


Culturally adapting an evidence-based intervention to promote a healthy diet and lifestyle for Yup'ik Alaska native communities

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ABSTRACT

Underserved populations are at increased risk for obesity and related cardiovascular disease, type 2 diabetes, and other chronic diseases. Lack of access to healthy foods, sedentary behaviour, and other social environmental factors contribute to disease risk. Yup'ik Alaska Native communities are experiencing lifestyle changes that are likely to affect their cardiometabolic risks. Barrera & Castro's Cultural Adaptation Framework was used to adapt an evidence-based intervention (EBI) originally designed for Latino communities for use in Yup'ik communities. Focus groups and key informant interviews were held in two Yup'ik communities. Major themes included causes of obesity, barriers and facilitators to healthy foods and physical activity, and intervention ideas. The adaptation process was guided by a Community Planning Group of Yup'ik women and included information gathering, preliminary adaptation design, preliminary adaptation tests, and adaptation refinement. Two of the adapted educational modules were pilot tested. Involving community members as co-researchers in cultural adaptation is vital for an EBI to be effective in another population. Small group gatherings led by local lay health workers are culturally appropriate and may be an effective health promotion model in Yup'ik communities. Social environmental factors affecting healthy food availability and physical activity need further exploration.

ARTICLE HISTORY

Received 11 July 2022
Revised 4 December 2022
Accepted 14 December 2022

KEYWORDS

Yup'ik women; Alaska native; intervention research; cardiovascular disease; cultural adaptation

Introduction



Underserved and marginalised populations have increased risk for obesity and related diseases such as cardiovascular disease (CVD), type 2 diabetes (T2D), cancers, and other chronic diseases [1,2]. The prevalence of CVD is rising among American Indian and Alaska Native (AIAN) people [3]. Heart disease is now the leading cause of death for Alaska Native men and second leading cause of death in Alaska Native adults [4].

Lack of access to healthy foods, sedentary behaviour, and other social environmental factors contribute to obesity and CVD disease risk in underserved populations [5]. Affected populations often have limited access to health promotion programmes because of geographic location, cost, and logistics of attending programmes [6,7]. Culturally adapted evidence-based interventions (EBIs) are critically important for effective health-promotion programmes to address health disparities in culturally diverse populations [8,9].

Until fairly recently, intervention programmes on healthy diet and physical activity were based in health-care settings [10]. However, community-based

participatory research (CBPR) has led to a different approach to health and behavioural change based on reaching individuals where they live, rather than requiring individuals to come to a clinic setting [11,12]. For example, *Body and Soul* gathered African American women into their local churches to access weight control programmes [13]. Since then, a number of health promotion programmes have occurred in settings more accessible to individuals than health care facilities [14–16]. Importantly, in the past ten years, such programmes became adapted to take place in individual homes [17]. One such effort has been labelled as “home health parties”, where a community member invites friends and neighbours to participate in a series of educational sessions for health promotion. Sessions are led by a trained lay community health worker who is like the population being reached [18,19]. Such approaches have been successful in underserved populations such as Latinx [20,21], African American [22,23], American Indian [24,25], and other populations [26,27].

Consuming an unhealthy diet of highly processed market foods high in saturated fats, refined grains,

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and sugar, along with a transition to a more sedentary lifestyle, has increased the risk for obesity and related cardiometabolic diseases in rural Alaska Native communities [28]. Since 2003, we have conducted community-engaged research with Yup'ik Alaska Native people investigating risk and protective factors for CVD, T2D, and stroke [29–34]. Over 2000 Yup'ik adults have participated in these studies and many continue enrolling in new studies related to cardiometabolic disease. Clinically relevant research findings are shared individually with participants and aggregate findings are shared with the community, Tribal governments, and the Yukon-Kuskokwim Health Corporation (YKHC) who provides health care for all residents in the region. In a cohort of Alaska Native adults, we found the prevalence of obesity (BMI \geq 30) was significantly higher in women (40%) than men (20%), and 58% of the women had central adiposity compared to 18.6% of men [35]. Many study participants are not aware of the relationship between diet, physical activity, and CVD risk. Community members have expressed a desire for community-engaged interventions to promote healthy foods and physical activity.

Here we focus on the process of culturally adapting an efficacious home-based intervention targeted to a marginalised Latina (female) study population [36] for an intervention with Yup'ik women to decrease obesity and related risk factors for CVD. Although not the only framework available, this study used the Cultural Adaptation Framework (CAF) [37] to adapt the home-based intervention into one suitable for Yup'ik people [38,39]. The CAF is widely used to adapt behavioural health interventions [40] and has been expanded to include population-level impact [41]. Its essence consists of four steps: 1) Information gathering; 2) Preliminary adaptation design; 3) Preliminary adaptation test; and 4) Adaptation refinement. In each step, a mixed model research approach is used to guide the process of adapting, piloting and refining an EBI into another culture. Information gathering is largely qualitative with information obtained from key stakeholders in the culture to which the intervention is being adapted. Key questions include whether the EBI fits the new culture and areas that would be of concern or are not understandable. The second step takes the information gathered in the first step and builds an intervention that appears to be consistent with the new culture's norms and values. Focus groups and key informant interviews establish the principles that are relevant to the new culture. In step three, the resultant adaptation is examined by a group of stakeholders from the new culture. This group compares the EBI and the adaptation to ensure that the primary

objectives of the original EBI are maintained. Finally, in the fourth step, the adaptation is applied and any additional refinements made. Barrera and colleagues [40] have noted how the adaptations can meet local requirements, as well as engagement requirements, and sustainability.

In this work, we used the CAF to modify an existing EBI of dietary and physical activity change to meet the needs of Yup'ik communities. After following the steps given by Barrera and Castro, the resulting adaptation was piloted in Yup'ik communities. Here, we describe the process of adaptation and the reception given to the adaptation. Future work will assess the ability of the adaptation to result in dietary and physical activity change in Yup'ik communities.

Methods

The people

The Yukon-Kuskokwim Delta in southwest Alaska is the home of over 23,000 Yup'ik people, a culturally distinct Alaska Native population. Most Yup'ik people live in small, geographically isolated communities of 500 to 1000 people, and engage in a subsistence hunting and gathering way of life, providing a diet rich in marine and land mammals, fish, waterfowl, berries, and wild greens. Women are the primary caretakers and play an important role in the processing and distribution of fish and game [42,43]. However, the Yup'ik diet and lifestyle is in transition [44,45], and this has resulted in increased obesity-related disease risks [46]. Dietary patterns are changing due to a mixed economy that includes small community stores stocked with many energy-dense processed foods [47]. Furthermore, federal and state regulations have restricted the allowable amounts of fish and game for harvesting, which along with the high cost of fuel, has contributed to an increasing reliance on market foods [48]. In 2018, over 38% of AI/AN households in Alaska received food assistance through the SNAP programme [49]. Moreover, the U.S. Census Bureau reports 25.3% of persons in poverty in the Bethel Census Area compared to 11.4% reported in the overall U.S [50]. Climate change, including decreased snowfall, less pack ice to hunt marine mammals, and altered fish availability has impacted the harvest of subsistence foods [51,52]. While subsistence foods are still an important part of the Yup'ik diet, we have reported dramatic decreases in polyunsaturated fatty acid intake from fish and marine consumption over the past 60 years [53]. More recently, an increasing proportion of caloric intake is now obtained from market foods, high in sugar-sweetened beverages and

ultra-processed energy dense foods that have a long shelf life [47,54,55].

Historically, Yup'ik people lived a very active lifestyle and relied almost exclusively on hunting, fishing, and gathering activities to acquire subsistence foods for survival. More recently, overall activity levels and energy expenditure have decreased, and increasingly, community members have shifted to a more sedentary lifestyle with frequent use of snow machines and four wheelers [45,56]. This rapid transition threatens their traditional way of life and increases CVD risk.

Community planning group

A Community Planning Group (CPG) was formed at the beginning of the study and was engaged as co-researchers to provide community oversight, co-facilitate focus groups, analyse research findings, and guide the overall cultural adaptation of the intervention. The CPG was composed of six Yup'ik women who resided in the two study communities and who had participated in other research conducted by this group [57,58].

Participants

Adult women from two rural Yup'ik communities were invited to participate in focus groups via flyers posted in public places, word of mouth, and community radio announcements. As the primary caretakers and preparers of food, only women were included in the focus groups and adaptation refinement of the modules. Key stakeholders were identified in terms of their role in the communities.

Yup'ik women participated in seven focus groups during the information gathering phase. Five key informant interviews were conducted with both men and women who were stakeholders in the community, and included three managers of small local food stores, a community health aide and a local school board member. Demographics of focus group and interview participants are described in Table 1.

Study design

The conceptual framework guiding the study was the social ecological framework (SEF), a theoretical

perspective that notes that behaviour is determined not only by the individual, but also by factors around the individual such as family, organisations (workplaces, schools, religious organisations), community norms and values, and environmental factors such as the political economy [59,60]. Working from the SEF, we sought to identify personal and environmental barriers, as well as facilitators that participants thought influenced healthy food choices and physical activities. Focus groups and key informant interviews with stakeholders were held in two Yup'ik communities. The CPG helped facilitate focus groups in their communities, assisted in data analysis, and suggested refinements to the intervention. Two of the resulting culturally adapted modules were then piloted with women in each community. This bi-directional approach ensured community participation from the onset. We utilised the qualitative CAF which involved the four steps recommended by Barrera and Castro [37].

Step 1 – information gathering

Semi-structured key informant interviews with local stakeholders in each community were conducted to ascertain individual and environmental factors affecting a healthy diet and physical activity. These interviews were conducted at the local health clinic, community food stores, and a community member's home. We asked about the availability of healthy market and subsistence foods, and obstacles to obtaining healthy food. We also asked what types of physical activities were common in their community, the barriers to an active lifestyle, and activities that were culturally acceptable and feasible in their community. Participants were also asked about causes for excess body weight, what they thought constitutes a healthy diet, and their views of appropriate physical activity.

Focus groups with adult Yup'ik women (four in one community and three in the second community), were held to ascertain individual, social, and environmental factors that influence access to healthy foods and physical activity. Focus group sessions were held in a public community hall or in a community member's home.

All focus group sessions and key informant interviews were audio-recorded with consent of participants and transcribed verbatim by a Yup'ik cultural consultant

Table 1. Demographics of Focus Group (FG) and Key informant interview (KII) participants.

Location	FG	KII	Female	Male	Total	Age Range
	<i>n</i>	<i>n</i>	<i>n</i>	<i>n</i>	<i>n</i>	
Community A	18	2	19	1	20	26–95
Community B	18	3	19	2	21	19–72
Total	36	5	38	3	41	

and translator. Since parts of the recordings included participants speaking in Yup'ik, a Yup'ik translator who was present at the focus groups reviewed the recordings and translated Yup'ik words and discussions into English.

Step 2 – preliminary adaptation design

We presented an overview of an EBI using a “home health party” approach. The approach is based on sending a trained lay community individual to a home where the participating individual had gathered friends, family, and neighbours to learn about healthy dietary patterns and engaging in physical activity. Participants were asked what an intervention on food and body weight might look like in their community, and whether a similarly structured intervention using lay health workers in their community be feasible. Further questions explored the viability of having small group gatherings in people’s homes as an acceptable intervention. Finally, we asked what kinds of educational materials would be useful and how they should be shared.

Analysis

A thematic analysis of the focus group and interview transcripts was conducted using ATLAS.ti 7.5 for the Mac OS. Using an emergent approach from the data, Ms. Hopkins and Dr. Thompson coded the focus group and interview transcripts; then met to discuss the codes. They developed common themes from the codes. Discussions were held until consensus on the themes was reached. Six major themes (described below) were identified then discussed with and verified by a Yup'ik cultural consultant, and completed for subsequent discussion with the CPG.

Step 3 – preliminary adaptation tests

An in-person CPG meeting was held at a regional university campus to discuss the findings and finalise the major themes. The research team, along with a cultural consultant and the CPG, modified and developed the intervention based on focus group and key informant findings. The educational modules were modified and adapted to reflect the major themes identified. Yup'ik language and local subsistence foods were then integrated throughout the educational modules. Visual props such as Yup'ik specific food models and measuring cups/bowls commonly used in the households were helpful to understand portion size. The adapted content, described in [Table 2](#), was then reviewed by the

CPG to ensure that the primary behavioural and health objectives of the original EBI were maintained.

Step 4 – adaptation refinement

We tested the adapted materials and educational messages in a mock home health party conducted with the CPG members. The modules, handout materials and presentation approach used in the home health parties were then further refined based on feedback from the CPG members. The refined materials and approach were subsequently pilot tested during three focus groups in the study communities ([Table 1](#)).

A CPG member facilitated delivery of two of the adapted modules and other educational materials at the beginning of each focus group in a mock “home health party” to pilot test the intervention in her community. Each focus group was held in a community member’s home and lasted about 90 minutes. Module 1 “The Yup'ik Way is Good for You” focused on nutrients in food, their importance for health, and where healthy Yup'ik and market foods are available. Module 2 “Being Active is Good for Your Body” focused on the health benefits of physical activity and maintaining an active lifestyle. Participants then provided feedback on presentation style, interest in the topic, general understanding of the materials presented, and applicability and feasibility of an intervention using these modules. Cultural adaptation of the remaining four modules will be conducted with community lay health workers during the initial phases of an intervention.

Research oversight

This study was approved by the University of Alaska Fairbanks Institutional Review Board, the Yukon-Kuskokwim Health Corporation Human Studies Committee and Executive Board, and the Tribal Councils in our study communities. Each participant in the study provided written informed consent.

Results

Themes

Six major themes emerged from our focus groups and key informant interviews: 1) Causes of overweight and obesity; 2) Barriers to healthy foods; 3) Facilitators to healthy foods; 4) Barriers to physical activity; 5) Facilitators to physical activity; and 6) Intervention ideas.

Table 2. Cultural Adaptation of Educational Modules.

New Module	Objectives-Latino Course	Objectives-Yup'ik Course	Sample Yup'ik Activities
The Yup'ik Way is Good for You	<ul style="list-style-type: none"> Learn about connection between diet and disease Learn about small changes to choose healthier options Learn about simple substitutions to make food taste better Discuss importance of physical activity 	<ul style="list-style-type: none"> Discuss how diet and activity influences health Discuss the role of dietary changes Discuss that small changes can make big differences Discuss why Yup'ik traditional subsistence foods are healthy 	<ul style="list-style-type: none"> Checklist of conditions in one's own body Checklist of food substitutions and smart choices Create healthy foods with traditional Yup'ik ingredients Identify activities that are part of the Yup'ik traditional way of life
The Fats of Life	<ul style="list-style-type: none"> Learn concepts of healthy lifestyle Learn about foods that balance calories State difference between healthy and unhealthy fats 	<ul style="list-style-type: none"> Discuss and identify healthy vs. unhealthy fats Distinguish between saturated and unsaturated fats Discuss ways to decrease unhealthy fats in the diet Discuss fats as described on food labels 	<ul style="list-style-type: none"> Use worksheet to identify healthy vs. unhealthy fats Taste liquid fats (seal and olive oil) Prepare Akutaq (Eskimo ice cream) made with traditional ingredients, not unhealthy fats Practice changing unhealthy fats to healthy fats in a recipe
The Truth About Sugar	<ul style="list-style-type: none"> Learn about sugars and how they can be reduced Learn about foods that have simple and complex carbohydrates Eat foods high in complex carbohydrates 	<ul style="list-style-type: none"> Recognise hidden sugar in beverages Identify added sugar in processed food Discuss simple and complex carbohydrates Identify hidden sugars in food labels 	<ul style="list-style-type: none"> Estimate sugar in beverages such as Kool-Aid and Cola Track sugars consumed in one day in average diet Practice identifying simple and complex carbohydrates in food labels Taste beverages without added sugar (flavour enhancers, vitamin water)
Eating Healthy with Subsistence and Market Foods	<ul style="list-style-type: none"> Use MyPlate to describe a healthy diet Reading components of a food label Describe a healthy serving size How to eat healthy on a budget 	<ul style="list-style-type: none"> Demonstrate on MyPlate appropriate portion size Identify healthy market foods Plan a meal using healthy market foods Identify unhealthy market foods 	<ul style="list-style-type: none"> Draw a typical meal on MyPlate and discuss portion size Make a healthy meal using subsistence foods (moose stew) Prepare a meal using healthy market foods
Being Active is Good for You	<ul style="list-style-type: none"> Physical activity helps control chronic disease Physical activity helps to control weight Set S.M.A.R.T. goals to reach desired physical activity 	<ul style="list-style-type: none"> Describe what physical activity does for your body Describe typical traditional physical activities Identify factors that limit physical activity Participate in a traditional physical activity 	<ul style="list-style-type: none"> Create a Fitbit challenge for participants (e.g. 10,000 steps a day for a week) Participate in one or more traditional activities (packing water, tundra walking, wood hauling, fish camp, berry picking) Participate in Yup'ik leisure activity (e.g. fiddle dance, Eskimo dance)
The Healthy Yup'ik Way	<ul style="list-style-type: none"> Review modules Find someone who made changes Small changes lead to big differences Pace yourself and keep it up! 	<ul style="list-style-type: none"> Review modules on diet and physical activity Highlight changes made by participants Reinforce attendance at future meetings 	<ul style="list-style-type: none"> Have participants each say one thing they have learned Discuss how the Yup'ik way of life is a healthier way of life Distribute calendar with future meetings to attend if they wish

Table 3. Barriers to Healthy Foods.

Subsistence Foods	Market Foods
Fuel/Transportation Costs	Cost
Climate Change	Availability
Federal/State Regulations	Additives
Availability	Quality/Taste

Causes of overweight and obesity

The participants identified eating too much food and inactivity as the main causes of being overweight or obese.

Some noted that obesity tended to run in families and thought it was passed down from parents to their children.

Barriers to healthy foods

Healthy foods were categorised into two groups, subsistence foods that are hunted and gathered, and foods that are available in the local food stores (Table 3). Cost and availability were identified as barriers to both subsistence and market foods. The high cost of fuel for snow machines, boats, and four wheelers was a barrier

to hunting, fishing, and gathering subsistence foods. Market foods were considered expensive due to the cost of shipping to remote communities, and fresh fruits and vegetables were rarely available in the local stores. Others expressed concern about unhealthy additives in market foods.

A strong factor affecting food availability was the common use of “bypass” shipping – a freight service subsidised by the USA Postal Service that allows businesses in urban areas to ship directly to rural customers (usually stores) “bypassing” the postal service and going to local airlines. This provides lower costs for shipping but requires a minimum quantity of 1,000 pounds and goods can sit for long periods of time waiting for available space to ship to the communities [61]. This was seen as a detriment to the food that eventually reached the rural markets, because perishable items often arrive in poor condition or are spoilt.

The availability of subsistence foods or “food from the land” was identified as an overwhelming contributor to a healthy diet. Marine mammals, fish, moose, waterfowl, berries, and wild greens were considered an important part of a healthy Yup’ik diet, rich in cardioprotective omega-3 fatty acids [62,63]. One participant stated “We eat Native food, lots of Native food ...”

Barriers to physical activity

Barriers to activity were reported in three focus groups: environmental factors, use of motorised vehicles, and technology. Environmental factors included ice and the lack of snow. Slippery ice and the risk for injury was cited as a main barrier in walking outdoors especially among older women. The lack of snow hampered travel by snow machines to hunting and fishing sites where people could be physically active.

A further barrier was technology. As one participant noted “nowadays, what I’m seeing is electronic going on too much with our teenagers, our kids, our grandkids, ugh not like us. We used to go out and play every day, run around and all that and nowadays it’s mostly electronic, they’re doing it, electronic games, phones, iPad, computer”.

Facilitators to physical activity

Participants noted that the Yup’ik way of life is an active lifestyle of hunting, fishing, gathering food, hauling water and chopping wood. Additional traditional activities include spring and summer camping, and participating in traditional dance. One participant described “going out on the tundra, gathering greens, getting berries, run up the hill ...” Another woman shared about activities while camping “they do a lot of walking at fish camp, work on fish, play games ...” Other ways

people are physically active include basketball, volleyball, and community games. However, indoor sports are limited to when the school gymnasium is available and is more common in men than women as one participant shared “... there’s men and women’s, mostly men’s basketball”.

Intervention ideas

A community member’s home was the preferred location for intervention activities over a public meeting place. Public space to meet in the community requires additional funds and space is rarely available. Several of the focus groups were held in a CPG members home. One participant shared “We can gather like this in a home ...” This would allow small, informal gatherings that would promote learning and sharing of ideas. Educational materials that focused on health benefits of subsistence foods and healthy market foods were preferred. Participants said, these materials should include Yup’ik language and be specific for foods that are locally available. Format specifications included having small group discussions led by a community member and sitting in a circle where there is equal opportunity for discussion. A key component of focus group discussions was sharing traditional knowledge by Elders. The women expressed a need to learn how subsistence foods were prepared traditionally, before the introduction of unhealthy market foods.

Taste testing and sharing recipes were preferred ways to introduce healthy market foods that may be unfamiliar to community members. Community-wide events and “walking clubs” were identified as culturally appropriate ways to promote activity. Social media (Facebook and text messaging) were seen as a culturally acceptable and effective means of delivering health information and providing social support. It was noted that each community in the region has its own Facebook group and most adults have smart phones. However, women preferred their own intervention-specific Facebook group to deliver health information and provide social support.

Discussion

In this paper, we review the process of culturally adapting an EBI from a Latinx population to a Yup’ik population. Despite the vast differences in the two populations, the approach to the intervention preferred by Yup’ik people mirrored that of the EBI. Specifically, the participants liked the idea of having small group sessions held in their homes to focus on culturally-relevant ways of eating and engaging in physical activity. Small home-based gatherings are more feasible in

Yup'ik communities as public spaces to meet require funds for electricity and heating, and space is rarely available.

Collaboration with the CPG, comprised of women who had participated in our previous studies of risk and protective factors for CVD, was central to the success of this adaptation. The CPG and the women participating in the focus groups were integral to the cultural adaptation framework; they assisted in the modification, refinement and testing of the EBI to create one that would be culturally relevant for their community. Additionally, the women expressed feelings of ownership of the project and wanted the materials from the pilot testing to share with others in their respective communities.

The regional health corporation (YKHC) employs and trains local Community Health Aides to provide health care to community members. This culturally accepted, effective model of training community members can be used to train community lay health workers who can lead the same kind of home sessions that have been effective for health promotion interventions in other underserved populations.

Participants in the study desired more information about the nutritional benefits of subsistence foods as well as healthy ways of food preparation. Participants feared that traditional recipes are being lost with the increase in market food availability. Climate change and socioeconomic factors, including fuel and supply costs necessary for subsistence practices, are affecting access to healthy subsistence foods [51]. Access to healthy, affordable food options in the local stores (i.e. lean meats, fresh fruits and vegetables, whole grains and healthy vegetable oils) would promote healthy market food intake [64,65]. Training local store owners/managers to make healthier product choices for their stores will facilitate community access to affordable, healthier foods and reinforce what they learn in home-based sessions. Social media, such as Facebook groups and text messaging are widely used in these communities and can be an effective way to deliver health education about nutrition and physical activity.

Activity levels are changing as technology introduces a more sedentary lifestyle [66]. Community members, especially younger age groups, are transitioning to more sedentary time watching television, working on computers, and playing video games. The use of snow machines and four wheelers has decreased the amount of time spent walking within the communities and energy expenditure while engaging in subsistence activities compared to historical practices [67]. Community-wide activities such as walking groups, sponsored sports events, and traditional dance are all

culturally embedded ways to increase physical activity. Additionally, year-round access to the school gym is needed for basketball and other indoor structured sports.

Geographic isolation creates barriers to healthy living such as access to healthy market foods and physical activity. It is important to ensure that food choices do not increase CVD or other chronic diseases. Our results suggest that a home-based intervention focusing on healthy dietary patterns that include both subsistence foods and healthy market foods, as well as increasing physical activity, is an appropriate way to reduce the cardiovascular health disparities that are prevalent in this population. Our cultural adaptation supports this view.

Strengths and limitations

Community involvement in the cultural adaptation of the intervention was a major strength. Focus groups and interviews with community members provided culturally relevant information for the adaptation. The CPG assisted in analysing the data, refining, and testing the educational modules. Community members pilot tested and provided feedback on two educational modules, as well as provided feedback on essential components of a home-based intervention that would be culturally relevant and feasible in their community.

Limitations included the low number of key informant interviews and involvement of only two communities; thus, it is not known if the results are generalisable to other Yup'ik communities. Another limitation is that only two of the six modules used in Latinx communities were culturally adapted. However, the enthusiasm of the participants for the adapted intervention indicate that the approach is well-accepted and feasible. Lastly, this study focused on the individual level educational component of an intervention, and not the multi-level approach that is needed for an effective intervention to address the barriers to access to healthy food and physical activity.

Conclusions

Given the geographic isolation of rural Yup'ik communities, they are ideal venues for home intervention programmes. Collaborative cultural adaptation with community members as co-researchers is vital for an EBI to be effective in a culturally distinct, yet vulnerable population. Small group gatherings led by trained local lay health workers provide a culturally appropriate and effective health promotion model in Yup'ik communities. Interventions to increase availability of

healthy and affordable healthy food options in the local food stores are needed. Community-wide health promotion activities that are culturally relevant are preferred over clinic level interventions. Social environmental factors affecting healthy food availability and physical activity in these remote communities need further exploration.

Implications for practice

Many effective interventions for diet and physical activity exist, however, most are oriented to specific populations. Building on successful EBIs from other groups helps reduce the amount of time and energy required for implementing an intervention in a population in need. Cultural adaptation done in collaboration with, and delivered by, community members of the population may lead to effective and sustainable programmes in at-risk communities that could be a model for healthy promotion programmes in other rural Alaska Native communities. Future community-engaged research is needed to understand effective and culturally appropriate community-wide interventions in marginalised populations.

Acknowledgments

The authors wish to express our sincere appreciation to all of the Yup'ik community members who contributed to this study and to their communities for welcoming us and teaching us about the Yup'ik way of life.

Disclosure statement

No potential conflict of interest was reported by the author(s).

Funding

This work was supported by a COBRE grant from the National Institute of General Medical Sciences – NIGMS (P30GM103325) from the National Institutes of Health.

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