

RESEARCH PAPER

Addressing the public health burden caused by the nutrition transition through the Healthy Foods North nutrition and lifestyle intervention programmeS. Sharma,* J. Gittelsohn,[†] R. Rosol[§] & L. Beck[‡]

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Arctic, food shops, health education, Aboriginal Health, nutrition and physical activity intervention, worksites.

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Abstract

Dietary inadequacies, low levels of physical activity, excessive energy intake and high obesity prevalence have placed Inuit and Inuvialuit populations of the Canadian Arctic at increased risk of chronic disease. An evidence-based, community participatory process was used to develop Healthy Foods North (HFN), a culturally appropriate nutrition and physical activity intervention programme that aimed to reduce risk of chronic disease and improve dietary adequacy amongst Inuit/Inuvialuit in Nunavut and the Northwest Territories. HFN was implemented over the course of 12 months in a series of seven phases between October 2008 and 2009 (Nunavut) and June 2008 and 2009 (Northwest Territories). Combining behaviour change and environmental strategies to increase both the availability of healthful food choices in local shops and opportunities for increasing physical activity, HFN promoted the consumption of traditional foods and nutrient-dense and/or low energy shop-bought foods, utilisation of preparation methods that do not add fat content, decreased consumption of high-energy shop-bought foods, and increased physical activity. Messages identified in the community workshops, such as the importance of family eating and sharing, were emphasised throughout the intervention. Intervention components were conducted by community staff and included working with shops to increase the stocking of healthy foods, point of purchase signage and promotion in shops and community settings, pedometer challenges in the workplace and use of community media (e.g. radio and cable television advertisements) to reinforce key messages. HFN represents an innovative multilevel approach to the reduction of chronic disease risk factors amongst Inuit and Inuvialuit, based on strong collaboration with local agencies, government and institutions.

Rationale for an intervention

Previous research has highlighted the urgent need for nutrition and physical activity programmes to mitigate the negative impacts of the nutrition and lifestyle transition on Inuit and Inuvialuit populations of the Canadian Arctic. Erber *et al.* (2010a) and Hopping *et al.* (2010a) identified widespread dietary inadequacies (including vitamins A, B₆, E and D, dietary fibre, calcium, zinc and total folate) and

heavy reliance on non-nutrient-dense shop-bought foods. These shop-bought foods were consumed five to seven times more frequently per day than fruit, vegetables and traditional foods, and participants with higher socioeconomic status were somewhat more likely to consume nutrient-dense foods than those with lower socioeconomic status, suggesting possible economic barriers to a healthy diet in these communities (Erber *et al.*, 2010b; Hopping *et al.*, 2010b). Evidence also suggests that decreasing levels

of physical activity in these populations have contributed to growing obesity prevalence (Bjerregaard *et al.*, 2004; Deering *et al.*, 2009). The mean body mass index of a sample of Inuit adults in Nunavut and Inuvialuit adults in the Northwest Territories (NWT) was 29.9 kg/m² (overweight) and 30.0 kg/m² (obese), respectively (Expert Panel, 1998; Hopping *et al.*, 2010c,d). In 2005, approximately one-quarter of adults in Nunavut and the NWT self-reported a body mass index ≥ 30.0 kg/m² (obese), which was 10% higher than the national prevalence (Public Health Agency of Canada, 2009). Obesity places these populations at high risk for developing type 2 diabetes, heart disease and cancer (National Task Force on the Prevention and Treatment of Obesity, 2000). Age-adjusted prevalence of self-reported hypertension was 28 per 100 in a sample of Inuvialuit adults (Erber *et al.*, 2010c).

The literature has highlighted the major impact of 'psychosocial' factors, such as intentions to perform a healthy behaviour, on food choice and consumption (Ajzen, 1991; Glanz *et al.*, 1998; Van Duyn *et al.*, 2001; Pollard *et al.*, 2002; Watters & Satia, 2009). Mead *et al.* (2010a,b) demonstrated significant associations between dietary behaviours and the psychosocial factors of healthy food knowledge, self-efficacy and intentions amongst Inuit and Inuvialuit, thus emphasising key factors that can be modified by nutrition intervention programmes to improve health outcomes in these populations. Environmental interventions occurring in concert with individual behaviour change strategies have been identified as a promising approach for preventing obesity at the community level (Glanz *et al.*, 1995; Kumanyika, 2001). Environmental interventions appear to be particularly appropriate for addressing the emerging chronic disease epidemic amongst Aboriginal peoples. These populations are the most affected by the environmental changes associated with the nutrition transition, which have led to limited access to traditional foods and increased access to imported foods that are frequently high-fat, high-sugar and less nutrient-dense. By shifting the balance back to greater reliance on traditional foods and on those shop-bought foods that are lower in energy and/or more nutrient-dense, the negative effects of the transition may be mitigated. Combining these efforts to change food selection with interventions to increase physical activity will likely prove beneficial to Inuit, Inuvialuit and other Aboriginal populations in the Canadian Arctic.

Recent work with food shops has shown this to be an effective means of changing the food environment and improving diet and diet-related behaviours in low-income populations (Gittelsohn *et al.*, 2007, 2010a; Ho *et al.*, 2008). Food shops, which exist in almost every community in the Canadian Arctic, provide community venues for health promotion at the point of purchase, which can

influence decision-making at the moment when consumers are selecting foods for immediate consumption or for the household's groceries (Seymour *et al.*, 2004).

To date, there have been few efforts to implement nutrition and physical activity interventions targeting populations that utilise a community and evidence-based approach at the same time as working within the commercial food system to increase the accessibility and availability of healthier alternatives in the shops and promoting traditional food systems. To address the needs of Inuit and Inuvialuit populations, Healthy Foods North (HFN) was developed to reduce the risk of chronic disease and improve dietary adequacy. HFN is a nutrition and physical activity intervention programme targeting Inuit and Inuvialuit communities in the Arctic regions of Nunavut and the NWT, Canada. The first round of the programme was completed in four communities (as of October 2009) and the programme is currently being maintained in these communities as well as implemented in the two communities that served as comparison communities for the data collection. In this article, the components of the HFN programme are described and sample intervention materials are presented (Appendix S3).

The Healthy Foods North programme

The four intervention communities range in population size from approximately 800 to 3500 inhabitants, in median family annual income from C\$37 000 to 64 000 (£23 800 to 41 100), and in unemployment rate from 40% to 65% (Statistics Canada, 2007a,b). The remoteness of the four intervention communities plays a large role in the availability and accessibility of healthier food options. The transportation methods available at different times of year (i.e. airfreight, ice road and barge) greatly impact food availability, cost and quality in the communities (Sharma 2010a). The setting has been described in full detail elsewhere (Sharma 2010a). Institutional Review Board approval for the research and intervention components was obtained from the Committee on Human Studies at the University of Hawaii, Office of Human Research Ethics at the University of North Carolina at Chapel Hill, and Beaufort Delta Health and Social Services Authority Ethics Review Committee. The Nunavut Research Institute and the Aurora Research Institute licensed the study.

HFN was developed using a community participatory process, which included community workshops and qualitative and quantitative formative research (Gittelsohn *et al.*, 2010b). The qualitative research consisted of in-depth interviews conducted with community stakeholders that focused on health, nutrition and possible approaches to dietary and physical activity intervention, and the quantitative research used 24-h dietary recalls to investigate

nutrient intake and highlighted foods to target in an intervention programme (Sharma *et al.*, 2009, 2010b; Gittelsohn *et al.*, 2010b; Mead *et al.*, 2010c). Results from dietary recalls were presented to community members at community workshops (Gittelsohn *et al.*, 2010b). The community workshop process allowed all community stakeholders to use data collected from their communities in a practical manner to design a directed and relevant intervention programme. The workshops also enabled community members to develop and prioritise strategies for the programme, which fostered a sense of ownership amongst the communities. Finally, this process ensured that all components and materials of the intervention were culturally appropriate and relevant to the communities in question.

On the basis of community workshops, individual intervention materials and components were developed. The HFN intervention was divided into seven phases to be implemented over 12 months. It took place in the Nunavut communities between October 2008 to October 2009, and in the NWT communities between June 2008 and June 2009. Each phase, which was between one to two months in duration, focused on a particular theme and promoted certain healthy food options and approaches to physical activity (Table 1). In one phase, called the 'Teaser' phase, posters and flyers were posted that referred to HFN to generate interest in the community. Several primary themes (or motifs) were identified during community workshops and selected as overarching themes of the seven intervention phases. These included a family motif that represented a 'typical' Inuit or Inuvialuit family making healthy choices to positively impact on individual, family and community health, the importance of promoting traditional foods (particularly the hunting, gathering and sharing of traditional foods) and the economics and affordability of both traditional and shop-bought local foods.

Table 1 Healthy Foods North (HFN) intervention phases and components

Phase	Shop component	Physical activity component
0	Teasers*	–
1	Tea/coffee/healthy breakfast	Pedometer challenge
2	Healthy snacks	Pedometer challenge
3	Healthy home eating/ country foods	Pedometer challenge and walking club
4	Healthy beverages	Pedometer challenge and walking club
5	Healthier cooking/meal planning	Pedometer challenge and walking club
6	Getting enough vitamins & minerals	Pedometer challenge and walking club
7	Recap	Pedometer challenge

*Prior to the start of HFN, teaser posters and flyers were posted that referred to HFN to generate interest in the community.

Each of the seven programme phases included a number of key elements, such as print materials (i.e. posters, flyers, recipes, educational displays, shelf labels), radio and television advertisements and free gifts (called give-aways) that were tailored to fit the theme of each intervention phase and were given away at intervention activities. The main components of HFN included intervention and promotional materials, media and interactive, educational activities held in food shops, worksites, other community venues as well as community-wide events. Additionally, programme staff collaborated with the local food shops and national retailers to stock the promoted healthy foods for each phase (and maintain stock after the phase was completed), and the foods were promoted during the interactive educational sessions. Minimum standards were established for delivery of the components (Table 2). All materials and components of the programme were designed to reinforce each other, with the ultimate goal of reinforcing behaviour change to increase healthy eating and physical activity.

Staff from food shops and local recreation centre staff were involved in various aspects of the programme, such as taking part in community events. Involvement of other local organisations, such as Hunters and Trappers Associations and the Health Centre, helped to build support and understanding about HFN programme activities and provided the opportunity to develop future partnerships.

Healthy Foods North staff and training

A Healthy Foods North Manual of Procedures (MOP) was developed for programme direction, training and to ensure standardisation across the field sites. For implementation, local community members were trained to deliver the intervention components under the supervision and guidance of field coordinators. The community members were trained to implement interventions for 2–4 days using the MOP; they received additional booster sessions before the start of a new phase of the intervention. Training included didactic sessions, demonstrations and role-play. During initial and selected booster training sessions, a nutritionist from the local health authority/department provided lecture-style 'short-courses' on priority nutrition topics. Community staff received ongoing support and supervision from project coordinators located in their respective territory. Project coordinators accompanied local community staff during the first three or four interactive sessions and supported them through an ongoing constructive feedback process to build confidence and develop skills in completing the work outlined as key elements of the intervention programme. Conference calls with study investigators were conducted on a bi-weekly basis to address general issues that arose during programme implementation.

Table 2 Healthy Foods North (HFN) intervention implementation standards

Intervention component	Food shops	Community organisations/worksites
Healthy food choices stocked	Minimum of 30–50 units of target foods stocked for the duration of their promotional phase Encouraged shops to stock foods for remainder of the intervention	NA
Posters	One of each developed for the phase posted in plain view; full size Posted at the beginning of its phase Taken down at the end of its phase	One of each developed for the phase posted in plain view Posted at the beginning of its phase; Taken down at the end of the phase
Flyers	Minimum 10 passed out during each interactive session	Minimum 50 passed out during each phase
Educational displays	Put up during cooking demonstrations Put up as part of standing display (end-cap) throughout the phase	Standing display if permitted
Shelf labels	Posted at the beginning of its phase Remained up throughout the intervention 1 per 5 feet of shelf space	NA
Interactive sessions (cooking demos, taste tests)	Conducted a minimum of one time per shop per week per promotional phase Duration ≥ 2 h Performed at different times of the day and days of the week to maximise exposure	Conducted a minimum of two times per promotional phase in those community settings that have room for demos
Cable television ads	NA	Played at least two times per week during the appropriate phase
Radio announcements, stories	NA	Played at least two times per week during the appropriate phase
Coffee station makeover	NA	Two times per phase, maintained over course of the phase
Giveaways	Passed out during cooking demonstrations and taste tests	Passed out at community events, workplace pedometer challenges
Pedometer challenge	NA	Enrolled 4–8 people per worksite/phase Conducted in 2+ worksites/phase

NA, Not applicable.

Intervention materials

Key programme messages were delivered during each intervention phase through several media outlets (e.g. television, local newspapers and website) and functional phase-specific giveaways (e.g. HFN water glasses or bottles given away during the healthy beverages phase). The community workshops and community consultants, who collaborated for the duration of the programme, helped in the development of the intervention materials. These materials were tailored to each phase's messages and themes. For example, in phase four (healthier beverages), one of the promoted dietary behaviours was the consumption of water in place of carbonated drinks, so posters and flyers were developed to advertise this message (Appendix S3) and giveaways at intervention activities included water bottles and pitchers with water filters. The community participatory process for materials development ensured that messages and images were culturally appropriate. For example, the phase four poster promoting 'Immiq' (good water) showed the traditional method of gathering ice for water, thus also promot-

ing physical activity (Appendix S3). The phase three flyer illustrated the theme of healthier eating at home by depicting an Inuit or Inuvialuit family eating in the traditional style (on the floor using an ulu¹ to cut meat) and by comparing the healthiness of traditional meats (known locally as 'country' foods) with shop-bought meats (Appendix S3). All materials were available in English as well as in local languages (Inuktitut and Inuinnaqtun) where appropriate. The logo for the HFN programme was also developed based on community input.

Retail food shop components

The goals of the food shop components of the HFN intervention programme were to increase accessibility and availability of healthier food choices and to promote these foods at the point of purchase. Using formative research findings and information from community workshops,

¹An ulu is an Inuit all-purpose knife.

the HFN team initiated a series of regular meetings and conference calls with local food shops and their national headquarters. The focus of these meetings was to create an opportunity for shared community dialogue regarding the availability and feasibility of a set of specific healthier food products and brands made available in the shop that could be promoted during each programme phase. The criteria for promoted food selection included meeting community needs, requests, nutrient content, food availability and cost. Promoted food items for each phase were sold at an equal or lesser price than the unhealthy alternatives that they were intended to replace.

Other in-shop components of the HFN intervention programme consisted of a set of activities that supported and promoted healthier food options to positively influence food-related psychosocial factors (i.e. increase healthy food knowledge, self-efficacy and intentions to consume a healthy diet). These psychosocial factors were expected to impact on dietary behaviour (i.e. increase the procurement of nutrient-dense traditional and shop foods, decrease the procurement of non-nutrient-dense foods and increase the use of cooking methods that reduce fat content) at household and individual levels. Promotional methods included signage, such as posters, flyers, shelf labels, displays at the end of food aisles, and interactive sessions. Posters and flyers promoted health and wellness and provided information to participants on making healthy food choices (Appendix S3). Shelf labels were colour-coded, produced in both English and, where appropriate, Inuktitut/Inuinnaqtun and located prominently in the shops to assist consumers in locating specific promoted foods, clearly identifying the promoted foods as healthier choices. In addition, end-of-aisle (also called end-cap) displays promoted key foods and nutritional messages. Interactive sessions included taste tests of promoted foods, demonstrations of healthier cooking methods, sharing of basic nutrition information and tips, and distribution of recipes and flyers. Interactive sessions were conducted approximately twice per week, ensuring that a high proportion of community members were exposed to the intervention (Table 2). During each phase, promotional items with the HFN logo, such as refrigerator magnets, cereal bowls and coffee mugs, were distributed to community participants of the programme.

Worksite components

The goals of the worksite components of the HFN intervention programme were to provide opportunities for increased physical activity and to reinforce key messages of each intervention phase. During each phase, one to three worksites in each community were identified and

invited to participate in pedometer challenges. Free pedometers were distributed to participants, and small contests were held within and between worksites as friendly competitions to promote walking and keep track of the most steps walked over a given period of time. The first phase of the programme included worksite coffee station makeovers, which consisted of HFN community staff visiting worksite coffee rooms to promote alternatives to unhealthy additions to coffee and tea. Sugar was replaced with artificial sweeteners, non-dairy creamer with skimmed milk powder and educational materials promoting these healthy alternatives were posted in the worksite. In many cases, community staff also provided short educational sessions to staff at the worksite about the HFN programme, and healthy food and lifestyle choices.

Community media components

Community media components of the HFN intervention programme reinforced key messages delivered throughout each intervention phase. Use of community and/or other media opportunities varied, depending on preferred and/or available methods in each HFN community. As such, radio and cable television advertisements were methods used more in some communities than others. Where they were used, approximately two to three brief radio 'stories' were developed for each intervention phase, where local actors portrayed typical family characters, such as a grandmother, husband, wife and children. HFN interactive sessions in shops, worksites and at community events were announced regularly to inform community members of any ongoing or new programme activities. Cable television advertisements featured simplified messages based on the posters or flyers for each phase and were broadcast throughout each phase. Posters were displayed prominently in public locations throughout each community, and newsletters or newspapers were also used to disseminate information, such as local events, key nutritional messages, physical activity tips and recipes. Communications were provided in the local languages of Inuktitut and Inuinnaqtun, as well as in English, where appropriate.

Other community-wide components

Many additional components of the HFN intervention were present at the community level, such as existing local events that provided opportunities for information dissemination to community residents. These events included health fairs organised in collaboration with other health and wellness associations, and organising educational booths at various events, such as local cultural and community celebrations or at trade shows held in the communities.

To promote physical activity at the community level, some of the HFN communities created walking clubs. For example, by working in collaboration with the NWT Recreation and Sports Association, physical activity was promoted through the formation and facilitation of Nordic walking workshops and social walking groups at various skill levels (beginner, intermediate and advanced) in the NWT communities. Walking events and activities were led by trained community members. Other events included community hikes to the pingos (a local landmark in the NWT), community dances, fitness classes and family outings incorporating various forms of recreation (e.g. relay games and soccer tournaments). HFN staff collaborated with community-based organisations, such as the Elders and Youth Programme and the Canada Prenatal Nutrition Program, to deliver healthy eating and physical activity messages specific for these programme participants. HFN regularly partnered with local health programmes to help organise or participate in community-wide events, such as the *Community Clean-Up* day, *Fetal Alcohol Spectrum Disorder* workshop, and *Embrace Life Walk for Suicide Prevention*. Physical activity was also promoted indirectly by emphasising the importance of traditional practices such as hunting and gathering, including activities such as fishing, collecting ice water and berry picking.

Healthy Foods North: an innovative and collaborative approach to chronic disease prevention

The HFN intervention programme represented an innovative approach to the reduction of chronic disease risk factors in Inuit and Inuvialuit in the Canadian Arctic. It consisted of a number of essential elements, each of which involved multilevel collaboration with multiple stakeholders. Formative research on current Inuit and Inuvialuit diet, traditional and current attitudes and practices provided a strong basis for the development of a culturally appropriate, evidence-based programme (Gittelsohn *et al.*, 2010b). The programme design was based on meaningful community level support, consultation and involvement for the duration of the project, which are all vital components of a successful health promotion/chronic disease prevention programme. Community advisory groups, established during the formative research phase, continued to be involved in ongoing material and activity development through design and refinement of data collection instruments, data collection processes, intervention implementation and evaluation. In addition, HFN combined environmental components to increase both the availability of healthful food choices in local shops and opportunities for increasing physical activity. These essential components and processes resulted in an intervention that was intended to be sustainable and based on a commu-

nity's needs, desires, culture, and current health and dietary intake. However, programmes such as HFN may require additional, follow-up years of strong support and ongoing programme and leadership training to current staff members to achieve sustainability.

The design, implementation and evaluation of HFN were necessarily part of a long-term process that was essential in building meaningful and lasting partnerships, community-level support and government involvement. In addition to community-level and government support, additional elements required were collaboration with the private sector, academic and research components, and linkages with other government departments and their role in food systems and population health. Partnerships with academia provided expertise in designing a scientifically rigorous programme with appropriate evaluative measures for a unique population.

HFN invested considerable effort in collaboration with key stakeholders and the creation of meaningful and engaged multisectoral partnerships. Such collaboration is imperative in the design of programmes that strive to address determinants impacting the health status of any population. The NorthWest Company, Arctic Co-operatives System, the Inuvialuit-owned Stanton's Shops and Arctic Foods were retail food partners. This level of partnership was essential as a large component of nutrition education included point of purchase promotions in the retail setting. Additionally, partnerships with a large number of community and non-governmental organisations (at the community, regional, territorial and national levels) were essential to the success of the shorter-term goals of behavioural change and longer-term goals of environmental and policy change in the areas of nutritional and physical health, as well as overall food security.

Conflict of interests, sources of funding and authorship

The authors declare they have no conflicts of interest. The project was supported by American Diabetes Association Clinical Research award 1-08-CR-57, the Government of the Northwest Territories, the Government of Nunavut, Health Canada, Public Health Agency of Canada, and the Northwest Territories and Nunavut Public Health Association. SS developed the conception and design of the study, and all authors contributed to the drafting of the manuscript. SS and JG guided the development of the intervention strategy. LB and RR oversaw implementation of the intervention in the NWT and Nunavut, respectively. The authors critically reviewed the manuscript's content and have approved the final version submitted for publication.

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