Assessing Feasibility and Readiness to Address Obesity through Policy in American Indian Reservations

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Abstract

The Institute of Medicine and Centers for Disease Control and Prevention (CDC) have identified policy and environmental strategies as critical to the prevention and control of obesity. However such strategies are rare in American Indian communities despite significant obesity-related disparities. Tribal policymaking processes differ by tribal nation and are often poorly understood by researchers and public health practitioners, hindering the dissemination, implementation, and successful scale-up of evidence-base obesity strategies in tribal communities. To address these gaps in knowledge we surveyed 138 diverse stakeholders in two American Indian reservations to assess the feasibility of and readiness to implement CDC-recommended obesity policy strategies within their communities. We assessed general community readiness to address obesity using 18 questions from the *Community Readiness Handbook*. Means and standard deviations were evaluated and scores ranged from 1 (no readiness) to 9 (high readiness). We then assessed stakeholder attitudes regarding the feasibility of implementing specific strategies given tribal culture, infrastructure, leadership, and funding support. Average scores were calculated and mean values ranked from highest (best strategy) to lowest. Despite significant differences in their geographic and sociodemographic characteristics, both communities identified increasing the availability of healthy foods in tribal venues as the most feasible strategy and scored in the "preplanning" readiness stage. The survey design, implementation process, and findings generated significant community interest and discussion. Health planners in one of the communities used the survey findings to provide tribal decision-makers with measurable information to prioritize appropriate strategies for implementation.

Keywords

Community-based participatory research; health policy; Native Americans/American Indians; obesity; policymaking; environment; intervention

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ABSTRACT
The Institute of Medicine and Centers for Disease Control and Prevention (CDC) have identified policy and environmental strategies as critical to the prevention and control of obesity. However such strategies are rare in American Indian communities despite significant obesity-related disparities. Tribal policymaking processes differ by tribal nation and are often poorly understood by researchers and public health practitioners, hindering the dissemination, implementation, and successful scale-up of evidence-base obesity strategies in tribal communities. To address these gaps in knowledge we surveyed 138 diverse stakeholders in two American Indian reservations to assess the feasibility of and readiness to implement CDC-recommended obesity policy strategies within their communities. We assessed general community readiness to address obesity using 18 questions from the *Community Readiness Handbook*. Means and standard deviations were evaluated and scores ranged from 1 (no readiness) to 9 (high readiness). We then assessed stakeholder attitudes regarding the feasibility of implementing specific strategies given tribal culture, infrastructure, leadership, and funding support. Average scores were calculated and mean values ranked from highest (best strategy) to lowest. Despite significant differences in their geographic and sociodemographic characteristics, both communities identified increasing the availability of healthy foods in tribal venues as the most feasible strategy and scored in the "preplanning" readiness stage. The survey design, implementation process, and findings generated significant community interest and discussion. Health planners in one of the communities used the survey findings to provide tribal decision-makers with measurable information to prioritize appropriate strategies for implementation.

Keywords: Community-based participatory research; health policy; Native Americans/American Indians; obesity; policymaking; environment; intervention

INTRODUCTION

Policy and environmental strategies to improve access to healthy foods and opportunities for physical activity are increasingly recommended to prevent obesity(Khan et al., 2009). In 2009, Centers for Disease Control and Prevention (CDC) released 24 evidence-based strategies and measures – the *Common Community Measures for Obesity Prevention*– designed to guide communities in identifying and implementing obesity prevention policies(Khan et al., 2009). Such strategies are critical in American Indian (AI) communities where obesity is increasing among adults and youth at rates that exceed those in the general population(Hearst et al., 2011; V. B. B. Jernigan, Duran, Ahn, & Winkleby, 2010; Prevention, 2012) and a majority of AI youth are overweight (63%)(Gray & Smith, 2003) or obese (22%)(Adams, Harvey, & Prince, 2005; Hearst et al., 2011; Rinderknecht & Smith, 2002). Indeed the prevalence of obesity among the very young suggests an even more alarming trend, as in one study estimating prevalence in AI preschoolers at 31.2% compared with 12.8% among non-Hispanic White children(Anderson & Whitaker, 2009).

Despite these statistics, environmental approaches to address obesity are rare in reservation communities; a review of the literature found only two studies reporting on such interventions. One study in the Navajo Nation used signs at the point of purchase, in-store cooking demonstrations, and newspaper and radio advertisements. The study reported reduced overweight/obesity and improved obesity-related psychosocial and behavioral factors among those persons most exposed to the intervention(Gittelsohn, Kim, He, & Pardilla, 2013). Our own pilot study in a reservation in California, guided by the principles of community-based participatory research (CBPR), assessed and intervened on environmental factors contributing to obesity. The intervention included local grocery and convenience stores and was instrumental in developing a local food producers' guild and community-supported agriculture program. The project resulted in several key policy changes, including the permanent reallocation of shelf space at the grocery and convenience stores to include and promote vegetables and fruits (V. B. Jernigan, Salvatore, Styne, & Winkleby, 2012).

Recent efforts on the part of tribal nations and CDC to implement evidence-based obesity policy and environmental strategies highlight the need for tribes to consider their readiness to implement these strategies (Bunnell et al., 2012; V. B. B. Jernigan, Burkhart, Magdalena, Sibley, & Yepa, 2014). Community readiness is defined as the observable and psychological characteristics of a community that influence its ability to initiate change and econompasses both resources as well as the capacity and attitudes of a community that support or hinder intervention implementation and efficacy (Beebe, Harrison, Sharma, & Hedger, 2001; Foster-Fishman, Cantillon, Pierce, & Van Egeren, 2007). The stages of community readiness have been identified in several study populations(Aboud, Huq, Larson, & Ottisova, 2010; Weller et al., 1999) and a robust relationship between readiness stages and group change has been found (Mauriello et al., 2010; Velicer & Prochaska, 2008). Tribal communities have assessed community readiness to plan HIV/AIDS prevention interventions(Thurman, Vernon, & Plested, 2007), substance abuse programs (Hawkins, Cummins, & Marlatt, 2004), and smoke-free policy development (York & Hahn, 2007). This study, guided by a CBPR orientation, assessed tribal community readiness to implement selected CDC recommended strategies with the goal to assist health planners and tribal leaders in prioritizing obesity prevention policies for implementation.

METHODS

This project involved two AI reservations – one in Oklahoma and one in California – selected because of their interest in addressing obesity through policy and environmental approaches and their longstanding relationships with the study Principal Investigator (PI), an AI (Choctaw) interventionist and first author of this paper. The two reservations differ in geographic and sociodemographic characteristics. The Oklahoma reservation (OK), located in the northeastern part of the state, is relatively close to a large metropolitan area and has a total tribal citizenship of 11,394, of whom 5,682 reside in the geographic boundaries of the reservation. Nearly one quarter of tribal members live in poverty(Census, 2011) and the obesity rate is 36%(Health, 2004). The California reservation (CA) is geographically isolated, located within a dense mountain range in California, and comprised of approximately 2,000 AI residents who live either on the reservation or in the adjacent small town. Seventy-three percent of AI community members live in poverty and 65% are obese (D. Simmons, oral communication, September 2012).

The communities differ in their potential opportunities to implement health policies. While neither tribe has formal policies in place to address obesity, both communities have several individual-focused diabetes, fitness, and nutritional education programs available at no cost to community members and funded as part of the congressionally mandated Special Diabetes Program for Indians. Both communities also provide the Supplemental Nutrition Assistance Program (SNAP), the Women, Infant, and Children (WIC) program, and the Food Distribution Program for Indian Reservations (FDPIR), a commodity food program funded by the US Department of Agriculture. However, the OK tribe directly operates and manages these services while residents of the CA tribal community receive these services from other larger tribal groups that run and manage services within the area.

Community Advisory Board

A seven-member community advisory board (CAB) made up of the study PI and tribal health officials and residents from both tribal communities guided this study, which received approval by the Institutional Review Boards of the University of Oklahoma Health Sciences Center and the University of Washington. The CAB members developed the survey, identified and recruited appropriate key stakeholders relevant to health policy within both tribes, and collected and interpreted the data as well as disseminated it back to the communities.

Identification and recruitment of participants

This assessment used a combination of purposive and network sampling techniques. Members of the CAB created lists of key stakeholders who influence community health policy within their tribes. These individuals represented formal leadership, such as tribal council members, school board officials, and tribal health authorities, as well as informal leaders, such as elders, women's group members, and small business owners. Survey sample sizes were determined based on the numbers of key stakeholders identified within each community. Members of the CAB aimed to collect a total of 100 surveys from the OK community and 75 surveys from the CA community. CAB members contacted key stakeholders, described the purpose of the study, asked them if they were interested in participating, and if so, administered consented respondents forms and collected the surveys. They then copied and mailed completed forms and surveys to research staff at the University of Oklahoma Health Sciences Center, College of Public Health.

Measures

Community Readiness

The Community Readiness Model, as outlined in the Community Readiness Handbook, was used to assess community readiness (Plested, Edwards, & Jumper-Thurman, 2006). The Community Readiness Model, originally developed by researchers at the Tri-Ethnic Research Center at Colorado State University, is based on the transtheoretical model of individual stages of change and incorporates theories of community-level processes and social action to measure progress in group change. The Model assesses community readiness by administering, via interview and/or survey, a set of 20-36 questions to key stakeholders representing different sectors of the community (e.g. school, government, medical). Community readiness is assessed across six key dimensions: 1) efforts; 2) community knowledge of efforts; 3) leadership; 4) community climate; 5) community knowledge of the issue; and 6) resources. A level of readiness from 1 to 9 is assigned to each dimension. The 9 levels are readiness are: 1) no awareness; 2) denial/resistance; 3) vague awareness; 4) preplanning; 5) preparation; 6) initiation; 7) stabilization; 8) confirmation/expansion; and 9) high level of community ownership. Community readiness scoring guidelines as outlined in the Community Readiness Handbook recommend that two individuals independently determine a consensus score for each of the six dimensions. Final dimension scores are obtained by averaging (dimension) scores across all interviews/surveys. The overall score is then calculated as the average of the six dimension scores (Plested et al., 2006).

Strategies for moving communities toward greater readiness are then tailored for each community at each level of readiness and recommendations and example strategies are available within the published literature as well as via the *Community Readiness Handbook* (Edwards, Jumper-Thurman, Plested, Oetting, & Swanson, 2000; Plested et al., 2006). A higher score (e.g. a "6," corresponding with the initiation stage of readiness) suggests a community may be sufficiently motivated to initiate and sustain an obesity prevention and control intervention. Alternatively, a lower score (e.g. a "2," corresponding with denial/resistance) suggests a community would need to engage in awareness-raising efforts to build relationships and capacity before implementing an intervention (Edwards et al., 2000; Plested et al., 2006).

We administered a survey containing 18 questions from the *Community Readiness Handbook* modified to focus on obesity prevention and control. Using a Likert scale ranging from 1 (worst) to 10 (best) respondents assessed the 6 dimensions of community readiness including 1) community efforts (e.g. "How much of a concern is obesity in your community?); 2) knowledge of efforts (e.g. "Are you aware of any types of formal *policies* (rules, laws, regulations) related to obesity in place in the community?"); 3) leadership (e.g. "How much are tribal governmental leaders involved in efforts to address obesity?"); 4) community climate (e.g. "What are tribal members' perceptions of obesity?"); 5) community knowledge about the issue (e.g. "How knowledgeable are community members about obesity and its risks?"); and 6) resources (e.g. "How would you rate the expertise and training of community health professionals in dealing with obesity?").

Strategies to Improve the Food Environment

Food insecurity, defined as the limited or uncertain availability and access to healthy foods,(Drewnowski, 2004) is a significant problem in AI communities (V. Blue Bird Jernigan, Garroutte, Eva, Krantz, Elizabeth, Buchwald, Dedra, 2013) and was identified by CAB members as an important local problem they were interested in addressing. Therefore, we assessed

community attitudes regarding three specific CDC strategies designed to improve the food environments, chosen for their relevance to rural food environments, and based upon a similar study implemented in rural communities conducted by Jilcott et al. in 2012 (Pitts, Whetstone, Wilkerson, Smith, & Ammerman, 2012). Using a scale from 1 to 4, respondents were asked to assess how realistic implementing each of the following three strategies would be in view of tribal community culture and infrastructure: 1) increasing the availability of healthier food and beverage choices in tribally-operated venues; 2) improving the availability of affordable healthier food and beverage choices in tribally-operated venues; and 3) improving the geographic availability of supermarkets in rural tribal areas. Choices ranged from 1 (very unrealistic) to 4 (very realistic). Respondents then assessed the extent of leadership support and funding for each strategy. Choices ranged from 1 (no support/no funding) to 4 (a lot of support/a lot of funding).

Demographic Information

Basic demographic information collected included age, sex, race/ethnicity, marital status, education, and annual income.

Analysis

We described the basic demographic characteristics of survey respondents using percentages for categorical variables. For the community readiness questions we used the scoring guidelines set out in the *Community Readiness Handbook* (Plested et al., 2006). Three independent reviewers computed the average score for each of the 6 dimensions and the overall average score across all dimensions, with overall community readiness scores ranging from 1, indicating no awareness of the issue or problem to 9, indicating high level of ownership and detailed and sophisticated knowledge of prevalence, causes, and consequences. For each of the three food environment strategies, we calculated the average score and compared mean values, ranking them from highest score (best strategy) to lowest score. All analyses were conducted separately for each tribe using SPSS v.19 (Corporation, 2010).

RESULTS

Demographic characteristics appear in Table 1. In total 138 stakeholders (OK n=86; CA n=52) completed the quantitative survey, with response rates of 86% and 69%, respectively. Twenty-seven percent of the respondents in OK were male and 37% of those surveyed in CA were male. Participants in CA were older, with 29% reporting their age as 55 years or older, as compared to 23% in OK. Nearly half of the OK respondents were college-educated (48%) and most (74%) had an income greater than $20,000. In contrast, only 13% of those surveyed in CA were college-educated, with 40% reporting an income above $20,000.

Table 1. Demographic Characteristics of Tribal Community Members Surveyed[a]

Characteristic	OK tribal community (n=86)		CA tribal community (n=52)	
	n	%	n	%
Gender				
Male	23	27	19	37
Age in years (range 18-85)	36	42	18	35
36-54	30	35	18	35
55+	20	23	15	29
Education				
Some high school	7	8	7	13
High school diploma or	38	44	38	73
Any college	41	48	7	13
Marital Status				
Married/Living together	36	42	28	55
Income				
< $10,000	10	12	15	30
$10,000-$20,000	10	12	15	30
>$20,000	60	74	20	40

GED, General Education Degree

[a]Some participants chose to not complete all or part of the optional demographic section of the questionnaire; the number of missing values ranged from n=1 for age, n=1 for marital status, and n=9.

Of the six dimensions of community readiness (Table 2), OK had the highest level of readiness in "community climate" (6.0) and "community knowledge about obesity" (5.7). The lowest level of readiness was in "resources" (3.9) and "community knowledge of obesity efforts" (3.9). The overall readiness score for the OK community was 4.8, which reflects a preplanning stage of readiness.

Similarly, the CA community scored highest in "community knowledge about obesity" (5.8) and "community climate" (5.6). Similar to OK, CA also rated "community knowledge of obesity efforts" the lowest (3.9) followed by "resources" (4.5). Overall the average readiness score for CA was 4.9, which also reflects a preplanning stage of readiness.

Table 2. Calculated Scores of Community Readiness by Dimension and Overall Stage of Readiness, OK and CA Tribal Communities[a]

Dimension	OK tribal community	CA tribal community
Efforts	4.8	5.3
Community knowledge of efforts	3.9	3.9
Leadership	4.7	4.5
Community Climate	6.0	5.6
Community knowledge about the issue	5.7	5.8
Resources	3.9	4.2
Average score	**4.8**	**4.9**

[a] Scores range from 1 (no readiness) to 9 (high level of ownership and knowledge)

In total, 46% of those surveyed from OK were aware of tribal efforts to address obesity while 61% surveyed from CA were aware of efforts. Of those surveyed from OK, 17% were aware of proposals or action plans to address obesity and 24% of those surveyed from CA were aware of such plans.

As seen in Table 3, both communities identified "increasing availability of healthier food and beverage choices in tribally-operated venues" as the most realistic strategy with the most leadership and funding support in their communities (OK 2.64; CA 2.60). Both "improving availability of affordable healthier food and beverage choices in tribally-operated venues" and "improving geographic availability of supermarkets in our more rural areas" were rated equally in both communities (OK 2.56; CA 2.52).

Table 3. Community Ratings of Most Feasible COCOMO[a] Strategies, OK and CA Tribal Communities[b]

COCOMO strategy[a]	Increase availability of healthier food and beverage choices in tribally-operated venues		Improve availability of affordable healthier food and beverage choices in tribally-operated venues		Improve geographic availability of supermarkets in our more rural areas	
Question	OK Mean (SD)	CA Mean (SD)	OK Mean (SD)	CA Mean (SD)	OK Mean (SD)	CA Mean (SD)
How realistic given the tribal community culture?	2.78 (.85)	2.79 (.85)	2.72 (.94)	2.71 (.92)	2.72 (.94)	2.71 (.92)
How realistic given the tribal infrastructure?	2.65 (.79)	2.56 (.87)	2.61 (.88)	2.52 (.80)	2.61 (.88)	2.52 (.80)
To what extent do community leaders (e.g. tribal council members, elders) support this recommendation?	2.69 (.83)	2.63 (.89)	2.49 (.80)	2.48 (.85)	2.49 (.80)	2.48 (.85)
To what extent is there current funding for this recommendation?	2.44 (.86)	2.43 (.81)	2.41 (.88)	2.36 (.75)	2.41 (.88)	2.36 (.75)
Overall Mean Score Per Strategy	**2.64 (.83)**	**2.60 (.86)**	**2.56 (.88)**	**2.52 (.83)**	**2.56 (.88)**	**2.52 (.83)**

SD, Standard Deviation

[a]Centers for Disease Control and Prevention "Common Community Measures for Obesity Prevention"

[b]Mean scores range from 1 (Very unrealistic/No support/No funding) to 4 (Very realistic/A lot of support/A lot of funding)

DISCUSSION

Despite their geographic and sociodemographic differences, these reservation communities appear to be equally effective at appealing to their members in efforts to address and prevent obesity. Both communities recognize obesity as a local problem and, corresponding with a preplanning stage, maintain a level of community empowerment. Leadership exists, as does a growing community momentum to deal with obesity.

The large difference in prevalence of obesity between the OK and CA communities (36% versus 65%) and the nearly identical readiness scores of the two communities was an unexpected finding. Based on previous research (Feinberg, Greenberg, & Osgood, 2004; Freudenberg, Pastor, & Israel, 2011), we expected to find that the tribal nation with greater control and management of services would have greater capacity, and, in turn, a higher level of readiness to support and maintain the implementation of policy and environmental obesity intervention strategies. However more research is clearly needed in this area. Future studies should employ a comparative design study to fully examine how and what factors act as facilitators and barriers to

effective policy planning and implementation in tribal communities. Such a study design could also examine how tribal control and management of food (i.e. WIC, SNAP, FDPIR) and physical activity programs might influence tribal capacity, and readiness, to address obesity through policy.

Indeed, while the final community readiness scores generated were useful, the process of engaging tribal members in developing and administering the surveys and facilitating discussions with key stakeholders was equally useful. Over the course of this two-year process, which included one year of assessment planning and implementation and one year of community feedback forums, CAB members worked with key stakeholders to identify action-oriented recommendations appropriate to a preplanning stage of readiness (e.g. generating community ideas to combat the problem, generating support from community leaders in the cause) and moved forward in unique ways.

One of the participating communities worked closely with tribal leadership to prioritize strategies to address the structural conditions that disproportionately expose tribal communities to obesity risk, such as limited access to fresh fruits and vegetables and no public transportation. Through intensive planning meetings the community prioritized intervention strategies to address healthy food access at each of the food production, access, and preference levels. The community organized and developed a community supported agriculture program. Working in partnership with the university, as well as national Americorps volunteers, the community is currently developing a community farm to support the CSA program and has submitted two proposals for funding to support this work.

The other community identified through community forums discussions that, while obesity was a pressing need within the community, substance abuse prevention and treatment needs were prioritized by community members as more urgently needed. The CAB members worked with tribal leadership to respond to this issue by developing and submitting their own proposal to support substance abuse prevention using culturally centered approaches. The proposal was funded and health planners and tribal leaders cite the organizing work of this project as instrumental to these efforts.

There were, however, important limitations to this study. First, we were not able to compare readiness scores and attitudes across different stakeholder groups. This was due to low numbers in certain groups and the fact that so many community members identified themselves as belonging to multiple stakeholder groups. Examining these differences could inform strategies that meet the needs of these diverse groups and foster partnerships across groups. Additionally, the sampling methods employed in the study revealed a large bias of female respondents in both communities. While women tend to be overrepresented in community organizing work (Minkler, 2012), this does limit us from generalizing these findings to the larger communities. Lastly, the community readiness assessment captures only a snapshot of these communities during the survey period. Changes in leadership, funding support, and other factors may influence a community's resources and opportunities and result in higher or lower readiness levels. More targeted methods (e.g. consensus modeling) that compare a community's beliefs with biomedical models could be a beneficial next step for these tribes.

Despite these limitations, this study contributes to the gap in implementation and dissemination knowledge within AI communities. While the Community Readiness Model has been used by tribal communities to tailor intervention efforts to address numerous issues (Hawkins et al., 2004; Thurman et al., 2007; York & Hahn, 2007), this is to our knowledge the first published example of assessing community readiness to maximize environmental and policy

strategies to address obesity. We found only one published study, the American Indian Health Eating Project, that describes working with tribes to build capacity to implement policy and environmental changes to address obesity (Fleischhacker et al., 2012). This project aimed to improve access to healthy, affordable foods and resulted in the "Tools for Healthy Tribes," guide to policy planning and development (Fleischhacker et al., 2012) which recommends the assessment of community readiness to prioritize strategies for change.

In addition, our own recently funded National Institutes of Health study "Tribal Health and Resilience in Vulnerable Environments" or "THRIVE," currently in its second year, aims to address the gaps in implementing and scaling-up evidence based obesity interventions in tribal nations(V. Blue Bird Jernigan, 2015). This study is a randomized controlled trial of "healthy makeovers" at 20 tribally-owned and operated convenience stores in Oklahoma tribal nations and focuses on the implementation of menu labeling, increasing healthier food options, and subsidizing these food options within the stores. From the onset of the study the sustainability of the interventions has been planned. The participating tribal nations used a health impact assessment (HIA) to determine the potential effects of food environment policies on tribal health and the distribution of those effects within the population. To our knowledge this is the first study involving a tribal HIA that assesses and makes explicit the health effects of tribal fiscal and economic initiatives on community obesity rates. The assessment of community readiness to implement obesity policy strategies allowed us to incorporate community perspectives into a more extensive HIA which is now underway. This process has been identified and described within the literature as "community-based participatory policy work" (Freudenberg et al., 2011).

CONCLUSION

The use of a community readiness assessment to implement policy and environmental strategies to address obesity was a useful first step to engage community members in community-based participatory policy work. The process and findings provided health planners and tribal leaders with measurable information to prioritize strategies their communities are capable of implementing and develop activities to mobilize their communities toward action. Future studies must broaden readiness assessments to include an examination of the costs of obesity to communities as well as the projected financial and health impacts of implementing policy change strategies identified as feasible by community members. Equipping tribal leadership with this information will support tribes in their use of data on the health effects and cost effectiveness of community interventions, both to lay a foundation for evidence-based policy and to inform the evaluation and adaptation of successful environmental interventions to eliminate disparities in obesity.

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