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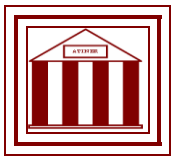

ATINER's Conference Paper Series
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Using a Socio-Ecological Framework for Community-Based Obesity Disparity Reduction Strategies

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An Introduction to ATINER's Conference Paper Series

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Abstract

Since 1980, obesity rates have more than doubled worldwide, and the United States of America is the most obese country in the world. Most public health professionals believe this escalation is due in part to the increased availability of calorie-dense, inexpensive foods and reduced job-related and leisure time physical activity. Using the socio-ecological model as a conceptual framework, researchers at the University of Kentucky are working with the state's six most obese counties, where adult obesity rates are greater than 40%. Five of the six counties are classified as Appalachian by the Appalachian Regional Commission, and all six are rural, with high levels of poverty and chronic disease. Despite the rural nature of these counties, residents do not live in isolation. The socio-ecological model depicts the various levels of influence on individual behavior: interpersonal, institutional and organizational, community, environment, and systems. Given the interacting influences affecting eating and physical activity behaviors in these specific community contexts, unique strategies at multiple levels of the socio-ecological model were chosen for implementation toward the goal of improving structural support for good nutrition and physical activity. Evidence-based interventions and

environmental strategies are being employed to support individual behavior change for people across the life course and to foster development of locally driven solutions. The first step in developing intervention strategies was engaging in formal coalition-building activities to identify and mobilize community assets, build collective capacity, and promote initiatives to address obesity. Researchers provided data and evidence-based resources to support the coalitions' work to strengthen local foods systems and to create physical activity opportunities in the built environment. To date, the six targeted Kentucky counties have developed multi-sectoral coalitions and discussed community assets. Coalitions have selected and initiated contextually appropriate implementation of evidence- or practice-based interventions to make the healthy choice the easy choice. This presentation will detail coalition-building approaches, community assets, strategies, outcome evaluation data, and progress. This project is funded by the Centers for Disease Control and Prevention.

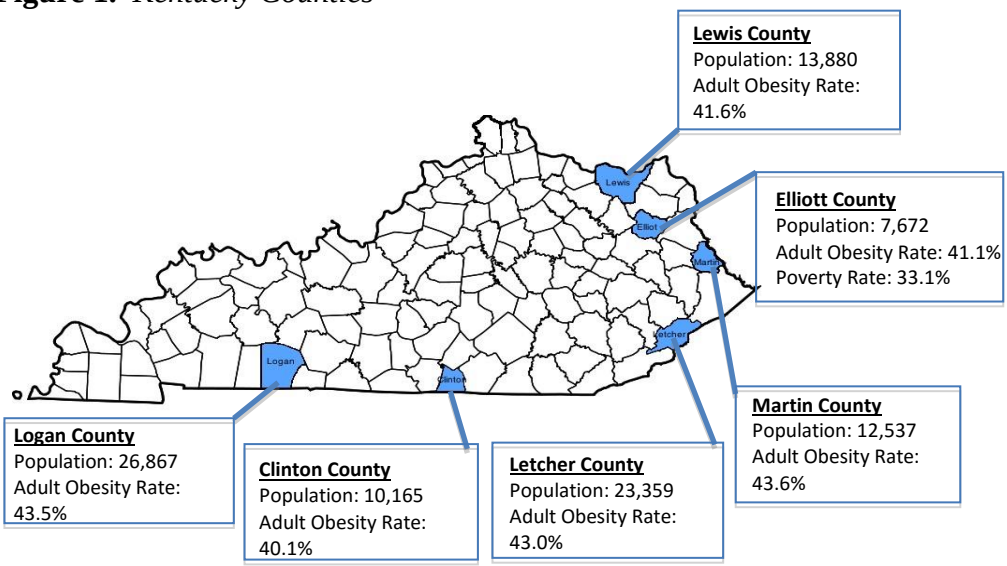
Keywords: Community-based participatory research, obesity, physical activity, public health, nutrition.

Acknowledgement: Funding for this project was provided by Centers For Disease Control 1416.

Introduction

Rural United States of America (US) residents bear a greater burden of obesity than urban residents and often lack access to healthy foods and physical activity. Community capacity to reduce obesity in rural areas is limited, and funding to support programs with promise in rural areas has been lacking (Nat'l Assoc Counties 2008). Kentucky is located in the southeastern region of the US and is one of 13 states within the Appalachian Region. The Appalachian region runs along the center of the Appalachian Mountains between northern Mississippi and southern New York. Forty-two percent of the Appalachian Region is classified as rural, while the US overall is 20% rural. Kentucky is a mostly rural state where poverty is common, obesity and overweight are the norm, and chronic diseases such as cancer and diabetes are prevalent. The state ranked 10th highest in the US for adults who were obese (CDC 2011). In Kentucky, 34.9% of adults are classified as overweight and 31.3% are obese (CDC 2012). However, in the six focal counties for this project, the adult obesity rates are much higher: 40% for Clinton, 41.1% for Elliott, 43% for Letcher, 41.6% for Lewis, 43.5% for Logan, and 43.6% for Martin County (CDC 2013) (Figure 1).

Figure 1. *Kentucky Counties*



US Census Bureau. 2008-2012. *American Community Survey 5-year*.
Foundation for A Healthy Kentucky. 2008. Heart Disease, Stroke and Cancer data. www.kentuckyhealthfacts.org.

These are geographically diverse counties with a total population of approximately 94,480 people (US Census 2012). Furthermore, 95.30% of residents in these counties are Caucasian (Community Commons). This population is challenged by high rates of poverty, unemployment, geographic isolation, grandparents raising children, low education, low health literacy, limited grocery store access, and few opportunities for physical activity. The confluence of these factors causes this population to

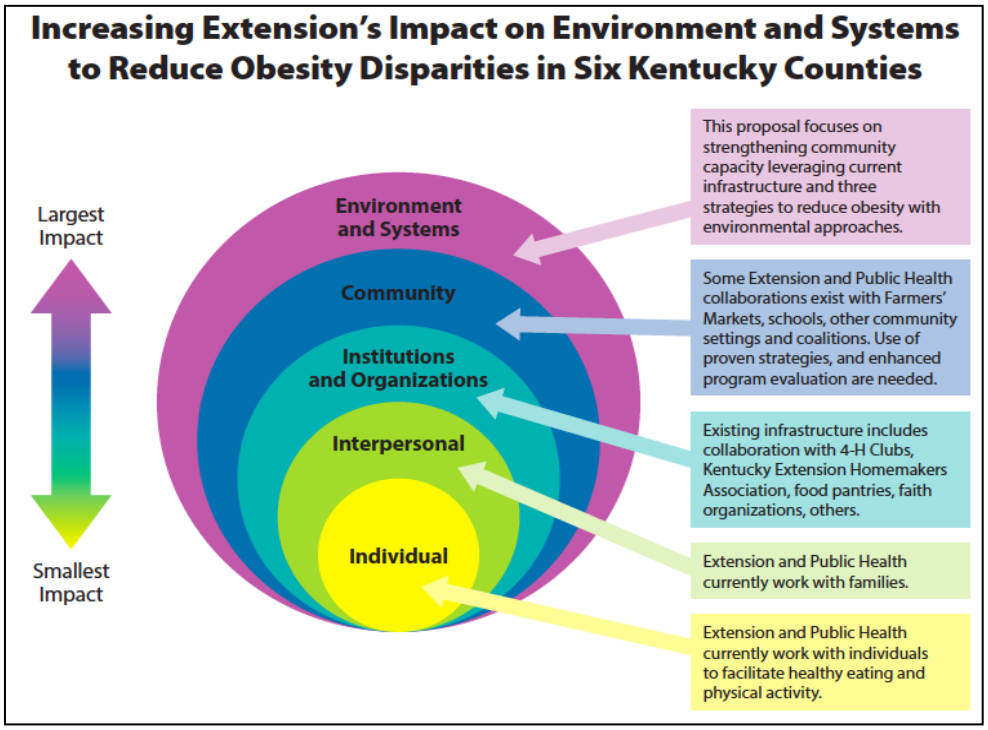
experience health disparities such as higher rates of obesity, cancer, diabetes, and stroke deaths than the US overall. More than a quarter of this population classified themselves as having poor or fair health (Community Commons).

In four of the six counties targeted by this project, there are no recreational or fitness facilities (Community Commons). More than $1/5^{th}$ of the population in these six counties lives in areas with no healthy food outlets or outlets with low availability of healthy foods (Community Commons). While there are a total of 46 fast food restaurants in these six counties, there are only 18 grocery stores (Community Commons). Healthy, convenient options are lacking. These six counties also have a higher rate of food insecurity and a larger percentage of the population on Supplemental Nutrition Assistance Program (SNAP), a federally supported program to help feed those in poverty, than the rest of the state. As such, there are opportunities for local grocers and farmers' markets to work together to stock and market healthy food options while also educating people about how to prepare meals to follow a healthy diet.

Socio-ecological Model

Socio-ecological models have been developed to explain the interrelationships between the individual and the environment in the broadest terms for close to a century. Many disciplines have embraced the ecological systems framework for human development originally proposed by psychologist Urie Bronfenbrenner in the 1970s. The framework has been adapted over time as it has been applied to discipline-specific research to generate practice-based evidence. The fields of public health, nutrition, and health promotion accept the model in which five concentric levels of social interaction influence each other, with the ultimate goal of identifying intervention points conducive to fostering individual behavior change (Figure 2).

Figure 2. *Socio-ecological Model*



Health equity resource toolkit for state practitioners addressing obesity disparities. CDC. http://www.cdc.gov/Obesity/Health_Equity/pdf/ toolkit.pdf.

The debate surrounding the extent to which human behavior can be explained by the motivations of individuals' "free will" (agency) or determined by the constraints of economic, linguistic, and cultural patterns (structure) remains one of the most central and contentious in sociological theory. As an applied framework for guiding public health interventions, the socio-ecological model has different theoretical goals than more canonical sociological theories of agency and structure, such as Anthony Giddens' structuration theory and Pierre Bourdieu's field theory. In formulating structuration theory, Giddens solution to resolving social theory's traditional bifurcation of agency and structure is the recognition that "the moment of the production of action is also one of reproduction in the contexts of the day-to-day enactment of social life" (Giddens 1984). Structuration theory defines social structure as the rules and resources by which individuals are both enabled and constrained and as the product of those agents' very actions. Similarly, Bourdieu's field theory requires a double reading of what he considers to be society's two orders of objectivity: the "distribution of material resources and means of appropriation of socially scarce goods and values … and the systems of classification, the mental and bodily schemata that function as symbolic templates for the practical activities – conduct, thoughts, feelings, and judgments – of social agents" (Bourdieu and Wacquant 1992). The "social physics" of the first order of objectivity considers social life to be constituted by objective, structured positions that can be empirically observed, measured, and analyzed independent of their

denizens. The "social phenomenology" of the second order of objectivity sees society as the emergent product of the choices, interactions, perceptions, and interpretations of individual actors' lived experiences. In short, "social reality exists … twice, in things and in minds, in fields and in habitus, outside and inside of agents" in a Mobius strip of simultaneous movement from the outside in and from the inside out.

As is evident from this review of contemporary sociological theories of agency and structure, the premises and assumptions of the socio-ecological model are consistent with those of structuration theory and field theory, but they focus on distinct units of analysis with divergent explanatory objectives. Structuration theory and field theory take social relations and interactions as their units of analysis, with the goal of explicating broader dynamics of social change and stability. In contrast, the socio-ecological model positions the individual as its unit of analysis, with the goal of identifying fruitful intervention points for altering individual health behaviors within obdurate structural environments, such as the six rural counties involved in this project. Although the socio-ecological model aligns with sociological accounts of agency and structure in its recognition of the mutually constitutive influence of individual action on structural contexts, the socio-ecological model focuses analytical attention on the structural factors that promote or prevent change in individual behaviors toward the goal of effecting systems change.

The socio-ecological model conceptualizes the individual as the center, which all the other spheres will eventually influence. Direct interaction, most often face-to face, is the direct route of influencing individual attitudes and behavior. From this point in the model, influence can flow in both or either direction(s), moving toward or away from the individual at the center. Many youth organizations educate children, with the assumption that they in turn will inform the family. Reversing the relationship, family structures will have varying impacts on individual members depending upon life stage and interpersonal relationships.

At the individual and interpersonal levels, this project provides cross-cutting strategies designed to reach people at all life stages by implementing evidence- and/or practice-based approaches to support improved health behaviors and health outcomes by reducing the prevalence of obesity and obesity-related chronic conditions. This goal was accomplished by expanding and building upon the services provided by the well-developed Kentucky Cooperative Extension Service (KY CES) through programs and partnerships. KY CES offers non-formal education to the citizens of Kentucky and is supported by the US Department of Agriculture, the state of Kentucky and local counties, through programs and partnerships. Currently, Family Consumer Sciences (FCS) Extension agents are located in all 120 Kentucky counties, and work to deliver face-to-face group programs to promote healthy eating and physical activity at no cost to community members addressing the first two levels of the socio-ecological model: individual and interpersonal. The programs offered throughout Kentucky include Weight: The Reality Series (WTRS), which is based on

the Diabetes Prevention Program (DPP) and has been shown to decrease weight and increase physical activity in adults (Mullins et al. 2014). Other programs delivered include Plate it Up Kentucky Proud, Taking Control of Your Diabetes, All Star Dads, Superstar Chef, Cooking Matters, Better Bites, Water First, and the SNAP-Education curriculum. All of these programs support increased consumption of healthy foods and physical activity. This work strengthens and fosters partnerships among FCS Extension, public health, community programs, and coalitions in each county to maximize efforts and funding to promote healthy behaviors.

Given the complexity of eating behaviors, especially among rural and geographically isolated communities, unique approaches are necessary (Sharkey and Horel 2008). This project is targeting levels of influence distal to the individual and interpersonal levels of the socio-ecological model: existing institutions, organizations, and infrastructure. These organizations include food pantries, 4-H Clubs, and faith organizations. Conceptually, it is clear that the food environment is a causal pathway influencing individual diet and disease (Glanz et al. 2005). It is suggested that improving the food and physical activity environment, especially among disadvantaged populations, may help to decrease the rates of disease. The community level of influence includes farmers' markets, grocery stores, schools, parks and recreation, and multi-sectoral community planning coalitions. The first step in developing community-specific intervention strategies was engaging in formal coalition-building activities to identify and mobilize community assets, build collective capacity, and promote initiatives to address obesity. At the same time, involving community members in coalition-building and assisting with improving the local foods systems can improve economic development for communities at greatest risk for disease, which can then support empowerment and self-sufficiency over time (DeHaven et al. 2011, Hale et al. 2011).

Methods

Using the socio-ecological model and guidance from the CDC, interventions were chosen for three strategies in the community setting as illustrated in the logic model below. Employing a community-based participatory research approach, FCS agents convened coalitions of county partners who are stakeholders in the project's goal of reducing obesity rates, including public health departments, public libraries, health care providers, grocery stores, public schools, faith-based organizations, parks and recreation departments, chambers of commerce, fitness/wellness centers, social services agencies, county judge offices, and senior centers. Initial community coalition planning meetings facilitated by University faculty and staff provided a thorough review of previous needs assessment data and a description of the purpose of the grant and the leadership role of the agent. Then, stakeholders generated a list of ongoing community initiatives that aligned with project goals to identify community assets. Finally, in a small-

group discussion, stakeholders developed a list of the causes of obesity in their county and mapped these causes of obesity onto the communities' assets in order to identify resources that could be leveraged to support this project. After identifying relevant county-specific needs and assets, community coalitions in the six counties selected from a menu of options to make environmental-level changes enhancing access to physical activity and healthy foods. The menu of options included evidence-based programs currently available to the KY CES that were appropriate for environmental-level obesity prevention in rural communities. The options focused on the most promising strategies, including accommodating distance to food sources, tailoring to local food cultures, and building community partnerships (Calancie et al. 2015).

In addition to the participatory research approach, physical activity spaces were evaluated directly using The Physical Activity Resource Assessment (PARA) tool that allows for a systematic assessment of areas utilized for physical activity. The one-page instrument facilitates documentation of physical activity spaces in terms of the type of space (parks, trails, churches, schools, etc.) and its features, amenities, quality, and incivilities. The features, amenities, and incivilities are rated using a rating scale of poor, mediocre, or good. Further, the instrument provides discrete definitions with pictures to ensure reliability among users of the tool. The assessment typically takes approximately 10 minutes to complete. The FCS agent from each county used the instrument to assess the physical activity infrastructure available within the county that they serve. Once completed, the tool provided the community coalitions a foundation from which to build upon for improving community infrastructure. The communities then could determine which infrastructure improvements would be most appropriate and beneficial to their specific community contexts. Five of the six counties have chosen to work on physical activity environment as component of their efforts to reduce obesity. These counties utilized the PARA tool to better assess potential area of improvement and to work with their coalitions to ultimately decide upon what facets of the physical activity environment on which to improve.

A logic model was developed for each county based on their selections. Training was provided for County Extension Agents regarding the evaluation plan and data collection. Data collection uses technology to enhance access and data management and employs random-digit dial telephone surveys, web-based evaluation and reporting systems, and on-line survey software. For primary data collection in communities, use of traditional printed assessment tools has proven to be most effective.

Programs to Reduce Obesity in High Obesity Areas Logic Model:

The Situation: According to CDC's BRFSS data, six of Kentucky's 120 counties have a prevalence of adult obesity exceeding 40% of the population. All of these counties are served by existing County Extension Offices and Public Health Departments.

Inputs	**Outputs** *Strategies/Activities*	**Outcomes** *Short term*	*Intermediate*	*Long term*
Project Team and State Steering Committee **Kentucky Cooperative Extension Service and Public Health Departments serving 6 counties:** Clinton, Elliott, Letcher, Lewis, Logan, Martin **Support and technical assistance from previous and current CDC Awardees in Kentucky** **Completed MAPPS & CHNAs** **Public/Private/Non-Profit Partnerships at State and County Levels** **Proven ability to:**	**Cross-Cutting Activities:** • Partnership engagement • Guidance and support for county programming • Strategic communication • Process and outcome evaluation **COMMUNITY SETTING Provide education and promotional support to environmental approaches:** • Provide community-wide Extension and outreach service to children, youth, and families to increase healthy behaviors like consumption of healthy foods and beverages and physical activity • Engage with and support community coalitions that support healthy food and beverage consumption and physical activity to prevent obesity and support health **Implement evidence or practice-based strategies to increase consumption of healthy food and beverages as recommended by the Dietary Guidelines for Americans:**	Increased **knowledge** of children, youth, and families related to healthy behaviors associated with eating and physical activity. Increased **number** or **capacity** of existing community coalitions that support and promote implementation of evidence or practice-based strategies to improve healthy behaviors. Increased **number** of community-wide practices that promote access to and improved	Increased consumption of nutritious food and beverages among children, youth, and their families. Increased physical activity among children, youth, and their families.	Improved weight status among children, youth, and their families. Improved health outcomes including decreased risk of chronic disease among children, youth, and their families. Reduced prevalence of obesity by 3% in implementation areas.

• engage community partners • implement evidence-based programs • collect and use data • reach underserved populations in rural areas **CDC Technical Assistance, Training, Guidance, and Funding**	• Increase access to and promote healthier food retail **Implement evidence or practice-based strategies to increase opportunities for physical activity:** • Create or enhance, and promote access to safe places for physical activity	behaviors related to healthy foods and beverages and physical activity.

Results

Qualitative Findings

Standard qualitative analysis techniques were used to examine the transcripts of community coalition meetings to identify contextually specific causal factors for obesity, poor nutrition, and low levels of physical activity. Given the demographic and geographic similarities of these six counties, it is not surprising that analyses identified several common themes across all six counties. Community coalition members discussed cultural factors in their counties that discouraged physical activity and good nutrition, describing traditional recipes for comfort food, social and school events centered on food, a lack of motivation and time to commit to physical activity, and physical inactivity due to technology use as social norms. As one community member in Lewis County described these cultural influences on nutrition, "We do everything with food. When a new baby comes we celebrate with food and we bring food when someone has a wedding. All kinds of celebrations are with food, fun food, cake, cookies. We are old-fashioned cooks. Mom cooked with bacon grease in the green beans." Additionally, participants elaborated on how fatalism about the prospect of improving health is perpetuated by high rates of poverty and unemployment, untreated mental health problems suffered by those coping with poverty, and the high costs of fresh foods.

These cultural factors are further entrenched by structural barriers to healthy eating and physical activity. Community members characterized their regions as "food deserts" in which limited numbers of grocery stores struggle to keep fresh produce in stock due to their geographic remoteness, fast-food chains are the only available restaurants, and costs of fresh foods are high. Community members also cited physical activity barriers, including children's diminished physical education and recess time during the school day and the lack of safe facilities and infrastructure, such as sidewalks and indoor gyms, for physical activity. "You have to have a safe place to go," said a community member in Letcher County. "There's no place to go and ride a bike." Finally, although community members identified assets for reducing obesity rates in their county such as public parks and farmer's markets, they indicated that gaps in health literacy and nutrition education prevented members of their community from regularly using existing nutrition and physical activity infrastructure.

Quantitative Findings (PARA)

The PARA tool allowed for the communities to assess what their infrastructure needs are and may requests for purchases to improve the physical activity opportunities in the county.

Elliot County sought to enhance the youth outdoor recreation area that currently has soccer fields, a shooting sports range, and a livestock pavilion. The farmers market is also held in the area. Based on the PARA assessment, the benches are reported to be in bad condition and unusable. There is limited lighting in the area. Picnic tables are in need of repair. This informed

infrastructure procurement of benches and picnic tables. Further assessment will look at other needs.

Clinton County assessed a large community park. The soccer field was rated poor meaning that there was less than 50% grass coverage and that there was trash. No bikes rakes were reported at the park. Furthermore, there were two or more large places with graffiti and large amount of litter on the ground. Lastly, there were a few pieces of equipment that has appeared to be defaced. The community decided to increase opportunities for physical activity through the purchase of outdoor fitness equipment that will engage more of the community in utilizing the park area.

Lewis County's efforts centered around the schools. Although overall the school was rated high on most points, the lack of grass on a large area was noted as an incivility. The community decided that its focus should be on increasing water access in the schools and chose to install water bottle filling station in the schools and programming that would educate students on the benefits of water.

Letcher County had two parks evaluated. Riverside Park was rated highly for their bathroom, benches, and picnic tables. There were few incivilities at that park. The Tanglewood Park however had areas of improvement. The lighting was noted as being insufficient and there were large area of overgrown grass and graffiti. There was at least one alcoholic beverage container visible to the evaluator. The community purchased some infrastructure improvements such as benches and is looking at ways to connect the community through walking trails.

There were four parks evaluated in Logan County. Russellville county /city park has little landscaping, also there was a great amount of litter on the ground and a large area without grass. At Auburn Park the benches were unusable and there were no landscaping efforts in the park. There was a large area that did not have any grass. This area did have a skate park. At Adairville Park there were potentially unsafe areas and the area was unkempt. The bathrooms were not clean and in disrepair. And the picnic tables were not in shade and were useable. Finally, at Lewisburg City Park the bathroom and benches were broken and unusable. Additionally, there was large area of overgrown grass. The playground equipment had pieces that needed to be updated and looked unsafe. The community is working to make sure that all areas have equitable improvements as the parks. Initial choices that have been selected include benches and picnic tables as well as planning for further improvements to bathrooms and community access.

Martin County has two parks – the Warfield Park and the Frank Hon Park. The Warfield Park has benches that are missing paint and boards, there are weeds in and around the park, and they have picnic tables that are not shaded that are useable but need of minor repair. At the Frank Hon Park, the benches are in bad unusable condition, there have been no landscaping efforts made beyond the grass, and there is limited lightening. Martin County's selections have focused on the improvements of the items recognized in the PARA tool.

Additionally, the community coalition is seeking to make improvements to the community's current assets.

Outcome Evaluation

The CDC developed three overarching evaluation questions to be used by all states in assessing their grant work at the SEM environmental and individual levels:

- How have community **environments** changed since the implementation of strategies to promote healthy eating and increased physical activity in children and their families?
- To what extent has community-based **education and support** occurred to promote healthy eating and increased physical activity among children and their families?
- To what extent has healthy eating and physical activity **increased** in specific settings and for specific populations?

The Kentucky evaluation team, using the overarching evaluation questions, developed the following evaluation questions to guide assessment and data collection on partnerships and leadership, physical activity, and healthy eating. For physical activity and healthy eating, evaluation was segmented to collect data about implementation fidelity, individual changes in knowledge and behavior, and environmental changes.

Partnerships and Leadership

- To what extent have community-based education and support been **effective** in promoting an increase in **knowledge** of healthy eating and physical activity?
- Are **community-level partners satisfied** with how priorities were determined, how programs are implemented and evaluated, how communication occurs between partners and funders, and how community members are informed about program efforts and outcomes?
- To what extent has the community-level partnership faced **barriers or facilitating factors** in the implementation of strategies to promote healthy eating and increased physical activity in children and families?
- To what extent have Family and Consumer Sciences Extension Agents served as **change agents** in their roles as coalition leaders by identifying solutions to implementation problems, facilitating intervention implementation, and linking multi-sectoral partners to support intervention implementation?

Physical Activity

Implementation	To what extent have evidence or practice-based strategies been implemented to increase opportunity for physical activity?
Knowledge	To what extent has knowledge about the importance of physical activity increased among children and their families?
Behavior	To what extent has physical activity increased among children and their families since the implementation of strategies to promote increased physical activity?
Environment	To what extent has the physical activity environment in the community changed since the implementation of strategies to promote increased physical activity (sidewalks, trails, parks, etc.)?

Healthy Eating

Implementation	To what extent have evidence or practice-based strategies been implemented to increase opportunity for healthy eating?
Knowledge	To what extent has knowledge about healthy eating increased among children and their families?
Behavior	To what extent has healthy eating increased among children and their families?
Environment	To what extent has the accessibility to healthier foods increased in the community since implementation of strategies to promote healthy eating?

An evaluation plan was developed to answer these questions that includes performance measures, data collection instruments, a schedule for data collection, and responsible personnel. Outcome indicator development and selection are key activities to align performance measurement with evaluation questions and program objectives (IOM 2013). Both quantitative and qualitative data are needed to present a full evaluation report that comprehensively integrates assessment of direct education, environmental enhancements, and social marketing efforts (CDC 2011). Where feasible, evaluation tools used by multiple states funded by this CDC grant were selected to allow aggregation of data across states. Data collected using these common measures is needed to demonstrate the collective impact of programs addressing obesity across the United States. Evaluation reports tailored to various stakeholder needs include infographics, success stories, and aggregated outcome indicator data.

Discussion

Lessons Learned – Community Engagement

Place-based public health intervention strategies must be informed by the multi-faceted perspectives and priorities of a wide range of stakeholders in order to ensure their effectiveness, acceptability, and sustainability. Particularly in rural, geographically isolated areas, it is essential to leverage the local expertise of community residents to understand the facilitators and barriers to individual and structural change. This local expertise illuminates the contours of each level of the socio-ecological model in specific community contexts,

thereby allowing intervention strategies to be tailored to the communities' needs, assets, and cultural norms.

Lessons Learned - Physical Activity Infrastructure

Physical activity infrastructure improvements are dependent on the community at large for success in targeting a reduction in obesity. Many communities have parks, but those areas may need improvements that cannot be handled by one organization. The use of the community input as well as the PARA tool provide a sold foundation for making physical activity infrastructure improvements that will benefit the community at large. The partners are also critical for the installation and maintenance that is needed for sustainable changes to the environment.

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