policies following the intervention in schools (n = 7, 24%), health facilities (n = 1, 3%), child care centers (n = 1, 3%), restaurants (n = 1, 3%), farmers markets (n = 1, 3%), and worksites (n = 1, 3%).

Ten studies included interventions' effects on health behaviors or theoretical constructs that are predictive of those behaviors (Table 4). Though results were mixed, interventions tended to improve participants' intentions to consume healthier foods (34,37,40,47), dietary knowledge (37,47), and self-efficacy related to healthy food acquisition and consumption (40,47). Also, interventions positively influenced the following behaviors: fruit and vegetable purchasing (35), reducing intake of sugar-sweetened beverage (43), and reducing dietary fat intake (47).

Weight status was the only health outcome reported in the reviewed studies (n = 6, 21%) (Table 4). Each of these 6 interventions included multilevel strategies that targeted individual-level behavior change such as counseling and education, in addition to policy and environmental level change strategies that included increasing availability of healthy foods, and discouraging the consumption of sugar-sweetened beverages. Only 1 of the 6 studies reported reducing weight status of participants (36). One study reported that although children's body mass index increased, the increase was less than in a comparison community (31). Another found that weight status increased (47), and 3 studies found that weight status did not significantly change (34,40,45).

Discussion

We assessed the state of research on nutrition-related policy and environmental strategies for obesity prevention in rural communities. The review identified 29 studies that implemented COCOMO nutrition-related policy and environmental strategies in rural communities. Other obesity prevention reviews have typically focused

on effectiveness or looked at specific populations and settings. This review included studies conducted with varied populations and settings and thus findings were too diverse to empirically assess effectiveness. Instead, our findings provide guidance on adapting and implementing policy and environmental strategies in rural communities.

In support of our a priori hypothesis, we found that many, but not all, COCOMO strategies were applied in rural settings (Table 3) and that multiple approaches were used to adapt them. The COCOMO strategies most commonly implemented in rural areas focused on increasing the availability of healthy foods and beverages and limiting the availability of unhealthy ones. Fewer studies examined approaches to limiting advertising of less healthy foods and beverages or modifying portion sizes. These findings are consistent with formative work with stakeholders in rural eastern and western North Carolina, which found that rural stakeholders rated strategies related to limiting advertising of less healthy foods and beverages as less feasible and acceptable than other COCOMO strategies (15,56). None of the studies reviewed sought to improve the geographic availability of supermarkets as recommended in strategy 3. Instead, many studies focused on improving the availability of healthier foods and beverages in small retail food outlets and increasing access to farmers markets, which may be more feasible targets for change than increasing availability of supermarkets in rural areas given the cost associated with locating supermarkets in rural areas.

Guidance on adapting and implementing strategies in rural communities

In rural communities, policy and environmental strategies that aim to increase access to healthy foods may also promote economic development through support of farmers, retail stores, and other businesses involved in food production, distribution, and sales (57). Researchers might study strategies that locate retailer's food outlets in closer proximity to customers, as illustrated by the use of mobile markets by Sharkey et al (58). To tailor interventions to local cultures and taste preferences, those planning rural interventions may benefit from conducting formative work to identify traditional and locally grown foods, as well as local approaches to food preparation. Formative work may also help identify local partners who may be important to promoting and implementing policy and environmental changes in rural areas.

Almost one-third of the studies (n = 10; 34%) were conducted with American Indian tribes or First Nations of Canada. Most of these studies (70%) were conducted in small retail settings (Tables 2 and 3). Research in these often under-studied, at-risk communities is critical to identifying culturally and contextually appropriate approaches to reducing nutrition-related disparities. However, tribally led nutrition-related policy and environmental strategies to prevent obesity may not be generalizable to other rural communities because of tribal governments' authority to determine their own governance structures, pass laws, and enforce laws through police departments and tribal courts (59). More research can enhance our understanding of the role of tribal self-governance for nutrition-related policy and environmental strategies to prevent obesity (60).

Our aim was to obtain a broad picture of nutrition-related policy and environmental strategies to prevent obesity in rural communities to identify gaps and guide future research. Efforts were made to identify all relevant studies. Formative, process, and outcome evaluation studies were identified for this review, which limited our ability to compare findings across studies, as did what data were collected and reported. Many of the studies were formative. Those studies that assessed outcomes typically involved only a small number of settings and were often quasi-experimental in design. Furthermore, as with all reviews, the study was constrained by limitations in the existing literature and publication bias. Only a limited amount of research on nutrition-related policy and environmental strategies for obesity prevention in rural areas has been published in peer-reviewed journals. The authors recommend consulting websites, gray literature, and other forms of reporting for additional insight into effectiveness and implementation considerations for policy and environmental-level nutrition interventions in rural areas. Finally, we used several strategies to identify studies that were conducted in rural settings; however, studies conducted in rural areas that did not explicitly indicate that they dealt with rural settings may not have been captured in our search.

Suggestions for future research

Explicitly compare the effectiveness of interventions in urban and suburban settings versus rural settings. None of the studies included in the review explicitly compared the effectiveness of policy changes in rural and urban communities. Future investigations should report observed differences in rural settings compared with other settings to inform future research aiming to reduce health disparities in rural areas. Only 14 of the 29 studies identified in this study assessed intervention outcomes at the environmental, policy, or individual level. Therefore, more work is needed to assess policy and environmental, social, psychosocial, behavioral, and biological outcomes associated with nutrition-related policy and environmental strategies.

Experiment with a variety of intervention settings. Among the studies reviewed, the most common settings were schools, small retail food outlets, and worksites. Additional research is needed to explore the feasibility and effectiveness of nutrition-related policy and environmental strategies in other rural settings, such as parks and recreational sites and hospitals, to identify the mix of settings that will yield the greatest population-level reach and effects.

Explore the possibility of aligning federal food and nutrition assistance programs with efforts to increase access to local foods. The limited research to date on COCOMO strategy 5, "improve availability of mechanisms for purchasing foods from farms," has focused on examining the effectiveness of voucher or coupon programs through USDA. This aligns with a study conducted by the NOPREN Rural Food Access Working Group (RFAWG), examining rural stakeholders' views about the most promising strategies for improving healthy food access in rural areas, finding that one of the highest ranked policy and research priorities included improving access to federal food and nutrition assistance programs (61).

Report costs associated with implementing intervention strategies. Decision-makers often need information about costs as well as effectiveness when deciding whether to invest in evidence-based nutrition-related policy and environmental strategies (62). Unfortunately, cost and cost effectiveness data are often not reported in scientific articles. In this review, 3 articles included some type of implementation cost information. Conrey et al reported the cost for implementing Women, Infants, and Children (WIC) Farmers' Market Nutrition Program (FMNP) enhancements across New York State for one year (24); Saksvig et al mentioned that the cost of their school-based intervention was low, but did not provide specific costs (47); and Ruelle et al calculated cost distance, which is a spatial analysis technique that measures costs associated with moving across a landscape to help planners identify potential locations for farmers markets (48). When authors report cost or cost effectiveness information, decision-makers are granted important information from scientific studies that could influence their decision to adopt promising nutrition-related policy and environmental strategies.

Explore the economic impact and the role of local champions related to increasing access to local foods. A recent NOPREN Rural Food Access Working Group study examined rural stakeholders' views about the most promising strategies for improving healthy food access in rural areas (61). Among the workgroup's top recommendations was research on the economic impact that strategies have on communities as well as the implications of revenue generation and job creation on increased healthy food access and purchasing power among individuals (61). For example, policy and environmental changes that increase local market and supply chain business opportunities have potential economic benefits for agricultural communities while also increasing access to healthy foods (57). The study's recommendations align with COCOMO strategies 5 ("improve availability of mechanisms for purchasing food from farms") and 6 ("provide incentives for the production, distribution, and procurement of foods from local farms"). There is little available research about the effect that local champions, such as policymakers, food policy councils, and other community-driven coalitions, have on nutrition-related policy and environmental change in rural communities. A better understanding could be gained through qualitative work with community stakeholders to determine who local champions are and to identify the best ways to connect with and engage those champions.

These findings help to inform the adaption and implementation of nutrition-related policy and environmental strategies for obesity prevention in rural communities. Although our review was not able to provide policy-makers with information about the effectiveness of different policy approaches, these findings offer insights into the various options available to improve the food environment in rural communities. Moreover, decision-makers should understand the limitations of adopting strategies generated from and tested in geographically diverse settings. The findings also indicate the need for additional research. One major research gap that remains is the limited number of studies testing effectiveness of nutrition-related policy and environmental strategies in rural communities. Future work could identify strategies that have not yet been formally evaluated but that could be feasible in rural communities, such as mobile farmers markets and community garden initiatives.

Acknowledgments

This study was conducted as a joint project of the CDC-funded NOPREN Rural Food Access Working Group (grant no. 5-37850). This work was also supported by the CDC-funded University of North Carolina at Chapel Hill Prevention Research Center (no. U48/DP000059). Michelle Schreiner's and Clint Owens's work was supported by grants no. T32NR007091 and no. 5T32NR008856 from the National Institute of Nursing Research. The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the CDC, the USDA, or the National Institutes of Health.

Author Information

Corresponding Author: Larissa Calancie, Department of Nutrition, University of North Carolina, Chapel Hill, Gillings School of Global Public Health, CB No 7426, 1700 MLK/Airport Rd, Room 239, Chapel Hill, NC 27599-7426. Telephone: 315-350-1689. Email: lcalancie@unc.edu.

Author Affiliations: Jennifer Leeman, Kelly R. Evenson, Michelle Schreiner, Clint Owens, Jared McGuirt, Alice Ammerman, University of North Carolina at Chapel Hill, Chapel Hill, North Carolina; Stephanie B. Jilcott Pitts, Lauren Whetstone, East Carolina University, Elizabeth City, North Carolina; Laura Kettel Khan, Centers for Disease Control and Prevention, Division of Nutrition, Physical Activity, and Obesity, Atlanta, Georgia; Sheila Fleischhacker, National Institutes of Health, Division on Nutrition Research Coordination, Bethesda, Maryland; Carmen Byker, Montana State University, Billings, Montana; Ellen Barnidge, Saint Louis University, St. Louis, Missouri; Wesley Dean, US Department of Agriculture Food and Nutrition Service, Washington, DC; Donna Johnson, Emilee Quinn, University of Washington, Seattle, Washington; Jane Kolodinsky, University of Vermont, Burlington, Vermont; Emily Piltch, Tufts University, Boston, Massachusetts; Courtney Pinard, University of Nebraska, Lincoln, Nebraska.

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Tables

Table 1. Ten Nutrition-Related Strategies from Centers for Disease Control and Prevention's *Recommended Community Strategies and Measurements to Prevent Obesity in the United States* (16)

Strategy Number	Strategy Description
1	Increase availability of healthier food and beverage choices in public service venues.
2	Improve availability of affordable healthier food and beverage choices in public service venues.
3	Improve geographic availability of supermarkets in underserved areas.
4	Provide incentives to food retailers to locate in and/or offer healthier food and beverage choices in underserved areas.
5	Improve availability of mechanisms for purchasing foods from farms.
6	Provide incentives for the production, distribution, and procurement of foods from local farms.
7	Restrict availability of less healthy foods and beverages in public service venues.
8	Institute smaller portion size options in public service venues.
9	Limit advertisements of less healthy foods and beverages.
10	Discourage consumption of sugar-sweetened beverages.

Table 2. Citation, Geographic Location, Setting(s), and Evaluation Type for Studies of Nutrition-Related Policy and Environmental Strategies for Obesity Prevention Conducted in Rural Areas of the United States and Canada, 2002–2013

Citation	Geographic Location	Setting(s)	Evaluation Type
Bachar et al, 2006 (21)	Reservations, Western, North Carolina	Worksites, faith-based institutions, community	Process, outcome
Belansky et al, 2010 (22)	Colorado	Schools	Process, outcome
Brown et al, 2010 (23)	Reservations, Montana	Schools, small retail food outlets	Formative
Conrey et al, 2003 (24)	New York	Farmers markets	Outcome
Curran et al, 2005 (25)	Reservations, Arizona	Small retail food outlets, community	Process
Drummond et al, 2009 (26)	Yuma County, Arizona	Child care	Outcome
Escoffery et al, 2011 (27)	Southwest Georgia	Worksites	Formative
Flamm, 2011 (28)	Ohio	Farmers markets	Formative
Fleischhacker et al, 2012 (29)	American Indian tribes in North Carolina	Community	Formative
Gittelsohn et al, 2010 (30)	First Nations, Nunavut, Canada	Small retail food outlets	Formative
Gombosi, 2007 (31)	Tioga County, Pennsylvania	Schools, community, worksites	Outcome
Harris et al, 2010 (32)	West Virginia	Schools	Process
Ho et al, 2006 and 2008 (33,34)	First Nations, Ontario, Canada,	Schools, small retail food outlets	Formative, outcome
Johnston et al, 2009 (35)	Broome County and Tioga County, New York	Schools	Outcome
Knol et al, 2010 (36)	Southeastern United States	Health facilities	Outcome
Kunkel et al, 2003 (37)	South Carolina	Farmers markets	Outcome
Laing et al, 2012 (38)	Mason County, Washington	Worksites	Process, outcome
Mead et al, 2010 and 2013 (39,40)	First Nation, Canadian Arctic	Small retail food outlets, community	Formative, outcome
Nanney et al, 2008 (41)	Utah	Schools	Process
Novotny et al, 2011 (42)	Hawaii	Small retail food outlets, community	Process
O'Brien et al, 2010 (43)	Maine	Schools	Outcome
Phillips et al, 2013 (44); Raczynski et al, 2009 (45)	Arkansas	Schools	Process, outcome
Rosecrans et al, 2008 (46); Saksvig et al, 2005 (47)	First Nation, Ontario, Canada	Small retail food outlets, community, schools	Process, outcome
Ruelle et al, 2011 (48)	Reservations, North Dakota and South Dakota	Farmers markets	Process
Schetzina et al, 2009 (49)	Northeast Tennessee	Schools	Formative
Schwarte et al, 2010 (50)	California Central Valley	Community, worksites, schools, public health	Process
Setala et al, 2011 (51)	Reservations, Arizona, Utah, New Mexico	Small retail food outlets, farmers markets	Formative
Sussman and Davis, 2010 (52)	New Mexico	Schools, small retail food outlets, community	Formative
Vastine et al, 2005 (53)	Reservations, Arizona	Small retail food outlets	Formative

Table 3. CDC Nutrition-Related Strategies[a] Applied in Policy, Environmental, and Community-Level Intervention Studies Conducted in Rural Settings and Approaches for Adapting and Implementing Strategies in Rural Settings, 2002–2013

	COCOMO Strategy Applied											Approaches to Adapting and Implementing Obesity Prevention Strategies in Rural Areas		
Citation	1	2	3	4	5	6	7	8	9	10	NS	Accommodate Distance[b]	Tailor to Culture[c]	Build Partnerships[d]
Bachar et al, 2006 (21)	x									x				
Belansky et al, 2010 (22)	x						x			x				
Brown et al, 2010 (23)	x	x		x								x		
Conrey et al, 2003 (24)					x	x								x
Curran et al, 2005 (25)	x											x		
Drummond et al, 2009 (26)	x						x							
Escoffery et al, 2011 (27)	x	x					x					x		
Flamm et al, 2011 (28)					x	x								x
Fleischhacker et al, 2012 (29)				x									x	
Gittelsohn et al, 2010 (30)	x	x										x	x	
Gombosi et al, 2007 (31)	x													
Harris et al, 2010 (32)	x						x			x				
Ho et al, 2006 and 2008 (33,34)	x	x					x			x				
Johnston et al, 2009 (35)	x					x	x							
Knol et al, 2010 (36)	x						x	x		x				
Kunkel et al, 2003 (37)					x							x		
Laing et al, 2012 (38)											x			
Mead et al, 2010 and 2013 (39,40)	x	x										x	x	
Nanney et al, 2008 (41)	x													

Abbreviation: CDC, Centers for Disease Control and Prevention; COCOMO, Recommended Community Strategies and Measurements to Prevent Obesity in the United States; NS, not specified.

[a] From CDC's *Recommended Community Strategies and Measurements to Prevent Obesity in the United States* (16).

[b] Accommodate long distances to food sources.

[c] Tailor strategies to distinct cultures and food preferences.

[d] Build strong local partnerships when implementing strategies.

(continued)

Table 3. CDC Nutrition-Related Strategies[a] Applied in Policy, Environmental, and Community-Level Intervention Studies Conducted in Rural Settings and Approaches for Adapting and Implementing Strategies in Rural Settings, 2002–2013

	COCOMO Strategy Applied											Approaches to Adapting and Implementing Obesity Prevention Strategies in Rural Areas		
Citation	1	2	3	4	5	6	7	8	9	10	NS	Accommodate Distance[b]	Tailor to Culture[c]	Build Partnerships[d]
Novotny et al, 2011 (42)	x				x	x						x		
O'Brien et al, 2010 (43)	x						x			x				
Phillips et al, 2013 (44); Raczynski et al, 2009 (45)	x						x		x	x				x
Rosecrans et al, 2008 (46); Saksvig et al, 2005 (47)	x													
Ruelle et al, 2011 (48)					x	x							x	
Schetzina et al, 2009 (49)	x						x							
Schwarte et al, 2010 (50)	x				x	x	x							
Setala et al, 2011 (51)					x	x								
Sussman and Davis et al, 2010 (52)	x	x		x										
Vastine et al, 2005 (53)	x	x										x	x	

Abbreviation: CDC, Centers for Disease Control and Prevention; COCOMO, Recommended Community Strategies and Measurements to Prevent Obesity in the United States; NS, not specified.

[a] From CDC's *Recommended Community Strategies and Measurements to Prevent Obesity in the United States* (16).

[b] Accommodate long distances to food sources.

[c] Tailor strategies to distinct cultures and food preferences.

[d] Build strong local partnerships when implementing strategies.

Table 4. Description of Articles Reporting Policy and Environmental, Psychosocial, Behavioral, or Biological Outcomes After Implementing Nutrition-Related Policy and Environmental Strategies For Obesity Prevention in Rural Communities, 2002–2012

Citation	Design	Sample Size, Settings if Reported	Policy and Environment Change	Psychosocial Change	Behavioral Change	Biological Change
Bachar et al, 2006 (21)	Pretest–posttest, no comparison	1 school, up to 600 students	Increased availability of fruits and vegetables in school cafeterias	Improved knowledge about how to make healthier food choices among school children	—	—
Belansky et al, 2010 (22)	Pretest–posttest, no comparison	45 schools	Increased number of schools with nutrition-related policies	—	—	—
Conrey et al, 2003 (24)	Time series, no comparison	All New York State FMNP participants	—	—	Increased redemption of FMNP coupons used to purchase produce at farmers markets	—
Drummond et al, 2009 (26)	Pretest–posttest, no comparison	17 child care centers	Increased number of child care centers with nutrition-related policies and environmental changes	—	—	—
Gombosi et al, 2007 (31)	Pretest–posttest, nonrandomized comparison	9 restaurants, approximately 4,200 students in 3 school districts and 2 private schools	9 restaurants initiated menu labeling	—	—	BMI increased less among children in intervention versus comparison community
Ho et al, 2008 (34)	Pretest–posttest, no comparison	4 communities, 95 community members		Higher food acquisition and intention scores but not for food preparation, self-efficacy, or outcome expectancies	—	Weight status not changed
Johnston et al, 2009 (35)	Pretest–posttest, no comparison	15 school districts, up to 40,000 students	Schools more consistently complied with existing policy limiting calories from fat and saturated fat in school meals	More parents perceived school lunches as nutritious at posttest compared with pretest	Increased purchases of fresh fruits and vegetables; 3% increase in participation of school meal programs	—
Knol et al, 2010 (36)	Pretest–posttest, no comparison	5 transitional group homes for clients with mental illness; 65	Group homes implemented policies about food options	—	—	Weight loss among most overweight and obese residents

Abbreviation: —, not measured; BMI, body mass index; FMNP, Farmers Market Nutrition Program; SFMNP, Senior Farmers Market Nutrition Program.

(continued)

Table 4. Description of Articles Reporting Policy and Environmental, Psychosocial, Behavioral, or Biological Outcomes After Implementing Nutrition-Related Policy and Environmental Strategies For Obesity Prevention in Rural Communities, 2002–2012

Citation	Design	Sample Size, Settings if Reported	Policy and Environment Change	Psychosocial Change	Behavioral Change	Biological Change
		clients	available in vending machine and cafeterias			
Kunkel, 2003 (37)	Postsurvey	Unspecified number of farmers markets, 658 seniors participating in SFMNP in South Carolina	Farmers markets increased use of SFMNP	Increased intentions to eat fruits and vegetables year round, food preparation knowledge, and purchases of produce they had never tried before	—	—
Laing et al, 2012 (38)	Pretest–posttest, no comparison	23 worksites	Increase in number of worksites with a health-related policy	—	—	—
Mead et al, 2013 (40)	Pretest–posttest, non-randomized comparison	4 communities, 133 to 246 community members	—	Increased knowledge, self-efficacy, and intentions related to healthy foods among intervention participants compared with control group; decrease in healthy and unhealthy food acquisition scores	—	No change in BMI
O'Brien et al, 2010 (43)	Cross sectional	123 intervention schools, 205 control schools; 80,428 students	Increased number of schools with nutrition-related policies; increased odds of having healthy foods available at school events	—	Reduced odds of students drinking more than 2 sodas per week	—
Phillips et al, 2013 (44)	Pretest–posttest, no comparison	All public schools in the state; number ranged from 113 to 496 per school	Increased availability of healthy versus unhealthy foods and beverages available in schools	—	Reduced purchasing of beverages from vending machines among adolescents with access to vending machines; no change in reported soda	—

Abbreviation: —, not measured; BMI, body mass index; FMNP, Farmers Market Nutrition Program; SFMNP, Senior Farmers Market Nutrition Program.

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Table 4. Description of Articles Reporting Policy and Environmental, Psychosocial, Behavioral, or Biological Outcomes After Implementing Nutrition-Related Policy and Environmental Strategies For Obesity Prevention in Rural Communities, 2002–2012

Citation	Design	Sample Size, Settings if Reported	Policy and Environment Change	Psychosocial Change	Behavioral Change	Biological Change
					reported soda consumption	
Raczynski et al, 2009 (45)	Pretest–posttest, no comparison	Statewide policy	Increased number of schools with nutrition-related policies and increased availability of healthy versus unhealthy foods and beverages	—	—	Percentage of overweight and obese children remained stable after the policy went into place
Saksvig et al, 2005 (47)	Pretest–posttest, no comparison	1 school, 122 students	School initiated a policy banning high-fat and high-sugar snack foods; initiated a school breakfast program	Improved dietary knowledge, intention, self-efficacy	Decreased percentage of energy from fat among boys, not girls; Increased fiber intake, especially among those participating in school breakfast program	BMI and percent body fat increased

Abbreviation: —, not measured; BMI, body mass index; FMNP, Farmers Market Nutrition Program; SFMNP, Senior Farmers Market Nutrition Program.

PREVENTING CHRONIC DISEASE
PUBLIC HEALTH RESEARCH, PRACTICE, AND POLICY
Volume 12, E58 APRIL 2015

SPECIAL TOPIC

Developing Local Board of Health Guidelines to Promote Healthy Food Access — King County, Washington, 2010–2012

Emilee Quinn, MPH; Donna B. Johnson, PhD, RD; James Krieger, MD, PhD; Erin MacDougall, PhD; Elizabeth Payne, MPH, RD; Nadine L. Chan, PhD, MPH

Suggested citation for this article: Quinn E, Johnson DB, Krieger J, MacDougall E, Payne E, Chan NL. Developing Local Board of Health Guidelines to Promote Healthy Food Access — King County, Washington, 2010–2012. Prev Chronic Dis 2015; 12:140544. DOI: http://dx.doi.org/10.5888/pcd12.140544.

PEER REVIEWED

Abstract

Policies that change environments are important tools for preventing chronic diseases, including obesity. Boards of health often have authority to adopt such policies, but few do so. This study assesses 1) how one local board of health developed a policy approach for healthy food access through vending machine guidelines (rather than regulations) and 2) the impact of the approach. Using a case study design guided by "three streams" policy theory and RE-AIM, we analyzed data from a focus group, interviews, and policy documents. The guidelines effectively supported institutional policy development in several settings. Recognition of the problem of chronic disease and the policy solution of vending machine guidelines created an opening for the board to influence nutrition environments. Institutions identified a need for support in adopting vending machine policies. Communities could benefit from the study board's approach to using nonregulatory evidence-based guidelines as a policy tool.

Background

Experts increasingly call for policies to prevent chronic diseases, including obesity. Such policies aim to improve access to healthy food and physical activity opportunities, making it easier for the population to adopt healthier behaviors (1,2). Local boards of health (LBOH) often have authority to adopt policies that could influence institutions such as government offices and worksites, housing, and recreational facilities (3,4).

Most local health departments engage in policy-making activities (eg, preparing issue briefs, providing public testimony) (5). Nearly half report policy making specific to obesity or chronic disease (5). However, fewer LBOHs engage in policy making than are authorized to do so (6). The form and policy-making authority of the approximately 3,200 LBOHs in the United States vary. More LBOHs are allowed to adopt regulations than to impose taxes, for example (5).

Public health practitioners could benefit from studies that deepen understanding of the feasibility, adoption, and implementation of policy approaches (7–10). Well respected theoretical frameworks (11,12) can inform such studies. This article examines the case of an innovative LBOH policy tool in King County, Washington, in the form of nonregulatory nutritional guidelines for food and beverages sold in vending machines, and we provide insight into the tool's development and initial use.

Methods

Using a qualitative case study design, this study assesses how one LBOH developed a policy approach to address healthy food access in its community and the extent of the approach's initial use. The evaluation was designed through collaboration between public health practitioners and researchers affiliated with Washington's Nutrition and Obesity Policy Research and Evaluation Network (NOPREN), a project funded by the Centers for Disease Control and Prevention to support transdisciplinary policy research and evaluation across a continuum of policy identification, development, evaluation, and dissemination (http://www.hsph.harvard.edu/nopren). Data were collected through focus group, interview, and document review methods.

We used Kingdon's "three streams" theory (11) to describe the adoption of the King County Healthy Vending Guidelines (*Guidelines*) by the King County Board of Health (KCBOH). Kingdon's constructs of "problem," "policy," and "political" streams are applied to consider whether and how local factors created a "policy window" for passage. We used the RE-AIM framework for policy impact (12) to guide an analysis of the use of the *Guidelines* by local jurisdictions (eg, cities) and organizations in the year following the adoption (Table 1).

Data included transcripts from a 1.5-hour focus group (October 2011) with all 4 local health department staff who participated most in guideline development, interviews with 4 LBOH members (February–August 2012; 3 local elected officials, 1 health expert), and interviews with representatives of 5 local jurisdictions and organizations that used the *Guidelines* (April–May 2012; 2 municipal staff members, 2 department directors, and 1 contract staff member). Nine women and 4 men participated. Interviews took 30 to 60 minutes. All but 2 were audio recorded; the interviewer took notes for each. Participants provided consent per protocol approved by University of Washington's Human Subjects Division. We also reviewed meeting minutes and videos, policy drafts, memos, and contract language related to the LBOH's adoption of the *Guidelines* and local jurisdictions' vending machine policy development.

We developed code definitions based on the theoretical frameworks and research questions, and used Atlas.ti version 7.0 (ATLAS.ti GmbH) to code and analyze data. Two researchers coded the data, compared their coding, and resolved discrepancies as needed. One researcher reviewed and summarized the final coded passages. This same researcher reviewed policy documents and media reports to supplement data recordings from interviews, focus groups, and meetings. Two local health department staff reviewed the resulting narrative to vet data interpretation. Minor adjustments were made on the basis of feedback.

Results

Guidelines' development

KCBOH is charged to "set county-wide public health policy, enact and enforce local public health regulations, and carry out other duties of local boards of health specified in state law" (13). Membership comprises 8 elected officials from specified jurisdictions (eg, county, largest city, 2 suburban cities) and 3 appointed health experts. KCBOH and its corresponding local health department, Public Health Seattle-King County (PHSKC), cover a large urban county with 39 cities, including Seattle, the most populous city in the state.

Problems stream

Addressing obesity was a high priority for PHSKC and KCBOH. Public health surveillance indicated that obesity was a problem in King County. "The board of health every year tries to look at how we're doing in King County," said one KCBOH member. "It became very clear that we had a rising problem of obesity." Broad-based community-wide prevention initiatives, such as the Obesity Prevention Initiative (14) and Communities Putting Prevention to Work (CPPW), increased attention to these issues. For example, the Seattle-King County CPPW project was a $25.5 million federally funded initiative focused on preventing obesity and tobacco use through policy, systems, and environmental change from 2010 through 2012 (15). PHSKC and KCBOH were impressed with evidence that frequent eating outside the home contributed to obesity and therefore wanted to improve the quality of food in away-from-home settings. At the time, there was limited practical guidance for aligning these food environments with the *2010 Dietary Guidelines for Americans* (DGA) (16).

Policy stream

In 2010, KCBOH convened a Healthy Eating and Active Living (HEAL) subcommittee to examine potential actions to promote HEAL and prevent obesity. The subcommittee comprised 3 KCBOH members who were elected officials, 1 KCBOH member who was a health expert, and PHSKC staff members. The subcommittee created a list of approximately 25 best-practice policy strategies and selected several to implement, including guidelines for healthy vending. Strategies were chosen because they could reach many people, used approaches grounded in public health science, avoided redundancy, demonstrated leadership, and allowed flexibility for jurisdictions and businesses.

Before 2011, KCBOH had 2 policy categories: 1) Rules and Regulations, which "have the force of law, are general and permanent in nature, and are codified" and 2) Resolutions, which are statements "in support of a current action or project" that are neither permanent nor have the force of law (17). In early 2011, at the suggestion of the PHSKC director, KCBOH adopted a third policy category: Guidelines and Recommendations. The new category was "designed to provide policy guidance where the Board does not have regulatory authority and to increase the reach of public health policy making to sectors that have not considered the public health impact of their policies in their sectors" (17). Members saw the category as allowing for greater specificity and impact than resolutions, without the legal and political complexity of a rule or regulation. A KCBOH member said, "We could take more frequent action without having the legal consequences which

sometimes seem to stymie government." KCBOH used the category to create guidelines for healthy community planning and then for healthy vending.

It took approximately 6 months to develop the guidelines. PHSKC staff reviewed vending and nutrition guidelines and spoke with nutrition policy experts from across the United States, vending machine company representatives, and entities experienced with healthy vending. The resulting *Guidelines* categorized foods as "limited" (ie, most processed; highest levels of sodium, sugar, fat, and salt), "healthier," and "healthiest" (ie, least processed, nutrient-rich, no added sugar or salt) based on the DGA and recommended increasing the proportion of "healthier" and "healthiest" items in vending machines (18) (Figure). They also provided guidance on using the *Guidelines* for policy development. The subcommittee identified "early adopter" organizations to pilot the *Guidelines* and demonstrate support for the approach.

Foods and Beverages	Healthiest *Foods are nutrient-rich and primarily whole foods that contain low to no added sugar and sodium.*	Healthier *Foods are more processed or refined with more added sugar, sodium, or fat. They contain fewer nutrients for the amount of calories they provide.*	Limited *Foods are high in sodium, sugar, fat, and refined grains and are less healthy.*
Vegetables	• Fresh or dehydrated vegetables (eg, baby carrots, celery, broccoli) • Cup of soup with a quarter cup of vegetables	• Fresh or dehydrated vegetables with added salt, sugar, or fat • Baked potato chips	• Fried vegetables • Regular chips
Nuts and seeds	• Unsalted nuts or seeds • Trail mix or fruit nut bars with only unsalted nuts and unsweetened dried fruit	• Salted nuts and seeds (low-sodium) • Trail mix or fruit nut bars with salted nuts and added sugar	• Salted nuts and seeds • Trail mix that includes candy
	Shelf Life. A refrigerated vending machine may be necessary.		

Other food and beverage categories are fruits; grains; dairy, meat, beans, and eggs; and beverages.

Nutrient Levels for Healthiest and Healthier Categories:	
	FOOD
Calories	**Healthiest and Healthier** Adults: No more than 250 calories per serving Children and youth: No more than 200 calories per serving
Fat	**Healthiest** No added fat for vegetables, fruits, nuts and seeds, dairy, meat, beans and eggs; for grains and soup, follow the recommendations below for Healthier. **Healthier** • No more than 35% of calories from total fat, excluding nuts, seeds, and nut butters, as these can be high in fat but are considered a source of healthy fat. Make sure these foods fall within acceptable calorie, sugar, and sodium levels. • No more than 10% of calories from saturated fat • Zero *trans* fat

Other Nutrient categories are Sugar, Sodium, For children and youth (Beverages)

Figure. -Food and beverages in the categories of "limited," "healthier," and "healthiest" and nutrient levels for each category.

PHSKC staff members described the rationale for and an overview of the *Guidelines* and displayed sample items from each food category at the April 2011 KCBOH meeting. Seven stakeholders testified during the public hearing portion of the meeting. KCBOH then voted unanimously to adopt the *Guidelines* with the intention that local jurisdictions and organizations across the county use them to improve their vending machine policies and environments.

Political stream

King County is a solidly Democratic county. Residents are favorably disposed to an activist role for government in promoting health (19). An increasing number of local efforts focus on improving access to healthy food.

KCBOH also has a history of using policy to address public health issues, including *trans* fat in restaurant food, menu labeling, healthy community planning, and tobacco use. Several KCBOH members have been active in local food system and policy development. KCBOH members generally expressed strong support for the *Guidelines*, citing a need for more healthy selections, a responsibility to make evidence-based recommendations, and an appreciation for approaches that encouraged healthy behaviors rather than banning unhealthy options. One KCBOH member said, "It's about choices . . . . It's all things in moderation and in healthy amounts, but we're not out to ban Snickers bars."

During testimony, stakeholders expressed a range of opinions about the *Guidelines* proposal (Table 2). Proponents (2 "early adopter" organizations and an obesity prevention advocacy group) described a need to increase the number of healthy vending machine options and an appreciation for the *Guidelines* as a resource to guide policy development. Vending machine companies ranged from cautiously supportive to opposed to the proposal; vendors expressed concern about their bottom lines, objected to price differentials between healthy and unhealthy foods, and anticipated a lack of demand for and availability of healthy products. One indicated that the company could "see the writing on the wall" and had started to "gear up" for the shift to healthier vending machine items. Washington's Department of Services for the Blind (DSB) expressed concerns about anticipated profit decline. (DSB has the right of first refusal to contract for vending machines in government buildings, according to state and federal law; it uses vending machine profits to support its programs.) A KCBOH member reported that beverage industry representatives met with his staff to express similar objections.

The *Guidelines'* recommendation to move toward 100% healthy items in machines was the most contentious point. Both proponents and opponents cited evidence of sales declines after introducing more than 30% healthy items, but proponents emphasized that sales recovered. One KCBOH member suggested removing the targeted percentages of healthy foods, but others emphasized that the *Guidelines* were not legally binding and were based on the best science. One member said, "Our role as a board of health is really to tell citizens, 'What do the facts say?' We chose guidelines so we could work with people and make it happen. . . . I think we need to challenge ourselves and the industry." KCBOH did not remove the targets.

One PHSKC staff member later summed up the advantages and disadvantages of the nonregulatory guidelines approach by saying, "It doesn't have the force of law. We are able to do an enormous amount in terms of who the target audience is and where we set the bar for the best practice, but it also means that carrying this through to implementation . . . is going to be different for each organization and in some cases, it is going to be incredibly time-intensive."

Policy window

Kingdon theorizes that a policy window "opens because of a change in the political stream . . . [or] because a new problem captures the attention of governmental officials and those close to them" (11, p. 168). KCBOH's new Guidelines and Recommendations policy category provided an opening as obesity prevention and healthy food access were gaining attention and support. The *Guidelines* provided a feasible alternative to regulations that addressed the problem of unhealthy food away from home. PHSKC staff described this concept as a "window of opportunity which we anticipate will eventually close because [KCBOH's] attention will change to something else."

Guidelines' initial impact

Reach

Interviewees described measuring the reach of the *Guidelines* as a challenge, particularly for local jurisdictions and organizations with decentralized vending but noted that the potential reach was high. The networks to which KCBOH and PHSKC belonged (eg, jurisdictions represented by elected official KCBOH members, PHSKC partners) were seen as assets. Two PHSKC partners and 2 jurisdictions represented by KCBOH members used the *Guidelines* in the first year. Another KCBOH member said, however, "As [an elected official], I guarantee you, I would not go in and tell [my constituents] what vending machines they could have. I need to have an advocate from within."

Adoption of vending machine policies by the first 4 local jurisdictions and organizations using the *Guidelines* affected approximately 345 vending machines. The total number of people reached is unknown; however, in one housing organization, approximately 460 employees and residents of 3,200 units had access to its 83 machines (20).

Effectiveness

Effectiveness is hard to measure because of a lack of accessible vending machine sales data. Interviewees indicated effectiveness of the *Guidelines* could be enhanced by outreach and technical assistance to promote and support use of the *Guidelines* as well as complementary behavioral change interventions.

Adoption

The *Guidelines* were incorporated into policy in several ways during the first year, including revised vending machine contracting requirements for 2 local jurisdictions and organizations and a county council motion for executive adoption of nutritional standards for vending machines (Table 3). Other local jurisdictions and organizations spent the first year considering policy options, including centralizing vending processes to make use of the *Guidelines* easier. Adopting organizations demonstrated strong fidelity to the nutritional guidelines and food categories, though several only required 50% healthy vending.

Local jurisdictions and organizations pursued vending machine policy change adoption because it seemed feasible (eg, "an area over which they could have some influence," "an easy win") but also reported that adoption was more complicated than anticipated. Challenges included the time and resources required, pushback from employees, and the perception that healthy vending restricts choice. The beverage industry and vending machine companies lobbied larger jurisdictions to discourage them from adopting 100% healthy items in vending machines or price differentials, requesting subsidies (unsuccessfully) to offset the expected sales reduction and losses due to expired products, and negotiating higher percentages of revenue that the companies would receive from the machines. PHSKC staff supported use of the *Guidelines* through presentations, development of a tool kit, consulting on contracting language, and identifying sources of products that met guidelines (21).

After approximately 2 years, 2 additional local jurisdictions and organizations adopted policies, including a city ordinance, requiring 50% healthy vending in all machines. A baseline evaluation of the ordinance reported that less than 10% of the city's machines met the *Guidelines* initially (Perez J. Process evaluation report: City of Seattle implementation of King County Healthy Vending Guidelines [unpublished student report]. Seattle, Washington: Public Health Seattle King County; 2013). A local children's hospital, community center, and low-income housing nonprofit also began changing their vending machine policies based on the *Guidelines* (20,22).

Discussion

This case illustrates an innovative LBOH policy approach to promote healthy food access when neither legislation nor regulation is feasible or desirable. The *Guidelines'* format, along with recognized health concerns and an amenable political landscape, created a policy window for KCBOH to extend its influence in promoting evidence-based practice and affect the nutritional quality of vending machine products. The *Guidelines* catalyzed and sup-

ported several local jurisdictions and organizations in developing or strengthening vending machine policies with fidelity to the *Guidelines*, and thus to national dietary recommendations. Although there are no data to measure longer-term outcomes in this case, improvements to the nutritional quality of vending machine products have altered consumer behavior in the past (23).

Although most LBOH policy making takes the form of regulation, regulations have limitations, including politicization and conflicts with or preemption by other laws (3). By using the *Guidelines*, KCBOH and PHSKC probably avoided some "nanny-state" concerns associated with other policy approaches (24). However, even the *Guidelines* produced some pushback from stakeholders.

This qualitative study allowed for in-depth examination of the case, but the findings pertain to organizations with unique contexts and cannot necessarily be generalized to others. In recollecting events and reactions, or describing politically sensitive situations, some interviewees may have omitted important details. No sales or implementation cost data were collected. Also, vending machine company representatives declined to participate.

As this study focused on the development and preliminary uptake of the *Guidelines*, future research could examine implementation of vending machine policies based on such guidelines as well as longer-term use of or changes made to nonregulatory tools based on evolving perceptions of the problem, tool, or political realities. Furthermore, studies could assess vending machine sales in particular jurisdictions over time and consider the health implications and facilitators and barriers to those changes.

Experts have called for policy approaches to prevent obesity and chronic disease by improving access to healthy food and addressing other determinants. LBOHs and communities could benefit from KCBOH's experience in using nonregulatory evidence-based guidelines as one policy tool toward this end.

Acknowledgments

This project is supported through NOPREN by cooperative agreement no. 5U48-DP001911 from the Centers for Disease Control and Prevention. The findings and conclusions are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

Author Information

Corresponding Author: Emilee Quinn, MPH, School of Public Health, Box 353410, University of Washington, Seattle, WA 98195. Telephone: 206-616-7362. Email: equinn1@uw.edu.

Author Affiliations: Donna B. Johnson, Elizabeth Payne, University of Washington, Seattle, Washington; James Krieger, University of Washington, Seattle, Washington, and Action for Healthy Food, Seattle, Washington; Erin MacDougall, Bastyr University, Kenmore, Washington; Nadine L. Chan, Public Health – Seattle and King County, Seattle, Washington. During this study, James Krieger and Erin MacDougall were affiliated with Public Health – Seattle and King County, Seattle, Washington.

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Tables

Table 1. Theoretical Models and Constructs Used for the Study of King County Board of Health Healthy Vending Guidelines

Theory or Framework	Construct	Description
Policy development: "three streams" theory (11)	Problems stream	"Problems are brought to the attention of people in and around government by systematic indicators, by focusing events like crises and disasters, or by feedback from the operation of current programs" (p. 19).
		"How do conditions come to be defined as problems? Values, comparisons, and categories contribute to the translation" (p. 110).
	Policy stream	"The proposals that survive to the status of serious consideration meet several criteria, including their technical feasibility, their fit with dominant values and the current national mood, their budgetary workability, and the political support or opposition they might experience" (pp. 10–20).
	Political stream	"Flowing along independently of the problems and policy streams is the political stream, composed of such things as public mood, pressure group campaigns, election results, partisan or ideological districts in Congress, and changes of administration" (p. 145).
		The "mood-elections" combination . . . can force some subjects high on the agenda, and can also make it virtually impossible for government to pay serious attention to others. But once the item is on the agenda, the organized forces enter the picture, trying as best they can to bend the outcomes to their advantage " (p.164).
	Policy window	"The separate streams of problems, policies, and politics come together at certain critical times. Solutions become joined to problems, and both of them are joined to favorable political forces" (p. 194).
Policy impact: adapted "RE-AIM" Framework (12)	Reach	"[T]he absolute number, percentage, and representativeness of those affected by the policy, or those whose health is to be improved as a result of the policy" (p. 108).
	Effectiveness	"[T]he change in proximal, or temporally appropriate, outcomes and any adverse impacts" (p. 108).
	Adoption	"[T]he absolute number, percentage, and representativeness of organizations, institutions, or governing bodies that pass or decide to implement a policy [and allocate] resources for enforcement, if applicable" (p. 108).
	Implementation[a]	"[A]pplying the policy as planned, adequately enforcing it, and ensuring ongoing and consistent compliance with the core components of the policy" (p. 109).
	Maintenance[a]	"[C]ompliance with the policy and resulting individual behavior changes and health outcomes that occur over time" and "continued enforcement of and compliance with the policy over time" (p. 109).

[a] Implementation and Maintenance are not addressed in this study, given the focus on preliminary impact within the first year of *Guidelines'* use.

Table 2. Arguments for and Against the Proposed Guidelines by Stakeholder Groups During April 2011 King County Board of Health Meeting

Arguments Made	Stakeholders					Sample Quotes
	KCBOH	VC	LJOs	HA	DSB	
In support, or acknowledged						
Rationale and context						
Health concerns (eg, obesity rates)	x	x		x		"We are seeing a shift in norms. We're seeing a demand for a greater diversity of products in our food." HA
Need/demand for healthy options	x	x	x	x		
Prevalence of out-of-home eating	x					
Government should model healthy environments	x			x		
Potential outcomes						
Increased healthy choices available	x		x	x		"When you provide a greater diversity of products, you see a shift in demand, ultimately a shift in supply." HA
Increased demand for, supply of healthy products	x			x		
Policy approach and implementation						
Voluntary, not mandated	x					"These proposed Guidelines will serve as a timely and valuable tool for our agency to identify healthy vending options and to ultimately implement healthy vending practices and policies successfully." LJO
Innovative (eg, emphasizes whole foods over nutrients alone)	x					
Evidence-based	x					
Allows for institutional flexibility	x					
Supports LJOs that want healthier vending, provides goals	x		x			
Possible to implement with limited revenue loss, few complaints		x[a]	x	x	x[a]	
In opposition, or concerns expressed						
Feasibility						
Insufficient availability of healthy items, refrigerated machines		x[a]			x[a]	"It has to be an educational process and not just putting healthy things in the machine." VC
References specific products, but markets will change		x				
Potential outcomes						
Loss of revenue, negatively impacting blind services and vending viability		x			x	"There are well documented cases of how our sales drop when we go beyond a certain point of . . . healthy choices." DSB
Policy approach						
Feels extreme, like a mandate		x			x	"There are very few machines in King County that are refrigerated, so you can't put apples or carrots or fresh-made sandwiches in them." VC
Different demographics warrant different approaches		x				
Will restrict "class of trade" (vending, but not stores)		x				
Education processes are key to process		x			x	

Abbreviations: DSB, Washington State Department of Services for the Blind; HA, health advocates; LJOs, local jurisdictions and organizations; KCBOH, King County Board of Health, VC, vending companies.

[a] Some stakeholders discussed thresholds whereby vending machines that had 30% to 50% healthier options would be likely to result in revenue loss, whereas vending machines with a lower percentage of healthy items might result in limited revenue loss.

Table 3. Healthy Vending Machine Policy Form, Fidelity, and Development Highlights of Jurisdictions and Organizations That Used the King County Health Vending Guidelines, 2011–2012

Jurisdictions and Organizations	Form of Policy	Fidelity to Guidelines	Policy Development Highlights
City parks and recreation department, early adopter	Revised vending contracts to be used agency-wide	100% healthy and healthiest items with minor adaptations to *Guidelines* (eg, allows diet soda)	Prior experience with healthy vending
			Mission aligned with healthy eating, active living; very supportive leadership
			Placed strong emphasis on education and organizational culture shift
Nonprofit public housing agency, early adopter	Issued a RFP for a vending contractor to provide healthy vending throughout the organization, resulting in a contract with a new company	A minimum of 50% healthy items for all of residential and administrative vending machines[a]	Supportive leadership
			Recipient of a grant with goals pertaining to healthy eating and active living
			Residents requested healthy vending
			Convened a vending committee; conducted taste tests and price surveys; developed education materials
			Prior small vending company did not have inventory that met criteria
			Planned to increase prices in advance to limit the association of cost increases with healthier selection
			No capacity to monitor or assess contract compliance
City, effort led by KCBOH member	In 2013, passed an ordinance requiring healthy items in vending machines on city property, complementary education and labeling, and an evaluation after the first year[a]	Ordinance required 50% of items in machines to meet healthier and healthiest criteria; *Guidelines* were included as an attachment to the policy[a]	Lack of centralized contracting mechanism, and many contracts
			A staff workgroup assessed current vending and considered approaches, spoke with vending companies and beverage industry representatives
			Report submitted to City Council after first year of implementation will make recommendations for next steps
County, effort led by KCBOH member	County Council adopted a 2011 motion calling on the County Executive to adopt nutritional standards for vending machines (no standards developed by time of interview)	Motion requested standards of 50% healthiest and 25% healthier items in machines, and implement pricing and marketing strategies	Began offering 20% to 30% healthy items in some machines in 2005; sales declined initially, then improved with educational and pricing strategies; half of healthy items under the prior criteria were found to fit in the *Guidelines'* limited category.
			County Executive options under consideration at time of interview: 1) fill DSB machines with items that meet *Guidelines*; 2) replace DSB machines with healthy "kiosks"; 3) request a waiver to manage DSB machines; 4) remove machines.
			Three years later, option 2 has been rejected; contract with prior vendor continues, and additional healthy items

Abbreviations: DSB, Department of Services for the Blind; Guidelines, King County Healthy Vending Guidelines; KCBOH, King County Board of Health; RFP, request for proposal.

[a] Details describe decisions made more than 1 year after *Guidelines* were adopted by KCBOH.

(continued)

Table 3. Healthy Vending Machine Policy Form, Fidelity, and Development Highlights of Jurisdictions and Organizations That Used the King County Health Vending Guidelines, 2011–2012

Jurisdictions and Organizations	Form of Policy	Fidelity to Guidelines	Policy Development Highlights
			have been added to the machines.[a]
City (out of state), learned of *Guidelines* from KCBOH member	Citywide 50% healthy vending per *Guidelines* with accompanying education	Adopted exact language of *Guidelines* as guidance for city departments; fidelity by departments to *Guidelines* not determined at time of interview	Staff had prior healthy vending experience
			Lukewarm support for *Guidelines* from political leadership
			Conducted a vending assessment
			Stakeholder pushback led to the city's issuing an administrative order without accompanying education, charging city departments to implement their own contracts

Abbreviations: DSB, Department of Services for the Blind; Guidelines, King County Healthy Vending Guidelines; KCBOH, King County Board of Health; RFP, request for proposal.

[a] Details describe decisions made more than 1 year after *Guidelines* were adopted by KCBOH.

PREVENTING CHRONIC DISEASE
PUBLIC HEALTH RESEARCH, PRACTICE, AND POLICY
Volume 12, E87 JUNE 2015

BRIEF

Spending at Mobile Fruit and Vegetable Carts and Using SNAP Benefits to Pay, Bronx, New York, 2013 and 2014

Andrew Breck, MPA; Kamila M. Kiszko, MPH; Courtney Abrams, MA; Brian Elbel, PhD, MPH

Suggested citation for this article: Breck A, Kiszko KM, Abrams C, Elbel B. Spending at Mobile Fruit and Vegetable Carts and Using SNAP Benefits to Pay, Bronx, New York, 2013 and 2014. Prev Chronic Dis 2015;12:140542. DOI: http://dx.doi.org/10.5888/pcd12.140542.

PEER REVIEWED

Abstract

This study examines purchases at fruit and vegetable carts and evaluates the potential benefits of expanding the availability of electronic benefit transfer machines at Green Carts. Customers at 4 Green Carts in the Bronx, New York, were surveyed in 3 waves from June 2013 through July 2014. Customers who used Supplemental Nutrition Assistance Program benefits spent on average $3.86 more than customers who paid with cash. This finding suggests that there may be benefits to increasing the availability of electronic benefit transfer machines at Green Carts.

Objective

In 2008, New York City implemented a policy that established 1,000 permits for mobile fruit and vegetable vendors to locate in neighborhoods with the scarcest levels of healthful food (1). The goal of this initiative, Green Carts, was to introduce a low-cost mechanism to increase the consumption of fresh produce (2,3).

However, the lack of fresh produce may be only part of the obstacle to a healthy diet. Green Cart permits restrict vending locations to low-income neighborhoods, where many residents purchase food with Supplemental Nutrition Assistance Program (SNAP) benefits. Financial support from New York State Department of Health beginning in 2010 covered the $900 cost of an electronic benefit transfer (EBT) machine necessary to accept SNAP benefits and the first 3 months of fees ($35/month plus 3.5 cents/transaction) for eligible vendors. Even after the implementation of this program, less than a third of vendors were equipped with EBT machines (4–6).

To evaluate the possible benefits of expanding the introduction of EBT machines at produce carts, we examined whether consumers spend more on fruits and vegetables per transaction at Green Carts when they pay with SNAP benefits than when they pay with cash.

Methods

Customers at 4 Green Carts in the Bronx, New York, were surveyed in 3 waves: June–July 2013, September–October 2013, and June–July 2014. The New York City Department of Health and Mental Hygiene identified 4 vendors as responsive and amenable to participating in the study. Two carts were equipped with EBT machines, and 2 more carts were expected to receive them shortly after our first data collection period. Green Cart customers who appeared to be adults (aged ≥18 y) were invited to voluntarily participate in a brief survey about their shopping behaviors and a "bag check" to determine what items the participant purchased. Surveys were conducted in either Spanish or English on 29 weekdays between 1:30 PM and 5:30 PM. During each round of data collection, we collected approximately 100 surveys at participating carts. Our overall response rate was 70%. Respondents received a transit pass valued at $2.50 upon completion of the survey and bag check. This study was approved by New York University School of Medicine's institutional review board.

Mean dollars spent per transaction and frequencies of demographic variables were calculated for each of 2 segments of the survey sample: 1) for the entire sample of respondents and 2) for only the consumers surveyed at Green Carts equipped with an EBT machine. Controlling for customer characteristics that we hypothesized are associated with fresh produce purchases, including race/ethnicity, age, sex, education, and annual household income, we used linear regression models to calculate separately the associ-

ation between payment method and the amount spent on Green Cart purchases for each analytic sample. Analyses were conducted using Stata version 12 (StataCorp LP).

Results

The full sample included 782 transactions at 4 Green Carts (Table 1). Most respondents were women (74.2%), were Hispanic (53.7%), had no more than a high school degree (63.7%), and lived in a household with an annual income of less than $25,000 (53.6%). Respondents were approximately equally likely to report that they usually purchased fruits and vegetables at a grocery store (41.7%) as they were to report buying these items from a produce cart (44.9%). On average, consumers spent $4.19 per transaction at the Green Cart. Most paid for their purchase using only cash (87.3%); 41.9% reported receiving SNAP benefits.

At EBT-equipped carts, 19.2% of respondents reported using SNAP benefits (or SNAP and cash) to pay for their purchase. Customers who reported using SNAP benefits at a Green Cart spent more money on fruits and vegetables: $8.20, on average per transaction, compared with cash-only customers who spent $3.68, on average per transaction at EBT-equipped Carts. Customers using SNAP benefits at Green Carts were more likely to report that they usually purchase fruits and vegetables from produce carts (64.7%) than from any other source, including grocery stores (27.3%). Most survey respondents who reported using SNAP at Green Carts were Hispanic (74.8%), women (89.9%), not employed (63.6%), or living in households with less than $25,000 in annual income (76.8%).

Linear regression showed a significant, large, and positive association between the use of SNAP benefits compared with cash at Green Carts and the total amount spent per transaction (Table 2). The results were robust across regressions on the entire sample ($3.86, $P < .001$) and on the sample restricted to consumers at Green Carts equipped with an EBT machine ($3.81, $P < .001$).

Discussion

Customers who used SNAP benefits at EBT-equipped Green Carts in the Bronx, New York, spent on average $3.81 more than customers who paid with cash. This study has several limitations. Sales and profit data were not available. The 4 Green Carts were located in only 1 borough of New York City and surveys were collected only during select times of day, so we do not know the extent to which the people we surveyed represent all Green Cart customers. Furthermore, we lacked information on fresh produce purchases made from other retailers, and thus we do not know whether SNAP users were purchasing more fruits and vegetables in total.

There are likely multiple barriers for households to access fresh food. Because the residents of areas with low availability of fresh produce are predominantly low income, the introduction of Green Carts to the neighborhood may be a first step toward increasing fruit and vegetable consumption. It is then possible that the availability to pay with SNAP benefits might result in increased expenditures at Green Carts, helping to overcome a barrier to a healthy diet. We do not claim that our findings are necessarily causal, nor do we assess the effect of this increased spending on nutritional quality. The results from our analysis suggest there may be benefits to introducing EBT machines to produce carts, suggesting the policy could be sustainably scalable to other urban areas, although more research is necessary to identify causal effects that justify making recommendations for policy makers.

Acknowledgments

This study was funded by the Centers for Disease Control and Prevention (supplement to 1U48DP001904-01). The authors thank the Green Cart team at the New York City Department of Health and Mental Hygiene for their assistance in initiating our relationship with the participating Green Cart vendors.

Author Information

Corresponding Author: Brian Elbel, PhD, MPH, New York University School of Medicine, 550 First Ave, VZ30 626, New York NY 10016. Telephone: 212-263-4283. Email: brian.elbel@nyumc.org.

Author Affiliations: Andrew Breck, New York University Robert F. Wagner Graduate School of Public Service and New York University School of Medicine, New York, New York; Kamila M. Kiszko, Courtney Abrams, New York University School of Medicine, New York, New York. Dr Elbel is also affiliated with New York University Robert F. Wagner Graduate School of Public Service.

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Tables

Table 1. Descriptive Statistics for Full Sample and Subsamples of Survey Respondents at 4 Green Carts in the Bronx, New York, 2013 and 2014[a]

Characteristic	Entire Sample (n = 782)	Consumers at Green Carts With EBT (n = 516)	*P* Value for Association Between Subsample and Rest of Sample[b]	Consumers Who Made Purchases Using SNAP Benefits (n = 99)	*P* Value for Association Between Subsample and Rest of Sample[b]
Spent at Green Cart, mean (SD), $	4.19 (3.85)	4.54 (4.12)	<.001	8.20 (5.56)	<.001
Payment method					
Cash only	683 (87.3)	417 (80.8)	<.001	0	<.001
SNAP or SNAP and cash	99 (12.7)	99 (19.2)		99 (100.0)	
Sex					
Male	202 (25.8)	110 (21.3)	<.001	10 (10.1)	<.001
Female	580 (74.2)	406 (78.7)		89 (89.9)	
Race/ethnicity					
White	44 (5.6)	22 (4.3)	<.001	7 (7.1)	<.001
Black	197 (25.2)	113 (21.9)		9 (9.1)	
Hispanic	420 (53.7)	304 (58.9)		74 (74.8)	
Other or refused	121 (15.5)	77 (14.9)		9 (9.1)	
Age, y					
18–24	26 (3.3)	19 (3.7)	.42	5 (5.1)	.006
25–39	257 (32.9)	178 (34.5)		46 (46.5)	
40–64	402 (51.4)	258 (50.0)		41 (41.4)	
≥65	97 (12.4)	61 (11.8)		7 (7.1)	
Education					
High school degree or less	498 (63.7)	359 (69.6)	<.001	77 (77.8)	.02
Some college	138 (17.7)	80 (15.5)		13 (13.1)	
BA or more	105 (13.4)	53 (10.3)		7 (7.1)	
Missing or refused	41 (5.2)	24 (4.7)		2 (2.0)	
Annual household income, $					
<25,000	419 (53.6)	300 (58.1)	<.001	76 (76.8)	<.001
25,000–49,999	175 (22.4)	100 (19.4)		8 (8.1)	
≥50,000	81 (10.4)	43 (8.3)		2 (2.0)	
Missing or refused	107 (13.7)	73 (14.2)		13 (13.1)	
Employment status					

Abbreviations: BA, Bachelor of Arts; EBT, electronic benefits transfer; NA, not applicable; SD, standard deviation; SNAP, Supplemental Nutrition Assistance Program.

[a] Values are number (percentage) unless otherwise indicated.

[b] Two-sided *t* test was used for dollars spent at Green Cart; χ^2 used for all other categories.

(continued)

Table 1. Descriptive Statistics for Full Sample and Subsamples of Survey Respondents at 4 Green Carts in the Bronx, New York, 2013 and 2014[a]

Characteristic	Entire Sample (n = 782)	Consumers at Green Carts With EBT (n = 516)	*P* Value for Association Between Subsample and Rest of Sample[b]	Consumers Who Made Purchases Using SNAP Benefits (n = 99)	*P* Value for Association Between Subsample and Rest of Sample[b]
Not employed	285 (36.5)	203 (39.3)	.02	63 (63.6)	<.001
Retired	102 (13.0)	58 (11.2)		7 (7.1)	
Working, part- or full-time	395 (50.5)	255 (49.4)		29 (29.3)	
SNAP recipient					
No	454 (58.1)	276 (53.5)	<.001	3 (3.0)	<.001
Yes	328 (41.9)	240 (46.5)		96 (97.0)	
Usual source for fruits and vegetables					
Grocery store	326 (41.7)	185 (35.9)	<.001	27 (27.3)	<.001
Produce cart	351 (44.9)	263 (51.0)		64 (64.7)	
Farmers market, produce store, or bodega	59 (7.5)	34 (6.6)		3 (3.0)	
Don't know or other	46 (5.9)	34 (6.6)		5 (5.1)	
Vendor					
A	182 (23.3)	95 (18.4)	<.001	9 (9.1)	<.001
B	180 (23.0)	180 (34.9)		52 (52.5)	
C	241 (30.8)	241 (46.7)		38 (38.4)	
D	179 (22.9)	NA		NA	
How often respondent shops at Green Cart					
<2 or 3 times/month	176 (22.5)	91 (17.6)	<.001	14 (14.1)	.01
1-6 times/week	460 (58.8)	337 (65.3)		72 (72.7)	
At least once/day	146 (18.7)	88 (17.1)		13 (13.1)	

Abbreviations: BA, Bachelor of Arts; EBT, electronic benefits transfer; NA, not applicable; SD, standard deviation; SNAP, Supplemental Nutrition Assistance Program.

[a] Values are number (percentage) unless otherwise indicated.

[b] Two-sided *t* test was used for dollars spent at Green Cart; χ^2 used for all other categories.

Table 2. Linear Regression Results of Dollars Spent at 4 Mobile Fruit and Vegetable Carts in the Bronx, New York, 2013 and 2014

Characteristic	All Survey Respondents (n = 782)		Only Respondents Shopping at Green Carts With an EBT Machine (n = 516)	
	β	*P* Value	β	*P* Value
Payment method				
Cash only	—	—	—	—
SNAP or SNAP and cash	3.861	<.001	3.812	<.001
Sex				
Male	—	—	—	—
Female	0.53	.07	0.823	.04
Race/ethnicity				
White	—	—	—	—
Black	0.588	.31	0.432	.60
Hispanic	1.191	.03	0.922	.24
Other or refused	0.848	.16	1.03	.23
Age, y				
18–24	—	—	—	—
25–39	0.767	.28	1.802	.04
40–64	0.191	.79	0.839	.33
≥65	−0.096	.91	0.541	.61
Education				
High school degree or less	—	—	—	—
Some college	−0.443	.19	−0.025	.96
BA or more	0.233	.56	−0.065	.91
Missing or refused	0.393	.50	1.174	.14
Annual household income, $				
<25,000	—	—	—	—
25,000–49,999	−0.453	.18	−0.460	.30
≥50,000	0.418	.38	−0.587	.37
Missing or refused	0.011	.98	−0.528	.26
Employment status				
Not employed	—	—	—	—
Retired	0.620	.23	−0.022	.97
Working, part- or full-time	0.317	.28	−0.245	.51
SNAP recipient				
No	—	—	—	—
Yes	−0.143	.64	−0.569	.15

Abbreviations: BA, Bachelor of Arts, EBT, electronic benefits transfer; NA, not applicable; SNAP, Supplemental Nutrition Assistance Program (SNAP).

(continued)

Table 2. Linear Regression Results of Dollars Spent at 4 Mobile Fruit and Vegetable Carts in the Bronx, New York, 2013 and 2014

Characteristic	All Survey Respondents (n = 782)		Only Respondents Shopping at Green Carts With an EBT Machine (n = 516)	
	β	*P* Value	β	*P* Value
Usual source for fruits and vegetables				
Grocery store	—	—	—	—
Produce cart	0.366	.19	0.295	.40
Farmers market, produce store, or bodega	0.342	.48	−0.330	.61
Don't know or other	−0.445	.42	−0.603	.38
Vendor				
A	—	—	—	—
B	1.987	<.001	2.087	<.001
C	−0.724	.09	−0.44	.33
D	0.560	.22	NA	NA
How often respondent shops at this green cart				
<2 or 3 times/month	—	—	—	—
1–6 times/week	0.236	.46	0.597	.17
At least once/day	−0.213	.60	0.020	.97
Vendor accepts EBT				
No	—	—	NA	NA
Yes	0.066	.90	NA	NA
Constant	1.285	.19	0.824	.52

Abbreviations: BA, Bachelor of Arts, EBT, electronic benefits transfer; NA, not applicable; SNAP, Supplemental Nutrition Assistance Program (SNAP).

PREVENTING CHRONIC DISEASE
PUBLIC HEALTH RESEARCH, PRACTICE, AND POLICY
Volume 12, E86 JUNE 2015

SPECIAL TOPIC

The Cleveland–Cuyahoga County Food Policy Coalition: "We Have Evolved"

Colleen C. Walsh, PhD; Morgan Taggart, MUPDD; Darcy A. Freedman, PhD; Erika S. Trapl, PhD; Elaine A. Borawski, PhD

Suggested citation for this article: Walsh CC, Taggart M, Freedman DA, Trapl ES, Borawski EA. The Cleveland–Cuyahoga County Food Policy Coalition: "We Have Evolved". Prev Chronic Dis 2015;12:140538. DOI: http://dx.doi.org/10.5888/pcd12.140538.

PEER REVIEWED

Abstract

Several pieces of legislation passed in Cleveland, Ohio, from 2007 to 2011, focused on improving the city's food environment through urban agriculture initiatives. We used qualitative, case study methods, including interviews with 7 key informants, to examine the policy development process and investigate the role of the Cleveland–Cuyahoga County Food Policy Coalition in developing and implementing 4 pieces of legislation. In this article, we focus on 2 pieces of legislation: zoning designation of an urban garden and allowance of small farm animals and bees on residential property. Five key themes emerged: impetus for policy came from community needs; education and raising awareness helped mitigate barriers; a cultural shift took place among policy makers; social connections and individual champions were needed; and concerns over food access and health influenced policy decisions. Legislative actions are important tools to influence the nutrition environment, as long as they are based on local needs and context.

Food Policy and Health

Consistent availability and affordability of nutritious food is a problem in urban neighborhoods, resulting in systematic injustices related to health outcomes (1). Food policy councils represent one strategy for creating policy, systems, and environmental changes to promote health by enhancing access to nutritious foods (2). The Cleveland–Cuyahoga County Food Policy Coalition (CCCFPC), founded in 2007, has been noted for its role in policy gains (3–6).

Food policy refers to a broad set of actions or decisions by government bodies, businesses, or organizations that have an impact on the production, distribution, and consumption of food (5). In this article, food policy refers to actions taken by local government in the form of legislation implemented in Cleveland to improve the city's food environment through urban agriculture ordinances. The objective of this case study was to describe the successes and challenges of creating the policies and the role of CCCFPC in the policy-making process.

Key Informant Interviews

We used qualitative, case study methods to explore food-related policies adopted by Cleveland from 2007 to 2011. Data related to each policy (ie, evaluation reports of the CCCFPC, the ordinances as posted in the City Record of Cleveland) were collected, and semistructured interviews were conducted with key informants. To identify policies, we compiled a list of CCCFPC initiatives from the previous 6 years. At the time of data collection (February–June 2013), CCCFPC had been involved in 20 food policy initiatives. These policies ranged from informal recommendations and guidelines for organizations, businesses, and governments, to formal legislative actions (6). Of the 20 policies reviewed, 6 resulted in legislation adopted by the City of Cleveland, a criterion we used to select 4 cases for this study (Box).

Box. Selected Food Policy Cases in Cleveland, Ohio, 2007–2011

Case Name (Year Passed)	Description of Policy	Organizations Represented by Interviews With Key Informants
Urban Garden District Zoning (2007)	Makes it possible for a parcel of land to be designated as a community garden.	The Ohio State University Extension, Cuyahoga County; Cleveland Botanical

Case Name (Year Passed)	Description of Policy	Organizations Represented by Interviews With Key Informants
	Rezoning a garden, however, does not guarantee that it can never be lost. It simply makes replacing a garden a public process, giving neighbors a voice to protect it.	Garden; Cuyahoga Community Land Trust; Cleveland City Council; Cleveland City Planning
Keeping of Farm Animals and Bees Licensing and Restrictions ("Chickens and Bees") (2009)	Allows for the keeping of small farm animals (goats, pigs, sheep, ducks, chickens, rabbits and similar animals) and bees on residential property in Cleveland.	The Ohio State University Extension, Cuyahoga County; Cleveland City Council; Cleveland City Planning
Agriculture and Farm Stands in Residential Districts (2010)	Agriculture as principal use on all vacant residentially zoned lots. Also permits the sale of produce from farm stands in Residential Districts.	The Ohio State University Extension, Cuyahoga County; Cleveland City Council; Cleveland City Planning
Mobile Food Vending ("Food Truck Legislation") (2011)	Allows mobile food trucks to operate within city limits.	Cleveland City Planning

The CCCFPC organizer (M.T.) made initial suggestions that helped to identify 10 key informants representing local government and community organizations associated with each policy and the CCCFPC. Seven of the 10 key informants agreed to participate and provided informed consent; 3 declined participation because of their perceived lack of insights into the legislation or because they did not have supervisory permission to participate. We limited our analysis to 4 pieces of legislation to focus on those that involved the key informants and that represented policies with distinct food-related objectives (Box). To demonstrate themes emerging from the case study, we focused this article on 2 policies: Urban Garden District Zoning and Keeping of Farm Animals and Bees Licensing and Restrictions (henceforth "Chickens and Bees").

During the interviews, which lasted approximately 1 hour, we explored the following topics: the impetus for the policy action; how legislation was created and implemented; the people involved; the perceived role of the CCCFPC during the process; if and how results of the legislation were being tracked; how participants saw this policy as improving urban health; and how legislation fit within broader city or regional goals. One researcher (C.C.W.) conducted all interviews in person except one, which was conducted by telephone because the participant no longer lived in Cleveland. The 7 participants represented 5 organizations: The Ohio State University Extension, Cuyahoga County; Cleveland Botanical Garden; Cuyahoga Community Land Trust; Cleveland City Council; and Cleveland City Planning. Participants included junior- and mid-level employees as well as high-ranking members of city government. Three participants were knowledgeable about and provided input on all 4 policies; 4 participants were interviewed primarily about 1 piece of legislation.

Interviews were audiorecorded, professionally transcribed, and reviewed for accuracy. Using a narrative analysis approach, we analyzed the qualitative data inductively to identify themes in participant narratives related to understanding common successes and challenges and the role of CCCFPC in the legislative process. One coder (C.C.W.) primarily conducted data analysis, and the codes were reviewed with a research assistant to ensure credibility and confirm key themes (7). Case Western Reserve University's institutional review board approved this research.

Key Themes

We found 5 underlying themes related to the successful passage of all 4 policies and CCCFPC's role.

Impetus for each policy came from the community or the needs of residents, and the CCCFPC played a role in making these needs heard. The 4 policies provided solutions to legislative obstacles for residents. For the Urban Garden District Zoning legislation, 4 study participants representing 3 community organizations explained how they approached a council member about the need to create a garden preservation strategy after they had seen several long-time gardens, viewed as vital to their communities, razed for development. The participants recalled a particular instance when a developer sought to demolish a garden that had been a part of the neighborhood since before World War II to make space for a parking lot.

Having seen this same scenario unfold in other neighborhoods, these 4 participants and the councilman decided to pursue a garden preservation strategy, which eventually became the Urban Garden District Zoning policy. Participants explained that although the zoning policy does not offer full protection from development, it does necessitate a public hearing process should someone try to change the zoning category to allow for any other use of the property. Informants indicated that initiators of this policy had pushed for more binding and legal land preservation for gardens,

"something with more teeth," one participant said. However, because of perceived political barriers, the creation of the zoning district was deemed most feasible.

Interviewees indicated that the Chickens and Bees legislation emerged as momentum on urban agriculture was building locally and nationally. Participants recalled 2 gardeners who wanted to raise chickens for eggs to sell as part of their Community Supported Agriculture program but who repeatedly received citations (for health code violations) from the city. These gardeners worked with the CCCFPC, using their stories as a way to convince policy makers of the community and economic development potential of allowing such endeavors. One participant described these community voices, which were heard by the city council and the planning commission at public hearings, as a catalyst to begin to examine the issues related to the use of policy for urban agriculture to find a balance between the needs and interests of residents, those of public health officials, and those of the community food systems advocates who wanted more food production in Cleveland.

Education and raising awareness helped mitigate barriers. Participants described the need to educate policy makers to achieve success and the importance of CCCFPC in raising awareness. Education was discussed as particularly important for passing the Chickens and Bees policy because officials raised concerns over health and safety. According to participants, opponents voiced concern about disease, hygiene, and the vulnerability of residents with bee allergies. The eventual passage was perceived to depend on the presentation by university-based experts on bee behavior to quell fears and provide information needed to build safety precautions into the legislation. These protections, which became part of the ordinance, include the need for larger setbacks for bigger animals (eg, pigs, sheep), guidelines for placement of coops and cages, and the need for a water source and flyaway barriers for bees. Urban farmers wanting to raise livestock or bees are required to obtain a license from the Cleveland Department of Public Health, a protection that interviewees indicated was important for passage.

Participants also described education as important in the process of developing and passing the Urban Garden District Zoning:

> I think that it was educating people about who gardeners really were . . . how many places in the city there were community gardens, and the value that they had to people, frankly, to people of limited income . . . some of it was access to fresh food, but a lot of it was the economic issue for a family.

Social networks and social capital of CCCFPC members were crucial, and political will and champions were needed. The working relationships between CCCFPC members exemplified the importance of social networks in accomplishing policy change. Individuals from partner organizations, who worked directly with diverse, often marginalized communities, described how they leveraged their personal and professional relationships to build trust between residents and policy makers. Participants indicated that a significant amount of time was spent in formative meetings developing these relationships, because they were seen as integral to accomplishing policy that would meet the most needs. An inclusive, open-membership grassroots approach allowed for a more "organic" creation of the CCCFPC with people, "not just the 'suits,'" and contributed to its success. (In other regions, food policy councils are formal councils created by government bodies in which members are appointed or invited [8]). Those interviewed suggested that the informal style and intentional process of formation of the CCCFPC might have played a role in early policy gains.

> [A] lot of derogatory comments got made by colleagues of mine that were whistling 'Green Acres' during the legislation process . . . and you're like, okay I get it, but you know, I'm sick of being on the front page of the Wall Street Journal for the foreclosure crisis.

The city planning official interviewed was also touted by other participants as having demonstrated strong leadership because the Urban Garden District Zoning legislation was risky for urban planners who typically do not consider "spot zoning" (ie, adjacent parcels with different zoning categories) as good planning practice. A city planning commission official described this policy as an unusual way to offer protection from redevelopment, but the idea of using zoning policy to promote urban agriculture in the city was appealing to him. Participants also described the CCCFPC organizer (M.T.) as key to these policy successes, lauding her for her community organizing and leadership capacities.

A cultural change and an evolution in attitude about urban agriculture took place in the city. Participants described an overall culture shift in Cleveland that made these 4 policies possible. The Urban Garden District Zoning legislation was described by all informants as an important success and the beginning of a shift in the way local policy makers viewed urban agriculture. As one city planning official explained, "urban gardens were considered just filling a gap in until the 'highest and best use' comes along, and I think now we realize that in many cases, an urban garden or an urban farm is the highest and best use. . . . [W]e have evolved."

Participants described the role that the process of developing and passing the urban agriculture legislation played in changing not

only public officials' perceptions of community gardens and urban farms but also among businesses and residents in general. As one participant stated, "I think community spaces and gardens are probably much more highly valued within the city now . . . and I think a lot of people would argue it is the best use for large plots of vacant land." This new attitude was contrasted with the opinions voiced by council members who referred to community gardens as "eyesores" when the Urban Garden Zoning policy was first introduced or those who thought the livestock legislation would decrease property values.

Food access inequities in marginalized Cleveland neighborhoods were described as important reasons for the local food policies and the work of CCCFPC. Participants discussed policies in terms of food access and health, and even before being asked about this topic, they described the persistence of food environment inequities, high obesity rates, and health disparities in Cleveland neighborhoods as justification for these policies. The city planning official explained that what he finds most intriguing about these policies is identifying the role that planning can play in addressing lack of access to nutritious food in inner city, low-income neighborhoods.

The council member interviewed for this study was vocal about the urban agriculture movement in Cleveland as being about food justice. When asked about who stands to benefit from these policies, he quoted the Bible: "'Whatsoever you do for the least of these, you're doing for me.' It'll help the people who are broke, broken, who are in food deserts, who are obese, who are without insurance, who are without access to medical care, the people who people usually forget." Other participants also described food justice as motivation for their efforts and the vision of the CCCFPC emphasizes the importance of food security for all residents (9).

Discussion

The results of our interviews suggest that achieving food policy change requires strong leaders, relationship building, and the ability to raise awareness among policy makers and the public. The success of the CCCFPC may, in part, be attributed to its grassroots formation and structure. Although notable exceptions exist (8,10,11), government-appointed food policy councils face bureaucratic challenges and can be less resilient (12). Although food policy councils within government entities may have more access to funding and be able to exert political authority, "their policy recommendations may not be as responsive to community needs" (8). In a case study of the Community Health Councils model in South Los Angeles, Lewis and colleagues (13) concluded that 2 food policy innovations, which sought to address the social determinants of chronic disease, were successfully moved through the policy process because the model used a bottom-up approach to develop community-based strategies and a multisector coalition.

Although our methods created a potential for limited perspectives, our findings reflect input from key players in urban food policy development in Cleveland. Their stories aligned, and we were able to find common threads in their accounts. The policies reviewed in this study, which were some of the first of their kind in the country (14,15), helped foster a local environment in which policy development to enhance access to nutritious foods flourished. As participants explained, the use of policy to promote urban agriculture provided a way to turn negative headlines about foreclosures and vacant land into something positive and innovative. The CCCFPC played a central role in these policy changes by collecting information, developing policy recommendations, and raising awareness to shape the local food environment.

Our findings indicate that legislative actions are important tools to influence the food environment, as long as they are based on local needs and context. Part of the success of these policies is due to their being grounded in the sociodemographic and political realities of Cleveland. Most community gardeners in Cleveland are older, low income, and African American (16,17). In some cities, such as Seattle, property is at such a high demand that the cost of a garden plot might be unattainable to low-income residents (18). Because of deindustrialization and population declines over the last century and the foreclosure and economic crisis of the last decade, vacant land on which gardens can thrive at little or no cost to residents is abundant in Cleveland (19,20). The special sociodemographic and economic characteristics of Cleveland have shaped the urban agricultural landscape and influenced the types of policy changes that the CCCFPC was able to seek and accomplish. As food policy councils continue to be promoted as a means to improve nutritious food access, policy identification should be highly contextualized and reflect of the needs of communities they seek to serve.

Whether or not these policies have increased access to fresh and nutritious food in Cleveland to overcome inequities in the system, the participants viewed that goal as an important reason for creating such policies and for the work of the CCCFPC. Future research focused on assessing the impact of policy efforts on nutritious food access and health outcomes is needed.

Acknowledgments

The authors were affiliated with the convening organizations of the CCCFPC when the research was conducted; Ms Taggart was the primary paid organizer. This article was supported by cooper-

ative agreement no. 1-U48-DP-001930 from the Centers for Disease Control and Prevention. Its contents are solely the responsibility of the authors and do not necessarily represent the official views of the Centers for Disease Control and Prevention. We thank Sue Flocke, PhD, Laura Donosky-Yoder, MPH, and Christine Schneider, MS, at the Prevention Research Center for Healthy Neighborhoods for help with this research.

Author Information

Corresponding Author: Colleen C. Walsh, PhD, Assistant Professor, Cleveland State University Mail: School of Health Sciences, 2121 Euclid Ave, Fenn Hall 219, Cleveland, OH 44115. Telephone: 216-687-3816. Email: c.c.walsh@csuohio.edu.

Author Affiliations: Morgan Taggart, Ohio State University Extension, Cuyahoga County, Cleveland, Ohio; Darcy A. Freedman, Erika S. Trapl, Elaine A. Borawski, School of Medicine and Prevention Research Center for Healthy Neighborhoods, Case Western Reserve University, Cleveland, Ohio. When the research was conducted, Dr Walsh was affiliated with the Prevention Research Center for Healthy Neighborhoods, School of Medicine, Case Western Reserve University. Ms Taggart is now with St. Clair Superior Development Corporation, Cleveland, Ohio.

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