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An Integrated Multi-Institutional Diabetes Prevention Program Improves Knowledge and Healthy Food Acquisition in Northwestern Ontario First Nations

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This article presents the impact results of a feasibility study in Canada for prevention of risk factors for diabetes in seven northwestern Ontario First Nations. Baseline and follow-up data were collected before and after the 9-month intervention program in schools, stores, and communities that aimed to improve diet and increase physical activity among adults. Regression analyses indicate a significant change in knowledge among respondents in intervention communities ($p < .019$). There was also a significant increase in frequency of healthy food acquisition among respondents in the intervention communities ($p < .003$). There were no significant changes in physical activity or body mass index in either intervention or comparison groups. The multi-institutional approach demonstrated promising results in modifying selected risk factors for diabetes First Nations communities.

Keywords: *First Nations; diabetes; community-based intervention*

The prevalence of Type 2 diabetes in Native North Americans is among the highest in the world, with up to 50% of adults in some communities documented as having diabetes (Centers for Disease Control [CDC], 2003; Harris et al., 1997). Fortunately,

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clinical trials have shown that modification of diet and physical activity are effective ways to reduce development of diabetes in high-risk individuals (Knowler et al., 2002; Tuomilehto et al., 2001). These intensive, individually targeted interventions are expensive and unsustainable for large populations in the long term. As the population at risk continues to grow, community-based strategies can reach more people and make lasting environmental changes to support individual behavior. A number of community-based trials for Native North American children and youth have been successfully implemented, but with mixed results (Caballero et al., 2003; Paradis et al., 2005; Ritenbaugh et al., 2003; Saksvig et al., 2005). Fewer studies have targeted adults and these have generally used a single intervention approach. In addition, some studies lacked comparison groups or measurements of proximal risk factors such as body mass index (BMI) or objective measures of physical activity (Goodman, Yoo, & Jack, 2006; Satterfield et al., 2003).

The Zhiiwapenewin Akino'maagewin: Teaching to Prevent Diabetes (ZATPD) program was a feasibility study of an integrated multi-institutional diabetes prevention program with school, store, and community components. One intention of working with school, store, and health/social services staff was to integrate program activities with existing activities. The primary goals of the intervention were to improve dietary choices and physical activity by increasing knowledge, self-efficacy, and attitudes about healthier behaviors as well as improving availability or opportunities to perform them. The intervention approach was based on social cognitive theory (Bandura, 1986) and drew from the experiences of the Sandy Lake School Diabetes Prevention Program (SLSDPP; Saksvig et al., 2005) and the Apache Healthy Stores (AHS) program (Curran et al., 2005). These studies used influences on environmental, behavioral, and personal factors to improve diet and physical activity. Materials and activities from SLSDDP and AHS were modified and new components were developed through formative research and collaboration with key stakeholders and community members (Ho, Gittelsohn, Harris, & Ford, 2006).

School Component

The ZATPD school component was based on a revision of the SLSDPP curriculum for third and fourth grades that promoted healthy eating and physical activity. In particular, changes were made to increase the relevance of the activities to semiremote communities. This component was included because key stakeholders were highly supportive of programs targeting school children, and reviews and recent research (Crockett, 1988; Davis et al., 2002) have suggested that children can be successful change agents in modifying parental behavior. The curriculum consisted of 16 lessons in third grade and 17 lessons in fourth grade to be led by the classroom teacher. Lessons were centered on a series of stories about two Native children and an elder who role modeled healthy behaviors. Activities encouraged students to practice these behaviors to increase personal factors, such as knowledge, self-efficacy, and intentions. Physical activity breaks and links to Ontario curriculum requirements were added to lessons to allow teachers to efficiently incorporate health into their daily classroom schedule. Physical activity resources for schools without physical education staff were developed based on teacher input and successful school programs, such as Pathways (Caballero et al., 2003) and CATCH (Luepker et al., 1996). The school component also included recipe cards and cartoons for school newsletters, posters, and letters and family action packs sent home to parents or guardians. Schools were also encouraged to adopt a policy of no soda and chips in school and to review their breakfast and lunch programs for nutritional content to provide environmental reinforcement for dietary behavior change.

Store Component

We adapted the AHS program by rearranging the order of phases to better correspond with lessons in the school component, choosing more appropriate foods, modifying artwork, and some program messages. The store component promoted healthier alternatives to commonly consumed foods over the five phases. Shelf labels, posters, flyers, and cooking demos or taste tests were used to convey program messages at point of purchase and to encourage consumption of foods that are lower in sugar, higher in fiber, or lower in fat through observational learning, changing of personal factors such as beliefs or intentions, and reinforcement. Store managers were encouraged to stock these foods if they did not already carry them. Based on the recommendations of community members, demos were conducted primarily on paydays or days when social assistance or child benefit checks are issued because patronage of stores is highest on those days. Because stores in some communities were located off reserve, we adapted the program to provide demos in local offices or community centers as well as in stores.

Community Component

To reach more community members and integrate with existing health and social services activities, a community component was developed. This included mass media (posters, flyers, cartoons in newsletters or on local access cable, and radio messages), cooking demos or taste tests in band offices on high traffic days such as when checks are issued or clinics were being held, and community events such as walking challenges or family fun nights. Program assistants were also encouraged to work with existing health and social service programs as a venue for educational workshops or cooking demos where community members could practice healthier behaviors to help increase self-efficacy.

Integration and Delivery of Intervention Components

The three components were integrated through five thematic phases lasting 6 to 8 weeks. For instance, when students were learning about added sugar in beverages, the store component promoted beverages lower in sugar, and in band offices the program assistant worked to improve the beverage choices offered and conducted taste tests of healthier options. Each of the five phases targeted specific foods or behaviors: (a) starting the day with healthy foods and exercise, (b) reducing fat, (c) healthier beverages, (d) shopping wisely and including five servings of fruits and vegetables a day, (e) healthier snacks and daily activities. The program assistant was a local community member who received training from the research staff on nutrition, physical activity, diabetes, health education strategies, and program-specific instructions on how to implement activities. She was supported by a field supervisor for the first 6 months of the intervention and then by phone and a site visit from the project coordinator. The program assistant was encouraged to collaborate with band and school staff on community activities and events to integrate the program into existing institutions and increase sustainability.

Process evaluation on feasibility of the intervention has been reported elsewhere (Rosecrans et al., 2007). This article presents data on the impact of ZATPD on diet and physical activity behavior, obesity, and their psychosocial determinants.

METHOD

The study was a quasi-experimental pretest/posttest evaluation conducted in four sites in northwestern Ontario. Site A (remote First Nation) and Site B (three smaller semiremote First Nations situated within an hour of a rural town) were paired with Site C (remote First Nation) and Site D (two smaller semiremote First Nations near a different rural town). Sites A and B received the intervention between September 2005 and June 2006, whereas Sites C and D were treated as comparison during this period and received the intervention in the following year. This study was approved by all First Nation band councils, the University of Western Ontario Ethics Review Board, and the Johns Hopkins Bloomberg School of Public Health Committee for Human Research.

The study took place in northwestern Ontario. Thunder Bay is the largest city in this region, with a population of about 125,000, including surrounding suburbs. Several smaller towns of population less than 10,000 are scattered throughout the rural region. Most of the non-Native communities lay in the southern part of the region, whereas further north there are mostly only fly-in First Nation communities. The semiremote reserves in the southern part of northwestern Ontario have road access to nearby non-Native communities, but in the north, remote reserves are isolated by the vast boreal forest and numerous lakes and are accessible only by air for about 10 months of the year. Semiremote communities generally do not have grocery stores, schools, or nursing stations on reserve and instead access these services in the nearest non-Native town. The two schools for Site B were approximately 25% and 85% Native and run by local school districts. The participating stores were all owned or operated by non-Natives. Remote communities usually have grocery stores, schools through eighth grade, and nursing stations on reserve. Other health care providers, such as dentists, physicians, and dietitians, fly in to remote First Nations to provide services, but often at infrequent intervals. All the stores in Site A were locally Native-owned and the school was run by the local education authority. In all locations, nearly all respondents reported grocery stores as their primary food source. There are no government commodity or food stamp programs in these areas other than occasional vouchers for pregnant women to purchase milk. As a result of the high prevalence of renal failure associated with diabetes, there are satellite hemodialysis facilities in all three of the northwestern Ontario district center towns.

A total of 13 trained individuals (5 community members, 3 research staff, and 5 students) collected data at baseline and follow-up. Informed consent was obtained from all participants. Baseline data collection was conducted from June to September 2005, when the first round of intervention began. After 9 months of intervention, follow-up data collection was completed from June to August 2006. Pregnant women, women who had a live birth in the past 6 months, and people who had not been living in the community for the last 30 days were excluded at baseline. At follow-up, we attempted to contact all 133 persons interviewed at baseline and were able to reach 80%. Of those, 88% (n = 95) completed the follow-up evaluation. Interviews were conducted at the respondent's house or the local band or health office.

Measures

At baseline, we assessed independent variables such as age, marital status, education, employment, material style of life (MSL), household size, and self-reported diabetes or impaired glucose tolerance (DM/IGT) to adjust for them in subsequent analyses. MSL is an additive index of 18 possible possessions (vehicle, washing machine, etc.) owned by the household used to represent socioeconomic status because of the variation in cost of living across communities and informal employment.

Psychosocial Factors and Food Behaviors. An adult impact questionnaire (AIQ) was administered to assess personal factors of knowledge, self-efficacy, outcome expectation, and intentions for specific food-related behaviors. Social cognitive theory suggests that personal factors interact with individual behavior and the environment to influence human functioning (Bandura, 1986). Individual's decisions, actions, and health outcomes depend on both their own characteristics and the social forces that shape the context in which they live. They learn by observing other's behaviors and choose whether to adopt those behaviors based on their perceptions of their own abilities (self-efficacy) and the perceived consequences (outcome expectations). Cooking demonstrations and taste tests provided an opportunity for both knowledge acquisition and observational learning. The environmental portions of the intervention, such as increased availability and promotion of healthier food choices, were also intended to influence personal factors, which in turn would be thought to change behavior. In addition, questions on frequency of healthy food acquisition and food preparation were included. We also collected data on dietary intake using a quantitative food frequency questionnaire, which will be reported elsewhere.

Food knowledge is the sum of scores for five multiple-choice questions related to healthy eating choices divided by the number of items allowing a minimum score of 0 (*no correct answers*) and a maximum score of 1 (*all correct answers*). (Baseline $\alpha = .42$; follow-up $\alpha = .478$.)

Healthy food self-efficacy is based on six multiple-choice questions. Respondents were asked how easy or difficult it would be (using a 4-point Likert-type scale) to perform a series of behaviors (e.g., How easy or difficult would it be for you to use cooking spray instead of oil or margarine to make eggs?) Scores were averaged into an index (baseline $\alpha = .56$; follow-up $\alpha = .47$).

Healthy food outcome expectations refer to participants' beliefs about the benefits of healthy food consumption. It was operationalized through six questions. Respondents were asked how helpful (using a 5-point Likert-type scale) they thought the series of behaviors presented in the knowledge and self-efficacy questions would be in keeping them healthy (baseline $\alpha = .80$; follow-up $\alpha = .76$). The distribution of scores was skewed, so the variable was transformed into two categories of medium or high outcome expectations as there were no scores in the low category.

Healthy food intentions is based on six multiple-choice questions (baseline $\alpha = .59$; follow-up $\alpha = .73$). Respondents were asked how often (using a 5-point Likert-type scale) they intended to perform the behaviors mentioned in the previous series of psychosocial questions in the next month. For instance they were asked, "During the next month, how often will you use cooking spray instead of oil or margarine?"

Healthy food acquisition frequency is an additive scale that includes 25 healthier food choices to be promoted by the ZATPD program (baseline $\alpha = .70$; follow-up $\alpha = .63$). We refer to food acquisition instead of food purchasing because many people fish or hunt in addition to purchasing food from stores. Respondents were asked to report how many times in the past 30 days they had acquired each food. The distribution of scores was skewed, so for the regression analysis, the square root of the score was used. This transformation resulted in a decrease in the skew coefficient from 1.4 to 0.49.

Healthy preparation of food represents the healthfulness of preparations of seven commonly consumed foods: ground beef, chicken, pork, fish, venison/moose, potatoes, and eggs (baseline $\alpha = .45$; follow-up $\alpha = .50$). Respondents reported the three primary methods of preparing these foods and each method was assigned a score and weighted for frequency.

Physical Activity. The same Actical accelerometers (Minimitter, Respironics Inc., Eugene, OR) were used at baseline and follow-up to measure activity in the follow-up evaluation. Respondents were instructed to wear the accelerometer at the hip at all times except when bathing for at least 3 days, including both weekend and weekdays.

Anthopometric Status. Height, weight, and percentage of body fat were assessed using the Invicta Plastics stadiometer and the Tanita UM-206 scale/bioimpedence analyzer, to the nearest 0.1 cm, 0.1 kg, and 0.1%, respectively.

Data Management and Analysis

Data from the AIQ were collected on paper forms and entered into MS Access, and 10% of entries were double-checked for quality control. Accelerometry data were downloaded from Acticals using an Actireader and extracted into MS Excel files for cleaning. All data were imported into Stata for cleaning and analysis at Johns Hopkins Bloomberg School of Public Health.

Descriptive statistics were calculated for all the follow-up data (means ± *SD*, minimum and maximum values). Differences in pre/post values across intervention and comparision communities were compared using *t* tests as well as regression analyses. Results were similar, so regression results adjusting for potentially confounding covariates are presented. All regression models adjusted for baseline value of the outcome variable, intervention/comparison assignment, age, gender, MSL, DM/IGT, and remote community. We also examined interaction between knowledge, self-efficacy, and intervention group.

RESULTS

Except for household size, there were no significant differences between the intervention and comparison respondents at baseline (Table 1). Respondents lost to follow-up were less likely to have diabetes, more likely to reside in comparison and remote communities, and more likely to have had lower knowledge scores at baseline than those retained.

Intervention Effects

Table 2 shows raw mean outcome scores at follow-up for the intervention and comparison sites. Respondents in comparison communities lived in significantly smaller households, most likely because there was a greater proportion of households in this group from semiremote communities where household sizes are smaller. In what follows, we describe differences in follow-up scores after adjustment for baseline scores, age, gender, MSL, DM/IGT, and remote community.

Table 1. Difference in Baseline Sociodemographics of the Study Sample (n = 95)

Sociodemographic Characteristics	Intervention (n = 57)	Comparison (n = 38)	p Value[a]
Male (%)	21.4	23.7	0.797
Age (years), mean (*SD*)	40.3 (11.5)	44.7 (12.7)	0.080
Grade 12 or equivalent education (%)	48.2	57.9	0.357
Material style of life (mean, *SD*)	10.3 (3.4)	11.1 (3.8)	0.286
Cohabitating (%)	64.9	52.6	0.231
Household income <$20K CAD, (%)	33.3	42.1	0.385
Earned income in past year (%)	61.4	68.4	0.484
Household size (mean, *SD*)	4.7 (2.1)	3.5 (2.1)	0.006
Self-reported diabetes or IGT (%)	38.6	29.9	0.333

NOTE: *SD* = standard deviation; IGT = impaired glucose tolerance.
a. Two-tailed t test of means or proportions.

Table 2. Psychosocial, Behavioral, and Anthropometric Outcomes for Intervention and Comparison Groups at Follow-Up (n = 95)

	Intervention	Comparison
Knowledge score, mean (*SD*)	0.73 (0.25)	0.62 (0.22)
Self-efficacy score	3.39 (0.38)	3.28 (0.52)
Outcome expectation score	4.35 (0.59)	4.06 (0.67)
Intention score	3.51 (0.62)	3.16 (0.86)
Healthy food acquisition score	45.86 (25.5)	33.92 (19.3)
Healthy food preparation score	1.32 (1.91)	1.65 (1.57)
Total activity counts	221,431 (101,419)	229,809 (127,320)
Minutes of sedentary PA/day	952 (116)	880 (175)
Minutes of light PA/day	280 (61)	331 (119)
Minutes of moderate PA/day	207 (71)	228 (91)
Minutes of vigorous PA/day	1 (2)	1 (4)
BMI	30.8 (7.6)	31.1 (6.8)
Percentage body fat (n = 92)	38.5 (9.0)	38.6 (9.0)

NOTE: *SD* = standard deviation; PA = physical activity; BMI = body mass index.

Food Behaviors and Psychosocial Determinants (Table 3). At follow-up, intervention respondents had significantly higher healthy food acquisition scores than comparison respondents after adjustment for baseline scores and other covariates. There were no significant differences in the healthiness of food preparation score. Food knowledge scores were significantly higher at follow-up for intervention than for comparison adjusting for baseline scores and covariates. There was no significant difference in self-efficacy or outcome expectations (not presented). Food intention scores were slightly higher for intervention versus comparison, but the difference was not statistically significant. The interaction term for baseline knowledge with follow-up self-efficacy was significantly associated ($p < .02$) with follow-up healthy food preparation score after adjusting for baseline scores and intervention group.

Table 3. Impact of ZATPD Intervention on Diet-Related Psychosocial Factors and Behaviors ($n = 95$)

	Food Knowledge Score		Food Intentions Score		Healthy Food Acquisition Score[a]		Healthy Food Preparation Score	
	β	*p* Value	β	*p* Value	β	*p* Value	β	*p* Value
Baseline value	.516	.000	.651	.000	.462	.000	.522	.000
Intervention group	.099	.019	.195	.103	.947	.003	–.367	.273
Sex	–.035	.468	–.315	.026	–.712	.060	–.343	.407
Age	–.001	.353	.002	.676	.023	.084	–.011	.439
MSL	.017	.006	.017	.289	.125	.007	–.006	.908
Remote	–.079	.072	–.238	.049	–.095	.778	.092	.788
DM/IGT	.029	.521	.308	.016	.423	.203	.172	.637
Intercept	.209	.128	.950	.023	.570	.518	1.671	.042
Adjusted R^2	.3484		.4695		.4058		.2451	

NOTE: ZATPD = Zhiiwaapenewin Akino'maagewin; MSL = material style of life; DM/IGT = diabetes or impaired glucose tolerance.
a. The square root of the healthy food acquisition score was used due to nonnormality of the raw score.

Table 4. Impact of ZATPD Intervention on BMI and Percentage Body Fat

	Post-BMI ($n = 92$)		Percentage Body Fat ($n = 83$)	
	β	*p* Value	β	*p* Value
Baseline value	1.097	.000	.913	.000
Intervention group	.818	.113	.150	.889
Sex	–.476	.430	–.921	.542
Age	.003	.907	–.067	.149
MSL	–.038	.603	.044	.770
Remote community	–.489	.346	–1.217	.255
DM/IGT	–.849	.122	1.491	.193
Intercept	–2.061	.190	5.589	.093
Adjusted R^2	.8913		.7451	

NOTE: ZATPD = Zhiiwaapenewin Akino'maagewin; BMI = body mass index; MSL = material style of life; DM/IGT = diabetes or impaired glucose tolerance.

Physical Activity. Total activity counts decreased for both intervention and comparison, whereas minutes of sedentary activity increased for both groups. There were no significant differences in changes in minutes of any category for the activity intensities across the two groups even after adjustment for covariates.

Obesity. After adjustment for baseline values and other covariates, there were no significant differences in change in BMI between intervention and comparison groups (Table 4). On average, intervention respondents gained 1.8 kg (range: –9.4, 37.5 kg) and comparison respondents gained 0.1 kg (range: –15.1, 14.4 kg), although as can be seen by the range, some respondents in each group lost weight.

DISCUSSION

General Implications

To our knowledge, ZATPD was the first integrated multi-institutional diabetes prevention program for Native North Americans. The primary aims of the overall study were to assess feasibility of the program and to observe impact on psychosocial and behavioral risk factors for diabetes. The intervention was implemented in partnership with schools, stores, and community health and social services with moderate fidelity, reach, and dose. There was good participation from key stakeholders, who found the program to be culturally relevant and appropriate (Rosecrans et al., 2007). The results presented here suggest that the intervention was able to have some impact on psychosocial factors and behavior.

Food Behaviors. A major focus of our intervention was promoting of specific healthier foods using shelf labels, taste tests, and mass media. The greater improvement in healthy food acquisition scores in the intervention respondents suggest that these strategies were successful in increasing selection of these healthier alternatives. We did not find any significantly different changes in unhealthy food acquisition scores across the intervention and comparison groups nor did we see a positive change in healthiness of food preparation methods. The intervention promoted use of cooking spray as an alternative to frying in oil for eggs and draining and rinsing as a method for ground meat, but we did not specifically promote other healthier methods included in the scoring, such boiling or baking for other foods. We will further examine dietary effects in a future article on the results of a concurrently administered quantitative food frequency questionnaire.

Psychosocial Factors. In this feasibility trial, we only found significantly higher scores in the intervention group for knowledge, the psychosocial factor that we would expect to see changes in first. Reasons for this may be that the intervention duration was not long enough or that scores for self-efficacy and outcome expectation were already fairly high at baseline for both groups, leaving minimal room for improvement. We did find an interaction between baseline knowledge and follow-up self-efficacy on healthy food preparation, suggesting that higher baseline knowledge scores combined with increased self-efficacy at follow-up were predictive of higher food preparation scores at follow-up. That is, higher knowledge scores at baseline were helpful if respondents had higher self-efficacy scores at follow-up.

Physical Activity (PA). We did not see positive changes in PA associated with our intervention. The majority of our intervention focused on food-related behaviors, and the weakness of the physical activity component may have been one of the factors in the lack of impact on activity. In addition, a number of the physical activity barriers identified in formative research were structural or environmental, such as loose dogs, poor road and weather conditions, no exercise facilities, and lack of time (Ho et al., 2006), which were more difficult to intervene on than the individual factors in the short intervention period. One community independently sought funding to build an indoor exercise facility for band members, suggesting that with motivation it is possible to address some of these barriers.

Anthropometry. Although lifestyle interventions have shown decreases in BMI, these have mostly been intensive individual programs (Knowler et al., 2002) or over a much longer intervention period (Schuit et al., 2006). In the short period of our community intervention, it is not surprising that we were unable to detect significant changes in BMI. In addition, our intervention did not specifically focus on reduction of caloric intake, one of the two ways to reduce BMI. The results of a recent community intervention targeted at children suggest that a more intensive approach may produce changes in BMI *z* scores (Economos et al., 2007).

Implications for Practice

Use Specific Evidence-Based Strategies. The improvement in healthy food acquisition scores suggests that our strategy of promoting specific foods identified through formative research (Sharma et al., in press) was successful. Health educators should promote healthier substitutes for commonly consumed foods in their communities as a means to enhance adherence to dietary recommendations and ensure an adequate diet. Where dietary inadequacies are present, such as calcium and vitamin D, healthier alternative foods selected for promotion may need to consider fortified alternatives, such as unsweetened juice with added calcium and vitamin D, to provide more nutrient density.

Strengthen Physical Activity Programs. The low levels of vigorous physical activity and the limited impact the intervention had on physical activity suggest the need for improved physical activity programs to prevent diabetes. Regular walking clubs or exercise classes are one way health educators can increase physical activity. To address barriers related to time, an emphasis on cumulative daily short bouts of activity can be suggested as an alternative to longer duration activity. Even one time events, such as a family field day, could encourage families to participate together. At schools, coordinated recess or mandatory daily physical education can increase activity in youth. Programs should work with community leaders to support environmental changes that improve access to physical activity.

Tailor Programs to Local Context. One of the key successes in development and implementation was the ability to respond to community needs and adapt program components to each locale. This helped gain the support of key stakeholders and made for a more culturally acceptable intervention. Health educators should engage community members in planning of programs to ensure culturally appropriate activities.

Employ Full-Time Staff for Health Promotion. The limited impact of the program may in part have been attributable to only moderate levels of implementation (Rosecrans et al., 2007). ZATPD employed only part-time intervention staff and existing health and social services staff appear to have limited time to intensify their activities. Given the pressing need for action to prevent diabetes and other chronic diseases in these communities, full-time, trained staff should be hired when implementing health promotion programs.

Implications for Policy

Increase Funding. At all levels, from band to national policy, a stronger commitment to health promotion is needed to address the epidemic of diabetes and chronic disease in First Nations. The costs of complications of diabetes are tremendous and can be prevented through reducing risk factors for developing the disease.

Increase Institutional Support of Environmental Changes. Another way to increase the intensity and sustainability of the intervention is to ensure that institutional change occurs. For instance, ensuring a minimum daily standard of physical activity in schools would help increase physical activity in children. Making sure band leadership enforced animal bylaws or developed guidelines for what food was available in offices or at community events would help remove barriers to healthier behaviors. Other measures would be to create positions for recreation coordinators or to develop physical activity facilities on reserves. Band policies for what is sold in community-owned stores could also encourage availability of healthier food options. It would also be important that role models such as band leaders, teachers, and health care providers demonstrate their support for healthier lifestyles by practicing them in their daily life.

Study Limitations

The short time intervention period may have limited the ability of the intervention to penetrate further into the community and have greater impact. Other full-scale studies have had longer intervention periods. In addition, improved integration of the three components would ensure that participants were aware of the linkages and were receiving reinforcing messages from multiple sources. With a longer or more intensive intervention period, we might see that the observed increases in knowledge would lead to increase in self-efficacy, outcome expectations, and finally intentions, given that another diabetes prevention study did not see changes in psychosocial factors even after 16 months of intervention (Daniel et al., 1999). Our results are promising, given that it was not a primary aim of the feasibility study to show impact.

Another limitation of the study was the nonrandom assignment of communities that occurred because of our previous commitment to the communities that participated in the formative research. In addition, our response rate in some communities was fairly low. However, given the small size of the communities and comparison with census data we feel that our sample is fairly representative with the exception of a slight overrepresentation of employed and more educated respondents in Site A. Comparison of baseline characteristics of the final sample and of those lost to follow-up showed no statistically significant differences. Future trials should include more communities that can be randomly assigned for a longer intervention period.

The low follow-up response rate in the control communities may have been in part due to lack of local community data collectors, but likely also reflected the lack of visibility of the research study in these communities. Community members may have been less likely to participate in the survey because they were not aware of program benefits, whereas in intervention communities the research staff were better informed and participants recognized that the survey was related to the intervention program. By delivering a nonbiasing program to the control communities, such as a tobacco control or suicide prevention program, community members might be more willing to be hired as data collectors and more willing to participate in a survey administered by research staff whom they felt had contributed to their community.

CONCLUSION

Results of this feasibility study suggest that integrated multi-institutional community-based programs can be implemented in partnership with institutions in First Nations communities to promote changes in psychosocial determinants of diet-related behaviors and acquisition of healthier foods. Longer and more intensive intervention periods may be needed to influence changes on physiological outcomes. Multilevel ecological approaches would be most effective in addressing the many determinants of risk factors for diabetes. Larger group randomized trials with a longer intervention period are needed to see positive impacts to physiological outcomes.

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