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Engaging Rural Nevadans in Participatory Research to Explore and Explain the Community Food and Physical Activity Context

Anne R. Lindsay
University of Nevada Reno, Extension, lindsaya@unce.unr.edu

Courtney Coughenour
University of Nevada, Las Vegas, courtney.coughenour@unlv.edu

Holly Gatzke
University of Nevada Reno, Extension, gatzkeh@unce.unr.edu

Juliana Baker-Tingey
University of Nevada Reno, Extension, tingeyj@unce.unr.edu

Steve Lewis
University of Nevada Reno, Extension, lewiss@unce.unr.edu

Mihaela A. Ciulei
The Pennsylvania State University, mmc5819@psu.edu

See next page for additional authors

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Cover Page Footnote

Please address all correspondence to Dr. Courtney Coughenour (courtney.coughenour@unlv.edu).

Authors

Anne R. Lindsay, Courtney Coughenour, Holly Gatzke, Juliana Baker-Tingey, Steve Lewis, Mihaela A. Ciulei, Katherine Gunter, and Deborah H. John

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Anne R. Lindsay, University of Nevada Reno, Extension
*Courtney Coughenour, University of Nevada, Las Vegas
Holly Gatzke, University of Nevada Reno, Extension
Juliana Baker-Tingey, University of Nevada Reno, Extension
Steve Lewis, University of Nevada Reno, Extension
Mihaela Ciulei, Pennsylvania State University
Katherine Gunter, Oregon State University
Deborah H. John, Oregon State University

ABSTRACT

The purpose of this study was to engage residents of four rural Nevada communities to explain local resources and readiness to address environmental challenges to weight healthy lifestyles. Residents engaged in HEAL MAPPS™, a participatory research approach using photomapping and community conversations to document lived experiences of place-based resources as supports or barriers. Data were triangulated to scale community readiness-to-change. This study focuses on a description of methods and qualitative findings. Healthy food unavailability emerged consistently among communities as a barrier; produce options were limited and many residents relied on convenience foods. Physical activity opportunities were available, yet access was a barrier. Transportation-related issues emerged as barriers to healthy eating and physical activity. Communities ranged between “vague awareness” and “preplanning” on readiness-to-change. Local data and shared knowledge of the obesogenic context can inform community policy and environmental improvements that promote health and enhance quality of life for rural populations.

KEYWORDS: Active living, food access, healthy eating, social determinants of health, weight healthy

INTRODUCTION

Obesity is prevalent among adults and children living in the United States (Flegal et al. 2001; Ogden et al. 2012; Patterson et al. 2004; Troiano and Flegal 1998). Residents in rural areas across the country are at even greater risk for overweight and obesity (Befort, Nazir, and Perri 2012). More than 15 percent of Americans live in rural areas encompassing 7 percent of the United States land area (USDA 2013). Even after controlling for demographic characteristics, rural children and adults are known to have higher prevalence and greater risk of obesity compared to their urban counterparts (Befort et al. 2012; Lutfiyya et al. 2007; McMurray et al. 1999; Patterson et al. 2004), making them a vulnerable population.

Rural communities are emphatically different than urban areas, and rural residency is a risk factor for obesity (Befort et al. 2012). Ironically, Nevada is described as the third most urban state in the United States, yet it is a very large, sparsely populated state with an average of only 24.6 people per square mile (U.S. Census Bureau 2010). Eighty-eight percent of Nevada residents resided in two of the 17 counties (73 percent in Clark County; 15 percent in Washoe County) (U.S. Census Bureau 2017), of which three are rural and 11 are frontier counties that are even more remote from population centers (Griswold et al. 2015). According to the Nevada Institute for Children's Research and Policy, nearly 30 percent of Nevada children entering kindergarten (Haboush-Deloye, Davidson, and Phebus 2014) and 65 percent of adults (CDC 2013) are overweight or obese.

Assumptions that rural communities act and respond similar to urban or suburban communities but on a smaller scale is far from accurate (Pitts et al. 2013; West et al. 2013; Yousefian et al. 2010). Rural communities are not just "mini versions" of their big city neighbors (Yousefian et al. 2010). It is unclear whether application of effective solutions in urban areas can be similarly applied to the unique issues experienced by rural communities. Despite the increased need for research in rural communities, investigative efforts are typically focused on more populated urban areas. Unfortunately, public health professionals generally focus their program efforts, policies, and investment strategies on populated urban communities rather than rural, leading to an underinvestment in the health issues of rural communities (Marmot et al. 2008). Research also suggests that there are unique commonalities across the nation's rural landscape, as well as great variation across these rural communities (Yousefian et al. 2010). Therefore, understanding the

unique habits and health needs within and among rural communities is critical to addressing the overall problem for all Americans.

Rural residents often have negative feelings towards research (Oakes and Kaufman 2006). These include beliefs that researchers use funded efforts for academic gain with little concern for the residents whom they are studying and a distrust of researchers' motives or intentions as well as the research process. Community members may believe that research institutions and researchers "use" the community for academic benefit but leave the community with little benefit in return, which can actually be harmful. Oakes and Kaufman (2006) suggest that academic researchers are not often from the community in which they are conducting research and therefore may not have an in-depth understanding of the local culture and community relations and dynamics.

Participatory research (PR) focuses on a process of sequential reflection and action, carried out with and by local people rather than on them (Cornwall and Jewkes 1995). Community-based PR is an approach that builds trust between community members and researchers while studying locally relevant problems using community input and action (Oakes and Kaufman 2006).

Ongoing communication, collective decision-making strategies, and techniques that support power sharing between all parties involved must be considered for PR to be effective (Downey et al. 2011). The goal is to collaborate with the community as a research partner since it is the community that is most affected by the issue being studied, such as the rural obesogenic environment in the current study. An obesogenic environment is one comprised of factors that support being obese. This allows research to be conducted from the bottom up, rather than from the top down, reframing the context, considerations, practical steps, and outcomes of the research (Barkin, Schlundt, and Smith 2013; Isler and Corbie-Smith 2012; Minkler and Wallerstein 2003).

Helping families and children in rural communities develop weight healthy habits, that is, promoting healthy eating and physical activity to balance food intake with energy expenditure, is critical to preventing overweight and obesity and minimizing chronic disease risk. For over 100 years, the public land grant universities' Cooperative Extension Service (CES) has served rural America. As a result, CES is well-positioned to share knowledge gained from academic research through direct outreach, engagement, and education of people in their communities to create positive changes (USDA 2013). This study engaged adult residents in four rural Nevada communities to explore and explain local healthy eating and

physical activity resources and elucidate their collective readiness to address environmental challenges to weight healthy lifestyles. CES campus-based researchers and county agents engaged and mobilized resident researchers and sector stakeholders in four distinctly defined communities using a PR approach and tools developed for CES implementation. CES PR tools allowed individual residents to assess community features regularly encountered as preventing or promoting weight healthy lifestyles. Collective opinions and perceptions of community resources and readiness to implement and support environmentally-based obesity prevention efforts were also solicited from residents.

METHODS

In partnership with and as a component of a federally-funded, multi-state research, education, and Extension program developed by Oregon State University (OSU), a team of researchers in Clark County, Nevada engaged four rural communities concerned about obesogenic environments and obesity prevalence in children in PR. The study protocol was reviewed and approved by the OSU Institutional Review Board (IRB #4909) and University of Nevada Institutional Review Board (#505006). Extension researchers were trained to use HEAL MAPPS™ (Healthy Eating Active Living: Mapping Attributes using Participatory Photographic Surveys) (John et al. 2017), a theoretically-based PR tool developed to help CES mobilize residents to assess the rural obesogenic context. HEAL MAPPS™ applies a framework that supports community resource mapping using Global Positioning System (GPS) technologies, and integrates a weight healthy equity approach (John et al. 2017). Rural residents' lived experiences of place-based community resources and community collective readiness to plan and implement changes to the obesogenic context through environmental and policy actions were assessed following HEAL MAPPS™ evidence-based procedures (John et al. 2014).

From a list of eligible Nevada communities, four communities, Wells (Elko County), Minden (Douglas County), Caliente (Lincoln County), and Laughlin (Clark County), were identified as being concerned about childhood obesity by the corresponding county CES agents and invited to participate in the PR project. In addition to a local interest in childhood obesity prevention, community eligibility was determined by being located in one of four distinct geographic regions, defined through a sensible division that included shared physical geography (e.g. mountain ranges),

socio-environmental and cultural determinants, such as median household income, race, and ethnicity, and primary industry (e.g. mining). Additional criteria used to describe eligibility included median household income relative to state poverty rate (high vs. low), comparative proximity to an urban center (near vs. far), and total population (<10,000 residents). For example, a high or low poverty community was defined by median household income above or below the 13.2 percent median poverty rate for rural NV (RHHub 2013). Near or far from an urban center was defined relative to mean distance (141.45 straight line miles) to urbanized area with a population of at least 50,000. Figure 1 provides a map that shows selected attributes of the four Nevada communities that were engaged in PR, with Laughlin being a rural community located in an urban county, Minden being located in a rural county, and Wells and Caliente being located in frontier counties. Table 1 includes community sociodemographic data for each community.

HEAL MAPPS™ PR process curriculum (John and Gunter 2014) includes community engagement activities and mobilization activities, including four face-to-face stakeholder meetings over a period of two to three months in each participating community, with qualitative and quantitative data collected concurrently during community engagements. The curriculum outlines four separate interfaces including inclusive recruitment, resident stakeholder training, focused group decision-making, and a CES facilitated community conversation. The CES-supported PR approach utilizes a train-the-trainer protocol for community-engaged, participatory discovery and experiential, collaborative learning. Prior to engaging the communities, county-based Extension agents residing in the respective county were added to the research team. Agents were then asked to reach out to community stakeholders, organizations, and residents whom they felt would and/or should be engaged in improving community health. The first interface was an introductory meeting in which the study plan and HEAL MAPPS™ process were explained to stakeholders in attendance. At the introductory meeting, rural community organizational stakeholders in attendance, many of whom resided in the community, engaged in the HEAL MAPPS™ organizational network mapping and inclusive outreach activity.

Organizational network mapping and power analyses aimed to reveal organizations and individuals from the community who would be supporters of or opponents to addressing environmental challenges to weight healthy lifestyles, and to identify participants from varying audiences that represented demographic groups within the community.

Figure 1: Nevada Map Showing Population by County, Including the Counties That Contained the Four Communities That Engaged in Healthy Eating and Physical Activity Resources and Readiness to Change Study Using the HEAL MAPPS™ Tool (map created by authors using the U.S. Census Bureau 2010 Demographic Profile Data)

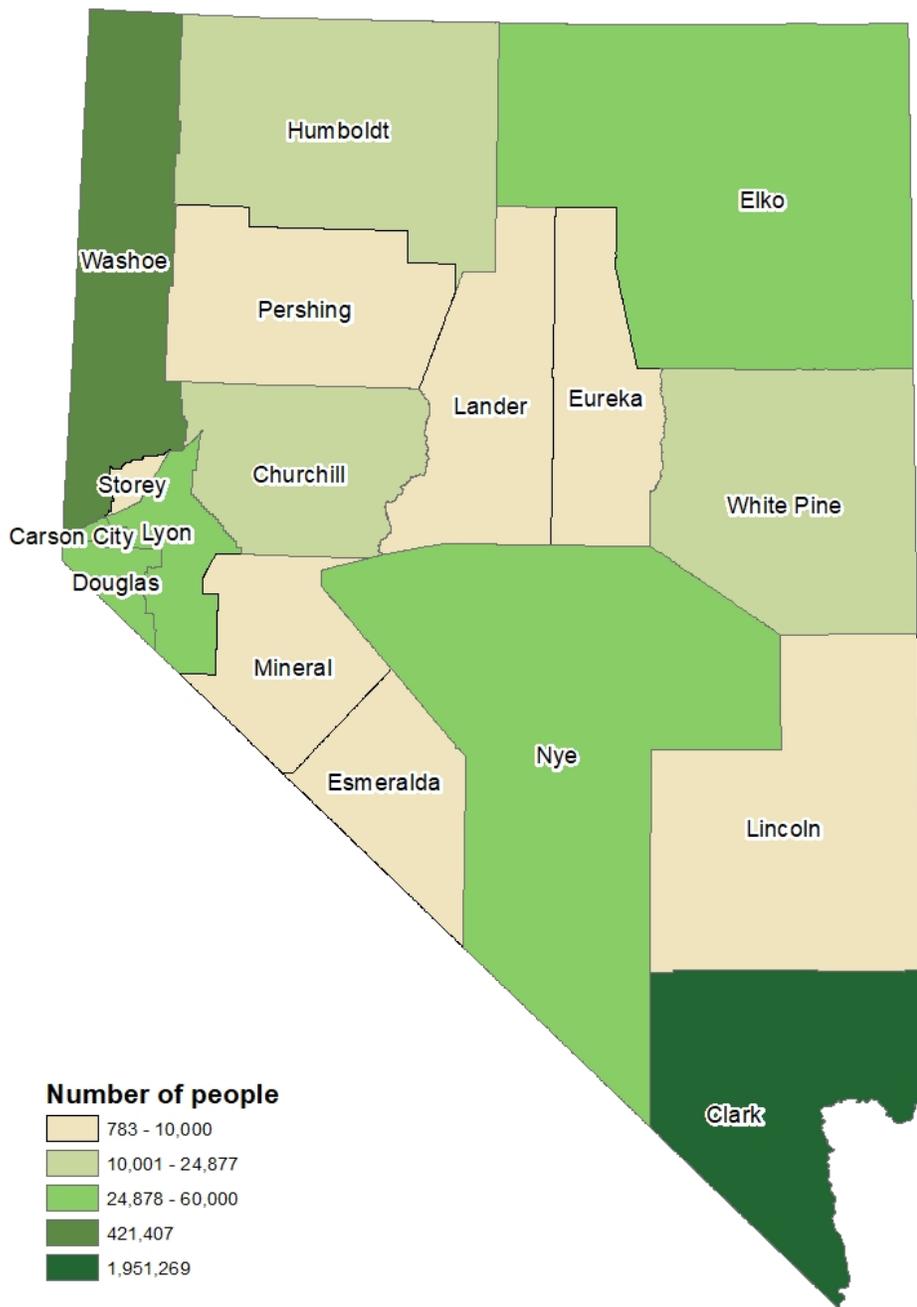


Table 1: Sociodemographic Data from the Four Communities that Participated in the HEAL MAPPS Participatory Research

Community	Geography classification	Poverty classification	Median HH income*	Sociodemographics**
Caliente	Close to urban	High poverty	\$26,083	84.5% White 3.9% Black 0.9% Asian 2.4% NA/AK Native 8.3% Other or multiple races 8.8% Hispanic 18.0% 65+ years
Wells	Far from urban	Low poverty	\$49,875	78.3% White 0.1% Black 0.4% Asian 6.8% NA/AK Native 14.4% Other or multiple races 20.0% Hispanic 12.8% 65+ years
Minden	Close to urban	Low poverty	\$63,257	91.9% White 0.3% Black 1.7% Asian 0.8% NA/AK Native 5.3% Other or multiple races 9.2% Hispanic 26.8% 65+ years
Laughlin	Close to urban	High poverty	\$41,386	85.0% White 3.1% Black 2.1% Asian 1.2% A/AK Native 8.6% Other or multiple races 13.7% Hispanic 30.7% 65+ years

Urban defined as population $\geq 50,000$, HH=household, NA=Native American, AK=Alaska

Sources: *2010 Census Summary File **2010 American Community Survey 5-year estimates

For example, the mapping aimed to identify rural community residents or stakeholders representing those residents to engage in the PR from groups such as low-income families, American Indian tribal members, and educational stakeholders. Engaging local residents and stakeholders in inclusive outreach was strategic for reaching and

involving members of diverse social groups comprising rural community populations and helped ensure equity and representation of diverse voices and perspectives from rural residents. Diverse participants bring a multiplicity of skills, expertise, perspectives, and experiences to the project. Community researchers suggest that expanding who represents the community to include diverse voices is critical (Oakes and Kaufman 2006; John et al. 2017).

The second community interface of the study protocol involved training the seven to 10 adult residents (identified during the stakeholder meeting) to use camera-enabled GPS devices to photomap. Residents, hereby called “mappers,” were mobilized to collect data by photographing community food/nutrition and physical activity resources and recording their experiential perceptions of each asset as either a support or barrier to being active or eating healthy in a photo journal log. Mappers added to the data by indicating the mode of transit (e.g. foot, bike, automobile, or other) they typically used when accessing the photographed asset during their everyday routines. Collectively, community mappers in each community produced approximately 150 photographs, mapped relative to the type of transportation used to access the resources and accompanied by matched journal log entries. Mappers reconvened to participate in a focus group (interface 3) to eliminate duplicate photos and determine which of the remaining photos would best represent the community assets they documented as related to nutrition and physical activity.

Finally, in the fourth interface, the whole community was invited to attend a dinner hosted at a local venue and participate in a facilitated community conversation focused on the issue and context of childhood obesity as a local concern. Open and targeted invitations reached community members through multiple efforts including personal word-of-mouth, telephone, and emailed invitations from community stakeholders, champions, and resident mappers, as well as through emails, social media posts, and recruitment flyers from local organizations and establishments. As the congregational mealtime ended, conversation facilitators welcomed community members and explained the subsequent media presentation format and focus. Attendees were informed that photographs of community assets taken by local residents would be displayed and serve as conversation starters during the discussion and polls. Instructions for using “clickers” and polling practice were provided. The discussion was co-facilitated by members of the research team (university, Extension, and/or community) using scripted, motivational interviewing and interactive polling questions embedded in the HEAL MAPPS™ facilitation protocol

(John and Gunter 2014) that were adapted from the Community Readiness Model (Plested, Edwards, and Jumper-Thurman 2006). More specifically, predetermined, close-ended community readiness poll questions to address environmental challenges were interspersed with open-ended discussion questions related to the displayed photos; participants were prompted to explain how the presented assets made eating healthy and being physically active easier or harder for themselves and others who reside in the community. Because polling was executed through the use of an audience response system (computerized “clickers”), participants responded anonymously, opinions tallied immediately, results displayed graphically, and values were used to prompt deeper discussion of personal thoughts and feelings that led to shared ratings. As the conversation progressed, the discussion narrative (response to poll, prompts, and open-ended questions) was transcribed as closely to verbatim as possible (still maintaining participant anonymity) by two scribes in attendance but not participating in the discussion. The separately scribed transcripts were later compared and merged to ensure that all of the conversation was documented.

HEAL MAPPS™ PR utilizes mixed-methods design to help “answer questions that cannot be answered by quantitative or qualitative approaches alone” (Creswell and Plano Clark 2011) and provide a more complete picture of the overall context of a community, that is, to tell a comprehensive story of the community’s weight health and wellness strengths and challenges. Quantitative data included consensus poll results, providing numerical indicators of the proportion of conversation participants perceiving aspects of the community context as enabling or hindering weight healthy lifestyles. Additionally, researchers collaborated to transform qualitative data collected through each mapper’s photo journal log, focus group photo annotations, and transcribed discussion narrative collected during the community conversation into community readiness scores, i.e. how ready the community is to address these challenges. Qualitative data were examined using an iterative content analysis process to explain in greater detail the diversity of residents’ experiences of the environmental resources as behavioral barriers and supports and perceived readiness of the community to address the obesogenic environment. A list of questions and prompts embedded in the HEAL MAPPS™ community conversation facilitation script is provided in Table 2.

Table 2: HEAL MAPPS™ Community Conversation Facilitation Script Used to Collect Quantitative and Qualitative Data from Participants in Four Rural Nevada Communities

Question	Type*	Readiness Dimension
Do you believe childhood obesity is an issue of concern in your community?	Poll	Knowledge of issue
Are you aware of any ongoing efforts or programs in your community that support healthy eating and physical activity, behaviors known to work together to prevent overweight and obesity?	Prompt	Efforts and knowledge of efforts
Are there any groups of people in your community that are not benefitting from these efforts, or for whom these programs are hard to join?	Prompt	Efforts and knowledge of efforts
How much do you agree with this statement: My community has adequate resources to help a variety of community members eat healthy and be physically active?	Poll	Resources for prevention efforts
How would individuals and local businesses in your community support efforts to make changes to the physical environment to make it easy to eat healthy or be physically active?	Prompt	Resources for prevention efforts
Would people want to volunteer time, donate money, or provide space to make it easier for community members to eat healthy and be physically active most every day?	Prompt	Resources for prevention efforts
Is anyone here aware of any grants that have been submitted or plans that have been put in place that would improve the conditions for eating healthy or being physically active in the community?	Prompt	Resources for prevention efforts
How knowledgeable are the people in your community about the link between the community environment (e.g. play spaces, parks, roadways, sidewalks, etc.) and obesity?	Poll	Knowledge of issue
How could someone new to your community get or find information about community resources and programs that promote healthy eating and physical activity?	Prompt	Knowledge of issue
What types of health information are available about the people in your community – information such as adults' physically active levels, who participates in physical activities, nutrition behaviors such as fruit and vegetable consumption or health statistics such as obesity rates? Are the data easily available would a community health partner, like me, be able to get this information?	Prompt	Knowledge of issue
How engaged do you feel that your community leaders, such as educators and school administrators, health and allied health providers, local governments, organizational and business leaders, are in local efforts to promote weight healthy kids and families?	Poll	Leadership
What are some of the ways that you believe or that you know your community leaders are active in efforts to promote healthy eating and physical activity? Who are these leaders?"	Prompt	Leadership
How and why do you think the leaders in your community would or would not support additional programs or activities to support healthy eating and physical activity?	Prompt	Leadership

Table 2: HEAL MAPPS™ Community Conversation Facilitation Script Used to Collect Quantitative and Qualitative Data from Participants in Four Rural Nevada Communities

Question	Type*	Readiness Dimension
How confident are you that the people in your community who provide programs, services, activities, and establish policies have expertise and training in healthy eating and physical activity?	Poll	Resources for prevention efforts
Is anyone aware of any efforts in the community to determine the effectiveness of programs and policies that increase physical activity and healthy eating and develop lifestyle habits? •If yes: are these evaluation efforts being used to make changes in programs, activities or policies or to start new ones? •If no: how would someone go about determining the effectiveness of programs in the community to increase physical activity and healthy eating and develop lifestyle habits?	Prompt	Resources for prevention efforts
How supportive are members of the community in efforts to promote healthy eating and physical activity to prevent obesity among children and families?	Poll	Community climate
Can you think of some obstacles that would prevent efforts to change [your community]'s environment to make it easier for everyone to eat healthy and be physically active?	Prompt	Community climate
Are there any situations or environments in your community where community members feel efforts to promote physical activity or healthy eating are unwelcome or not necessary?	Prompt	Community climate
How willing are you to work for changes in the community that will make it easier for children and families to eat healthy and be physically active most every day?	Poll	Resources for prevention efforts

*Poll questions were quantitative, measured using an audience response system ("clickers"), and used a four-point Likert scale; prompt questions were open ended and meant to engage participants in discussion.

Qualitative data from all sources, including photographs, route maps, route photo journals, focus group annotations, and transcribed narrative and poll responses from community conversation, were organized using NVivo 10 (QSR International) software for qualitative and mixed-methods research. First order coding into a priori thematic nodes was completed independently by two members of the lead institution's research team trained in qualitative methods and familiar with the analytic model. Data were coded into thematic nodes aligned with six dimensions of community readiness (knowledge of issue, current efforts - supportive and obstructive, knowledge of efforts, resources - physical activity and nutrition, leadership, community climate) and community recommendations, and into categorical nodes of community study sites to

enable within-site and among-sites analyses. Following first order coding, the team of Nevada researchers independently coded for themes emerging beyond the project frame. Second order coding and analyses revealed thematic categories and meanings beyond preliminary content analyses as shown in Figure 2.

Content coded into each of six community readiness dimensions was further organized according to the nine-point community readiness scale with criterion-anchored ratings ranging from 1-no awareness through 9-high level of ownership/professionalism (Plested et al. 2006). Qualitative data organized according to dimension-specific criterion anchoring each numerical value on the nine-point scale (Figure 3) were transformed with fidelity to Plested and colleagues' (2006) scoring methodologies into a quantitative score indicating the level of readiness for each dimension and overall for each community.

Figure 2: A Priori and Emergent Thematic Nodes from Qualitative Analysis

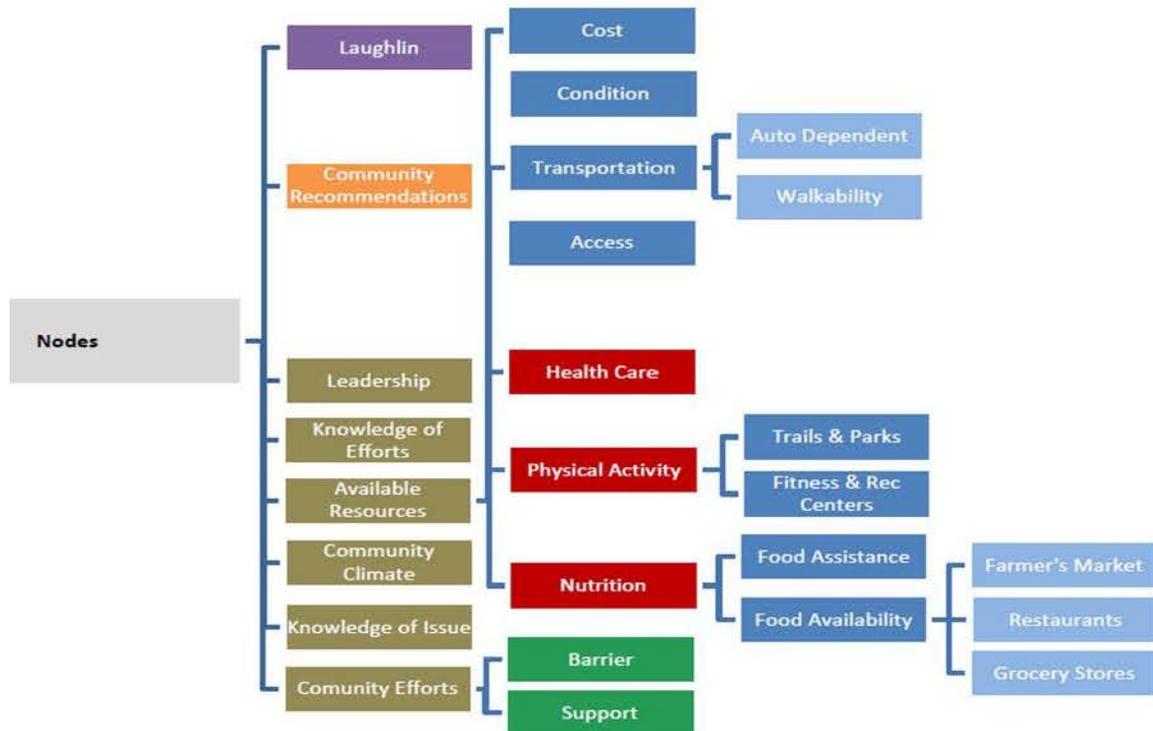


Figure 3: Community Readiness Model Criterion Anchored Rating Scale



FINDINGS

HEAL MAPPS™ PR participants (n=183) provided the following community data 1) approximately 600 annotated photographs that were included as available resources on their community maps, 2) response polls, and 3) community narratives that explained issues of resource accessibility. These data were provided through participation in any of the four interfaces; stakeholders (n=38), mappers (n=33), focus group attendees (n=32), and community conversation attendees (n=80). Many of the participants in each community attended multiple interfaces (e.g. stakeholders and mappers also attended the community conversation).

Overall community readiness to tackle the rural obesogenic context resulting from analysis of data coded into a priori nodes aligned with the six dimensions of Plested and colleagues' (2006) readiness model and scored using the nine-point anchored rating scale (see Figure 3) emerged as between stage 3-Vague Awareness and stage 4-Preplanning. Wells (3.8) emerged as the most ready community in overall readiness, nearing the pre-planning stage, followed by Minden (3.7), Caliente (3.6), and Laughlin (3.4). Table 3 provides numerical scores for each dimension of community readiness and overall for each community as well as mean scores in each dimension and overall for all communities.

One overarching finding observed in this study was that readiness in rural communities cannot be constrained by political boundaries, such as city limits, to either assess or intervene. Each of the study communities functioned as an expanded geographic community with shared place-based resources in association with other surrounding community places. For example, Caliente hosted a grocery store, farmers market, and elementary school and was closely intertwined with Panaca, which hosted

Table 3: Community Readiness Scores by Dimension and Overall for Four Rural Nevadan Communities

Dimension	Wells	Caliente	Minden	Laughlin	M (SD)
Current Efforts	4.8	3.9	4.0	4.5	4.3 (0.4)
Knowledge of Effort	4.3	3.3	4.0	3.0	3.6 (0.6)
Leadership	3.5	4.0	4.0	3.0	3.6 (0.5)
Community Climate	3.5	3.8	3.5	2.8	3.4 (0.4)
Knowledge of Issues	3.0	3.0	3.0	3.0	3.0 (0.0)
Resources	4.0	3.9	4.0	4.0	4.0 (0.1)
Total	23.1	21.8	22.5	20.3	21.9 (1.2)
Overall Community Readiness Score	3.8	3.6	3.8	3.4	3.7 (0.2)

*All scales ranged from 1 (no awareness) to 9 (high level of community ownership)

the local high school, and Pioche, a small tourist destination with shops and restaurants. Minden and Gardnerville are adjoining communities that operationally functioned as one, with residents even referring to them collectively as “Carson Valley” rather than by their respective town name. Wells is adjoined with and shares resources with the neighboring American Indian colony. Laughlin is located in the southernmost part of the state and shares a border with Bullhead City, which is located in the neighboring state of Arizona. This poses an even more complicated study situation in that residents may live in one community (e.g. Laughlin, Nevada) and work in the other (e.g. Bullhead City, Arizona). They spoke about “going across the bridge” for trips to Walmart and other destinations to access resources. When community dimensions of readiness and recommendations for change cross political jurisdictions, decision-makers may be slow or unable to respond to community demands.

A unique issue raised in Laughlin was that recipients of Nevada social assistance programs, such as Medicaid or Medicare, could not utilize more proximal services in Arizona. Laughlin residents explained that traveling 90 miles to Las Vegas was necessary to access services that were unavailable in Laughlin although available, more easily accessible, and sometimes more affordable in the neighboring Arizona community. This was reported as the same for the Supplemental Nutrition Assistance Program (SNAP) recipients. SNAP recipients *perceived* their benefits were not accepted in a neighboring community outside of Nevada, even if there were healthier, less expensive options available. The goal of this study was to engage and evaluate the four selected communities. However, we found the meaningful evaluations of the community context and interventions that aligned with dimensions of

readiness to change were not feasible without considering people's disparate lived experiences of place. These experiences are critical to understanding socio-environmental influences on rural health and lifestyles.

Preliminary data suggests that there are many community readiness commonalities across rural Nevadan communities as well as variability. Each community has some unique traits that either hinder or help healthy choices, though low availability of "healthy food" was identified as a barrier in all communities. This finding is consistent with studies of rural household and neighborhood environments that suggest healthy food availability in rural communities may be a contributing factor to rural diet and chronic disease disparities (Hosler 2009; Kegler et al. 2008).

Despite the vast number of federal, state, and local low-income food programs such as small grant subsidies, The Special Supplemental Nutrition Program for Women, Infants, and Children (WIC), school meals for children, and food banks, access to healthy foods, that is the number and location of grocery stores and healthy food outlets, are limited in these rural Nevadan communities. Convenience stores are the primary source of food and produce options are limited or non-existent. This is consistent with other studies on rural health (Larson, Story, and Nelson 2009; Liese 2007). Many communities have only one grocery store serving several small towns. Most communities lack public transportation, making it difficult to access local food banks and grocery stores, particularly for seniors and those too poor to have personal vehicles.

Current efforts contributing to limited produce options locally may be attributed to the regional food system and poor alliance between farmers, farmers markets, and food retailers, such as grocery stores and restaurants. Most rural communities in Nevada have produce growers, yet producers sell their crops to large retailers such as Whole Foods or Trader Joe's and not (or contractually not permitted) to local vendors. Large chains may not find locating stores in small rural communities economically feasible without a specific population threshold. Therefore, fresh produce was described as expensive and had limited delivery within study communities. We found produce deliveries generally occurring only twice a week and quality produce quickly sold, resulting in longer periods without high quality food options. Interestingly, residents within each community were aware of the day and time of local produce deliveries. When referring to the lack of fresh produce, some residents indicated that frozen produce was at least better than "convenience" foods.

Similarly, there are many resources for physical activity in rural communities such as gyms, dance studios, pools, tennis courts, golf courses, and organized sports such as Little League, bike/run races, and basketball leagues through churches, schools, and Inter-Tribal Councils. Each community also has an abundance of no/low cost outdoor recreation options, including parks, biking and hiking trails, walking paths, volleyball, horseshoes, skateboard parks, etc. However, residents reported restricted access to available resources is a barrier to daily physical activity and contributes to their inactivity, which aligns with studies demonstrating that proportionately, more rural adults, 62.8 percent, are physically inactive than their urban peers, 59.3 percent (Patterson et al. 2004). Residents reported that privately-owned facilities are expensive and have limited hours of operation. Restricted access, including distance to asset, hours of operation or public availability, safety issues such as absence of gates and fences around playground or park areas, and facilities not being well-kept or modernized, also contributed to rural inactivity. We also found that communications advertising and promoting community events and activities were inaccessible or unavailable and not centrally coordinated in or among communities.

Finally, limited active transportation resources and current efforts to improve neighborhood walkability emerged as a major barrier to being physically active in rural communities. Great distances between where children reside and where schools are located prohibit children from walking or biking to school. Additionally, limited transportation including “late” buses prevented children and youth from participating in after school programs. A perceived lack of public transit options also prohibited seniors from accessing local trails and parks. Other features described as barriers to physical activity included dangerous roads (no shoulders, no sidewalks) and absence of bike racks, shade in desert communities with high summer temperatures, signage, and crosswalks. Finally, limited knowledge and education for local residents about what constituted weight healthy lifestyles were also discussed. Residents indicated a strong desire for direct education about fitness, exercise, and healthy eating.

DISCUSSION AND CONCLUSION

Engaging community residents and stakeholders in PR and utilizing HEAL MAPPS™ in rural Nevada communities developed a data-informed understanding of local resources and the rural obesogenic environment, which will be used to develop more successful programs to support healthy lifestyles. Since the environmental assets and barriers to weight

healthy lifestyle habits were generated by community residents, stakeholders are supportive of using the information to build programs that address the barriers. The study will be used as background support to improve the success of acquiring necessary funding for increasing access to healthy food, communication of fitness activities, and improving community walkability, for example.

The findings from this study highlight the complexities of location and exemplify the need for researchers and practitioners to fully understand such complexities if they are to be successful at engaging the communities and influencing behavioral, environmental, and health determinants. For example, because all participating communities functioned collectively with neighboring communities, practitioners must be cognizant of this interdependency when conducting needs assessments and aiming to influence or shape healthy lifestyle resources. Additionally, it would be beneficial for decision makers within each of the communities to work collaboratively and potentially pool resources, when appropriate, to affect change.

The importance of perceptions and access to correct information was exemplified. For example, residents of one Nevada community that bordered a neighboring state reported that they had to use their SNAP benefits at a smaller, more expensive grocer that was located within the state limits because they *perceived* their benefits were not accepted in the neighboring state. Although this is incorrect and residents can use their SNAP benefits at any SNAP eligible retailer, because they were not privy to the correct information or perceived it as false, it undoubtedly played a role in their shopping behaviors and likely their healthy lifestyle decisions. Uncovering such perceptions directly from the community members enabled Extension researchers in this community to begin addressing the misinformation through educational outreach.

Additional next steps in this project will be to conduct qualitative interviews in each Nevada community based on the overarching themes that surfaced during the process. Interviews with key stakeholders may provide additional information related to identified and/or perceived barriers and inform the development of effective intervention strategies to address environmental challenges to weight healthy lifestyles. For example, growers, grocers, and restaurant owners could be interviewed to understand the issues surrounding the lack of healthy food access to community residents, while private property owners could be engaged to better understand the barriers related to accessibility and develop potential solutions, such as subsidies. Once the interviews are conducted,

an additional forum will be held to bring these key stakeholders together to begin conversations that revolve around collaboration, policy, and partnerships to improve communication and local operations. It is our goal that local champions will surface to help begin the process of change and continue to foster community engagement.

Determining the level of community readiness is an important factor informing whether an intervention can be effectively implemented and received by a community, and which strategies will be most effective for promoting change. The combination of the qualitative and quantitative data provides a foundation for if, when, why, and how ready the community is for change and what steps might be considered. In other words, researchers want to determine for example, whether a community is ready to adopt an intervention (readiness) and if so, how to effectively implement the design features in these rural communities. Findings from the Community Readiness Model in HEAL MAPPS™ should be used to inform practice. Specifically, the range of scores in these four rural Nevada communities indicate that they are just vaguely becoming aware and are starting to preplan as a community to improve their environment. Thus, to be most effective, any efforts to improve healthy lifestyles should include the education of residents and stakeholders on weight healthy living practices to continue building awareness (scale 3) and should provide aid in focusing local efforts (scale 4). Both of these are necessary in progressing the community into the next level of readiness to change.

Information generated from adoption and implementation of HEAL MAPPS™ in rural Nevada communities will enable researchers to better understand the obesogenic environment and prioritize actions critical to curbing obesity rates. Community members' diverse experiences of environmental resources that promote or hinder healthy lifestyles is an important determinant for implementing interventions that provoke behavior change. Findings from the current study should be used to inform policy and aid in improvement of environmental factors that will ultimately lead to an enhanced quality of life for these rural communities.

There are some limitations to the validity and potential generalizability of this study. First, there may be issues with the selection of individuals for the quantitative and qualitative data collection. Although attendees at the community conversation were recruited using flyers and local announcements as an open public forum, the individuals that attended the event may not have been a true representation of the community. The broad spectrum of specific populations, groups, or sectors within the community infrastructure may not have been fully

represented. Additionally, self-selection bias may also be a contributing factor. Those who participated in the community conversation may have been more passionate about the issue than the community as a whole. Furthermore, the total estimated participants sample (n=183) and small number of communities studied (n=4) may also be a limitation. Finally, when collecting qualitative data by way of community conversations, the risk of overinflated indicator counts is conceivable. Often times, particular individuals might speak up more often and more vociferously than other attendees. This may possibly skew the data towards the opinion of those individuals. The Nevada researchers, however, did not observe this phenomenon while scribing the conversations. Finally, researcher bias could also contribute to theme partiality. This was minimized by having multiple evaluators at multiple levels code the data.

Research should never be conducted for the sake of research. It is a means to a bigger end including the production of knowledge from which action can be taken to improve health and reduce health status disparities (Oakes and Kaufman 2006). One important key to PR is to disseminate the results to all partners and involve them in the wider dissemination process (Oakes and Kaufman 2006). Since gathering information alone does not provide opportunities for active and ongoing community engagement and ownership of decisions related to the research findings, it is critical that researchers and practitioners continue to work with the communities on implementation of next steps. This continued engagement is likely to lead to increased community buy-in and mobilization to take ownership and action on efforts leading to the enhancements of the determinants necessary for healthy lifestyles in rural communities.

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