A Family-based Intervention to Promote Healthy Lifestyles in an Aboriginal Community in Canada

Sonia S. Anand, MD, PhD, FRCPC^{1,2,*}

A. Darlene Davis, RN^{3,*}

Rashid Ahmed, BSc²

Ruby Jacobs, RN, BA^{3,*}

Changchun Xie, PhD²

Amber Hill³

Joon Sowden³

on behalf of the SHARE-AP ACTION Investigators

Stephanie Atkinson, PhD^{1,*}

Cameron Blimkie, BA, BPHE, MA, PhD^{1,*}

Melissa Brouwers, PhD^{1,*}

Katherine Morrison, MD, FRCPC^{1,*}

Larry de Koning, BSc, MSc²

Hertzel Gerstein, MD, MSc, FRCPC^{1,*}

Salim Yusuf, MBBS, DPhil, FRCPC, FRSC^{1,2,*}

ABSTRACT

Context: Obesity is a major public health problem in North America, particularly in Aboriginal people.

Objective: To determine if a household-based lifestyle intervention is effective at reducing energy intake and increasing physical activity among Aboriginal families after 6 months.

Design, Participants, and Intervention: Randomized, open trial of 57 Aboriginal households recruited between May 2004 and April 2005 from the Six Nations Reserve in Ohsweken, Canada. Aboriginal Health Counsellors made regular home visits to assist families in setting dietary and physical activity goals. Additional interventions included provision of filtered water, a physical activity program for children, and educational events about healthy lifestyles.

Results: 57 households involving 174 individuals were randomized to intervention or usual care. Intervention households decreased consumption of fats, oils and sweets compared to usual care households (-4.9 servings per day vs. -3 servings/day, $p=0.006$), and this was associated with a reduction in trans fatty acids (-0.2 vs. +0.6 grams/day, $p=0.02$). Water consumption increased (+0.3 vs. -0.1 servings/day, $p<0.04$) and soda pop consumption decreased (-0.3 vs. -0.1 servings/day, $p=0.02$) in intervention households compared to usual care. A trend toward increased knowledge about healthy dietary practices in children, increased leisure-time activity and decreased sedentary behaviours was observed, although these differences were not statistically significant.

Conclusion: A household-based intervention is associated with some positive changes in dietary practices and activity patterns. A larger and longer-term intervention which addresses both individual change and structural barriers in the community is needed.

MeSH terms: Obesity; lifestyle; health behaviours; Aboriginal health; physical activity

La traduction du résumé se trouve à la fin de l'article.

1. Department of Medicine, McMaster University, Hamilton, ON

2. Population Health Research Institute, Hamilton Health Sciences and McMaster University

3. Six Nations Health Services, Ohsweken, Canada

* Study Team Investigator

Correspondence: Dr. Sonia Anand, Hamilton General Hospital, Hamilton Health Sciences, 237 Barton Street East, 4 EAST Rm. 441, Hamilton, ON L8L 2X2, Tel: 905-527-4322, ext. 44557, Fax: 905-577-1490, E-mail: anands@mcmaster.ca

Funding: Canadian Institutes of Health Research (CIHR) Grant number: MCT 64076.

Acknowledgements: We thank Mr. Randy Calvert from the McMaster University Children's Exercise & Nutrition Centre for his assistance in training the health counsellors (Amber Hill, Joon Sowden) for this study. SHARE-AP ACTION Investigators include those authors indicated with an asterisk, as well as B. Harris, J. Pogue and G. Thomas.

Obesity is a major public health problem in North America and leads to a number of chronic health problems, including diabetes, hypertension, and cardiovascular disease.^{1,2} Aboriginal people living in Canada suffer a high prevalence of overweight and obesity which is directly associated with their high rates of type 2 diabetes and cardiovascular disease.^{3,4} Although genetic factors may increase the propensity to develop obesity, most Aboriginal communities developed obesity only in the past two generations.

The Six Nations Reserve in Brant County, Ontario, Canada took its present form of 20,000 hectares in 1847, and is now home to over 12,000 Six Nations people.⁵ The traditional lifestyle of the Six Nations people included agricultural farming, hunting and fishing. However the increase in permanent settlements during the second half of the 20th century led to a dependence on store-bought foods, automobiles, and other energy-saving devices.^{4,6} The Six Nations people may be disproportionately affected by obesity because of their rapid change from a physically active to a relatively sedentary lifestyle, as well as their dietary transition from lower energy non-processed to energy-dense processed foods, all of which is compounded by the relatively low socio-economic status of this community.

While individual weight loss programs can be effective, community interventions that reduce the average weight of community members have the greatest potential to reduce health consequences of obesity.⁷ To date, such community approaches have mostly been unsuccessful,^{6,8,9} and novel strategies are required. After review of the literature of prior behavioural interventions,¹⁰ and consultation with the community, we designed a household-based intervention to address the drastic problem of obesity on the reserve. The household structure was chosen to build upon the strengths of the family unit in Aboriginal culture and to invoke role-modelling of healthy lifestyle practices within the households. The primary objective of this study was to determine if a household-based lifestyle intervention is effective at reducing energy intake and increasing energy expenditure to inform the development of a large-scale household-based intervention in this high-risk community.

TABLE I

Components of the Lifestyle Intervention in SHARE-ACTION

Component	Individual Targets	Household Targets
Dietary	<ul style="list-style-type: none"> • ↓ intake of energy-dense snack foods, fast or fried foods • changes in cooking oil from saturated fats to mono or polyunsaturated fats • ↑ water consumption • ↓ sugared beverages • ↑ fruit and vegetable consumption 	<ul style="list-style-type: none"> • Read food labels • Provision of traditional Six Nations recipes • Grocery store tours • Food preparation classes
Provision of Goods	<ul style="list-style-type: none"> • Water cooler = two 18 L containers of filtered spring water, and 24 bottles of spring water provided to intervention households/week 	
Physical Activity	<ul style="list-style-type: none"> • ↑ leisure-time activity (i.e., increasing walking for adults) • ↑ outdoor activity and sports for teens and children 	<ul style="list-style-type: none"> • After-school Activity Program for Children (1-2 times/week)* • Outdoor games such as basketball, soccer and baseball, and swimming
	<ul style="list-style-type: none"> • ↓ sedentary behaviours, i.e., television watching, video games, and computer use 	

* Offered to usual care children also

METHODS

Participants

Eligible households on the Six Nations Reserve had to be comprised of a male and/or female parent with at least one child living in the same household, and all individuals between 5 and 70 years of age (including grandparents) were eligible. Households were excluded if they: a) were not willing to have the health counsellor visit their homes, b) had a planned absence from the Reservation for >1 month during the intervention, or c) had a planned break-up of the household in the coming year. Individual exclusion criteria are listed elsewhere.¹¹

Design

SHARE-AP ACTION was an open, randomized controlled trial. The Research Ethics Board of McMaster University and Band Council of the Six Nations approved the study protocol and all household members provided written informed consent. Households were randomized to intervention or usual care. The interventions and the delivery of interventions were informed by the protection motivation theory, the social learning theory, normative influences and theories of persuasion.¹²⁻¹⁵ These concepts were chosen because they address psychosocial factors that influence health behaviour, invoke modelling of healthy behaviours, and include positive reinforcement of healthy lifestyle behaviours by other family members and the health counsellors. The SHARE-ACTION intervention consisted of a regular home visit by Aboriginal health counsellors who were trained to assess and set dietary and physical activity goals for each household member. The components of the intervention

TABLE II

Baseline Characteristics of Participants in SHARE-AP ACTION

Characteristic	Intervention	Usual Care
Number of households (n)	29	28
Number of participants (n)	88	86
Average number of household members	3.03	3.07
Female 5 years or older – % (n)	62.5% (55)	60.5% (52)
Mean age of adults – years (SD)	41.3 (9.0)	37.2 (8.8)
Mean age of children ≤18 years	10.9 (2.9)	9.9 (3.2)
Employed adults >18 years – % (n)	70.7 (29)	75.0 (30)
Adults >18 years with high school education – % (n)	78.0 (32)	72.5 (29)
Children 5-10 years currently in school – % (n)	100 (20)	100 (28)
Children and teens 5-18 years currently in school – % (n)	42.6 (20)	60.9 (28)
Adults >18 years current smokers – % (n)	34.1 (14)	37.5 (15)
Children and teens 5-18 years current smokers – % (n)	6.4 (3)	2.2 (1)
Households/number of individuals who completed the study	28/84	23/75
BMI		
Adults >18 years	34.8 (6.1)	32.7 (6.5)
Teens	25.6 (6.5)	23.9 (5.1)
Children	22.8 (5.3)	20.6 (4.3)

Figure 1. Recruitment, randomization and follow-up

are provided in Table I. Usual care families received *Canada's Food Guide to Healthy Eating*¹⁶ and *Canada's Physical Activity Guide to Healthy Active Living*.¹⁷

Assessment and outcomes

Families completed health assessment at baseline and 6 months after randomization.

Energy and nutrient intake was measured using a 24-hour recall.¹⁸ The ESHA Food Processor was used for nutrient analysis.¹⁹ Physical activity was measured using a standardized set of previously validated questions in adults and adolescents.²⁰ For children, a 24-hour physical activity recall was used.²¹ Knowledge and attitudes about

TABLE III

Dietary Change in Household from Baseline to 6 Months*

	Intervention (n=82)			Usual Care (n=73)			P Value†
	Baseline	6 Months	Change	Baseline	6 Months	Change	
Kcals/day (SD)	1948 (845)	1696 (541)	-251 (996)	2102 (802)	1874 (617)	-228 (763)	0.21
CHO % Kcals	49.7 (10.6)	50.4 (9.4)	0.7 (12.6)	52.9 (9.6)	52.6 (10.7)	-0.3 (13.4)	0.47
Protein % Kcals	14.6 (4.9)	14.1 (4.0)	-0.5 (6.5)	13.7 (4.5)	14.1 (4.5)	0.4 (5.2)	0.53
Fat % Kcals	35.7 (8.8)	35.6 (8.5)	-0.2 (11.5)	33.4 (7.9)	33.2 (9.0)	-0.1 (12.4)	0.23
Trans fats (g/day)	0.6 (1.1)	0.5 (0.9)	-0.2 (1.2)	0.7 (1.5)	1.3 (2.9)	0.6 (3.2)	0.02

CHO: Carbohydrates; SD: Standard deviation; Kcals: kilocalories

* Adjusted for age, sex and baseline value

† Comparing change in each group

Note: includes all people 5 yrs. and older with both baseline and 6-mos 24-hour recalls; outliers total kcals <200 or >10,000 and those missing baseline or 6-month data were excluded

TABLE IV

Change in Food Servings Per Day in Household from Baseline to 6 Months*

Food Groups‡	Intervention			Usual care			P Value†
Servings/day (SD)	Baseline	6 Months	Change	Baseline	6 Months	Change	
Bread, cereal, rice, pasta	5.8	5.6	-0.2 (3.5)	5.5	5.3	-0.2 (4.5)	0.43
Fats, oils, sweets	17.5	12.5	-4.9 (14.8)	21.8	18.8	-3.0 (16.0)	0.006
Fruits and vegetables	2.4	2.5	0.1 (2.4)	2.4	2.1	-0.3 (1.8)	0.23
Meat, poultry, fish, dry beans, eggs, nuts	1.9	1.6	-0.2 (1.7)	1.8	1.9	0.1 (1.8)	0.69
Milk, yoghurt and cheese	1.7	1.3	-0.4 (1.3)	1.5	1.5	-0.1 (1.2)	0.63
Bottled or distilled water‡	0.8 (1.1)	1.0 (1.1)	+0.3 (1.3)	0.7 (1.0)	0.6 (1.0)	-0.1 (0.9)	0.04
Soda pop/juice	1.3 (1.1)	0.9 (0.9)	-0.3 (1.3)	1.5 (1.1)	1.4 (1.0)	-0.1 (1.1)	0.02

* Adjusted for age, sex, and baseline servings

† Comparing change in each group

‡ Food groups according to USDA Dietary Guidelines as measured by the Food Guide Pyramid in ESHA dietary analysis program

Note: includes all people 5 years and older with both baseline and 6-mos 24-hour recalls

healthy dietary practices were assessed using a modified PATHWAYS KAB questionnaire.²² Physical measures including height, weight, waist and hip circumference, bio-electrical impedance, and blood pressure and a fasting blood sample were collected using standardized methods. A subset of households were also invited to attend McMaster University to undergo DEXA evaluation using the Cyprus body composition analysis machine in 77 subjects.

The primary outcome assessment occurred at 6 months after randomization. The primary outcomes included the change from baseline in daily energy intake (kcal per day), and the change in physical activity. Secondary outcomes include the changes (from baseline to end of study) in food patterns, weight, abdominal fat, blood pressure, body fat, and knowledge, attitudes and behaviours.

Statistical considerations

We estimated 25 households per group, assuming an average of 3 participants per household and an intercluster correlation of 0.3 (given sample Spearman correlation = 0.25 as observed in the SHARE-AP study),²³ would provide more than 80% power to detect modest changes in the percent of total calories of major macronutrients (i.e., carbohydrates, protein, and total

fat) and increases in physical activity. We anticipated that 10% of households would drop out of the study and planned to randomize 55 households. All analyses were conducted using SAS (version 8.2), Cary, North Carolina. The effect of group (intervention vs. usual care) on each dependent variable (i.e., energy intake, and physical activity, physical measures) was assessed using linear mixed models where fixed effects include treatment group, age, sex and baseline measures, and random effects include household nested within group. Subgroup analyses comparing the primary outcome and the secondary outcomes by age group (children vs. adolescents vs. adults) and by sex were performed.

RESULTS

Recruitment of households began in May 5, 2004 and was completed on April 7, 2005. Fifty-seven households (n=174 individuals) were randomized (29 households with 88 individuals to intervention vs. 28 households with 86 individuals to usual care). The last 6-month clinic visit occurred on December 2, 2005. Forty-eight households completed the six-month visit, 28/29 (96%) in the intervention and 23/28 (82%) in the usual care group, respectively (Figure 1). Baseline character-

istics of the participants are shown in Table II. Briefly, the households were young families with school-aged children. Physical measures of overweight and adiposity indicated that the majority of participants were at risk for obesity-related health consequences.

Nutrition

Energy intake (kcal/day) was reduced in both intervention and usual care groups after 6 months (average change 220 kcals/day) with no significant difference detected between groups (Table III). Intervention households decreased their consumption of fats, oils and sweets (decrease of 4.9 servings per day vs. decrease of 3 servings/day, $p=0.006$), and trans fatty acids (-0.2 g/day vs. +0.6 g/day, $p=0.02$) compared to usual care households. Fruit and vegetable consumption was low in both groups (i.e., 2-3 servings per day) and did not change, consumption of bottled or distilled water increased (+0.3 vs. -0.1 servings per day, $p<0.04$), and soda pop consumption decreased (-0.3 vs. -0.1 servings/day, $p<0.02$) among intervention compared to usual care households (Table IV).

Physical activity

One quarter of individuals were classified as being highly active in their leisure time,

TABLE V
Leisure-time Physical Activity and Sedentary Behaviours

Activity	Intervention			Usual Care		
	Baseline	6 Months	Change	Baseline	6 Months	Change
Low activity ¹ (%)†	26.7	24.0	-2.7	21.9	23.4	+1.5
Moderate Activity (%)†	52.0	51.0	-1	50.0	54.7	+4.7
High Activity (%)†	21.7	25.3	+3.6%	28.1	21.8	-6.3%
Screen hours/day ^{2‡}	3.7 (2.9)	3.1 (3.7)	-0.6	3.5 (3.0)	3.4 (4.0)	-0.1
			95% CI: -9.42,8.22			95% CI: -8.92,8.72

1 Activity defined as: Low = <25th percentile for leisure METS; moderate = 25-75th percentile for leisure METS; high = >75th percentile for leisure METS

2 Defined as time spent watching television, playing video games or using the computer in leisure time

† P to test a change in the activity pattern (low, moderate and high) from baseline to 6 months in intervention vs. usual care (adjusted for age and sex) = 0.35

‡ P comparing change in intervention to change in usual care (adjusted for age and sex) = 0.69

and this proportion increased somewhat after 6 months in the intervention group (21.7% to 25.3%; +3.6%) compared to the usual care group (28.1% to 21.8%; -6.3%) where the proportion classified as being highly active actually decreased. Sedentary behaviours such as television, video games, or computer use were reduced in the intervention (change from 3.7 hours to 3.1 hours/day) vs. usual care (3.5 to 3.4 hours/day) households. However these changes in activity did not reach statistical significance (Table V).

Physical measures

Overall, there were no statistically significant changes in body weight, waist circumference, skin fold thickness or body fat percentage in the intervention versus usual care group. Interestingly, individuals in both groups lost and gained weight over the 6-month period; specifically, 19 people lost weight (average 4.1 kg) in the intervention group compared to 23 people in the usual care families (average 3.2 kg loss). Conversely, 53 people in the intervention group gained weight (average 3.4 kg) versus 44 people in the usual care group (average 3.4 kg) (Figure 2).

Knowledge about healthy lifestyles

Half of all participants thought that they were too fat, and 60% worried about it. Over two thirds of participants across all age groups including children reported having previously tried to lose weight. Some trends suggesting increased knowledge about healthy food choices were observed among children in the intervention group (Table VI).

DISCUSSION

We have demonstrated that a culturally sensitive intervention among Aboriginal

Figure 2. Average weight change by treatment group

households is associated with some positive changes in dietary practices and activity patterns. A larger and longer-term study is required to determine if such an intervention can prevent weight gain, and to explore the bi-directional influences on health behaviour within the household.

We chose a randomized design in SHARE-AP ACTION over a non-randomized community intervention to allow a clear determination of the effectiveness of the intervention.²⁴ The family unit was an attractive unit of randomization because parental behaviour guides the development of children's behaviour, and social support within families for behaviour change has a significant positive influence.²⁵ Evidence to date demonstrates that the most effective interventions to bring about weight loss include behavioural and cognitive-behavioural strategies used together with physical activity and dietary counselling.¹⁰ Furthermore, the intensity of the intervention as well as its duration are also correlated with greater reductions in weight.¹⁰ Although activity changes in our study did not reach conventional levels of statistical significance, we did observe promising

trends towards the proportion of people classified as being highly active, and a reduction in sedentary behaviours in the intervention families. The small impact of our intervention in changing activity patterns suggests that changing activity behaviour may require other strategies in addition to trying to increase an individual's motivation to exercise, as the influence of powerful societal forces may minimize the potential of motivated individuals to initiate and sustain exercise.^{26,27} After reviewing the results of this study, the Six Nations Health Committee raised the concern that a number of structural barriers may have been at play, resulting in a less effective intervention. For example, most of the roads on the Reserve are paved county roads designed for cars and trucks to travel at a speed of 80 km/hour. There are no bicycle paths or sidewalks, and there are safety concerns about walking at night, and attacks from unleashed dogs. Most adults must drive to work either in the town of Ohsweken or off the Reserve. While there are walking trails and running tracks at the schools on the Reserve, individuals have to drive to these locations to walk. Hence

TABLE VI

Change in Knowledge of Dietary Information among Children

Question	Intervention				Usual Care				P Value†
	Respondents	Baseline	6 Months	Change	Respondents	Baseline	6 Months	Change	
Which would you choose to drink <u>diet pop</u> or regular pop?	18	38.9%	61.1%	+22.2%	24	54.2%	45.8%	-8.3%	0.09
Which is the lowest fat milk? (homogenized, 2%, or <u>skim</u>)	18	38.9%	61.1%	+22.2%	26	19.2%	30.8%	+11.5%	0.57
Which has the lowest amount of sugar, <u>diet pop</u> vs. regular pop?	19	57.9%	68.4%	+10.5%	26	57.7%	46.2%	-11.5%	0.21
Optimal number of fruits and vegetables per day (<u>Answer = 5/day</u>)	6	50%	83%	+33%	5	60%	80%	+20%	0.68

Notes: For these questions the knowledge was high among adults and poorly completed in adolescents. Correct answers are underlined.

† P values reflect the comparison of percent change in intervention vs. usual care

individuals have to be highly motivated to increase their leisure-time activity in the face of these barriers, and our Health Counsellors' advice alone was not enough to motivate individuals to overcome these barriers. For children and adolescents, we encouraged physical activity after school and provided some support by holding after-school sports sessions one or two times per week. At times, the attendance at these programs was low because parents found it too inconvenient to drive children to attend. Given the challenges in organizing these activities, after-school activity programs are unlikely to be the single long-term solution to increase energy expenditure in young people in this community.

We observed that fatty foods, oils and snacks and soda pop decreased in intervention families, and water consumption increased. Over the long term, if such reductions in high-energy foods and sugared beverages were sustained, an impact on body weight is possible.⁷ However, consumption of fruits and vegetables was low and was not altered by our intervention. The Six Nations Health Committee identified a number of barriers to increasing consumption of fruits and vegetables among Six Nations families. First, there is no fresh produce distributor on the Reserve and families must travel off the reserve to large grocery stores to purchase produce. Second, fruits and vegetables are relatively expensive in the small off-reserve towns that border the Six Nations Reserve. Third, fruits and vegetables have a limited shelf life, making them impractical choices for many Reserve families. Finally, the effectiveness of the intervention was likely influenced by the social disadvantage faced by many Aboriginal families living on the Reserve, which we have previously shown is strongly correlated to the presence of obesity, diabetes and cardiovascular dis-

ease.²⁷ These structural barriers faced by the Six Nations people cannot be overcome by simply advising families to alter their food choices and activity patterns.²⁸

While there are some encouraging results of our intervention, such as the increase in knowledge and some changes in dietary intake, our results are consistent with the results of a recently completed large-scale community-based intervention study of Aboriginal school children in the United States (PATHWAYS).⁶ This costly intervention randomized 21 Aboriginal communities to a multi-component intervention designed to increase health education and physical activity, and 20 communities to control. Despite an intensive effort, no differences in body fat or mean BMI were observed between intervention and control communities after a 3-year period, despite an increase in the knowledge and attitudes about food choices, and self-reported physical activity among intervention communities.⁶ In Canada, the Kahnawake School Diabetes Prevention Project community-based intervention observed some early improvements in healthy lifestyle outcomes. However, these benefits were not maintained over the long term, and a reduction in the prevalence of obesity was not achieved. Explanations for their lack of success included the increasing availability of fast food restaurants surrounding the reserve, and the increasing number of families with double-income parents, which results in decreased supervision of children's eating patterns and physical activity.²⁹ Furthermore, healthy lifestyle interventions may be particularly challenging to implement long-term in Aboriginal communities because of the strong political, socio-economic, and cultural forces that influence the community's short- and long-term planning.^{27,29}

Limitations

The limitations of our study included: a) the reliance on self-reported lifestyle changes which can produce bias,³⁰ b) not being powered to detect differences in BMI or changes in physical measurements, c) dietary recall bias with the 24-hour dietary recall. However, 24-hour recalls have been shown to be a valid method for assessing dietary intake among Aboriginal children,¹⁸ and were deemed to be optimal for this study to measure short-term changes that may be attributable to our intervention.

In summary, the effects of our intervention were modest and in the presence of powerful structural forces such as the built environment and food supply, a wide-scale intervention as currently designed would be costly and unlikely to lead to significant and sustainable reductions in body weight. However, a number of features of our intervention were promising, and a modified intervention including increased accessibility to fruits and vegetables, and structural changes to increase habitual activity through walking and less reliance on driving, may be successful in preventing weight gain if tested in a larger longer-term study.

CONCLUSION

A household-based intervention to improve lifestyle practices is associated with some positive changes in dietary practices and activity patterns. A larger and longer-term intervention that addresses both individual behaviour change and structural barriers in the community requires testing.

REFERENCES

1. Mokdad AH, Bowman BA, Ford ES, Vinicor F, Marks JS, Koplan JP. The continuing epidemics

- of obesity and diabetes in the United States. *JAMA* 2001;12;286(10):1195-200.
2. Yach D, Stuckler D, Brownell KD. Epidemiologic and economic consequences of the global epidemics of obesity and diabetes. *Nat Med* 2006;12(1):62-66.
 3. Harris SB, Gittelsohn J, Hanley A, Barnie A, Wolever TM, Gao J, et al. The prevalence of NIDDM and associated risk factors in native Canadians. *Diabetes Care* 1997;20(2):185-87.
 4. Anand SS, Yusuf S, Jacobs R, Davis AD, Yi Q, Gerstein H, et al. Risk factors, atherosclerosis, and cardiovascular disease among Aboriginal people in Canada: The Study of Health Assessment and Risk Evaluation in Aboriginal Peoples (SHARE-AP). *Lancet* 2001;358(9288):1147-53.
 5. Six Nation Community. Available online at: <http://www.sixnations.ca/Profile.htm> (Accessed January 15, 2006).
 6. Caballero B, Clay T, Davis SM, Ethelbah B, Rock BH, Lohman T, et al. and Pathways Study Research Group. Pathways: A school-based, randomized controlled trial for the prevention of obesity in American Indian schoolchildren. *Am J Clin Nutr* 2003;78(5):1030-38.
 7. Jeffery RW. Public health strategies for obesity treatment and prevention. *Am J Health Behav* 2001;25(3):252-59.
 8. Carleton RA, Lasater TA, Assaf AR, Feldman HA, McKinlay S, and the Pawtucket Heart Health Program Writing Group. The Pawtucket Heart Health Program: Community changes in cardiovascular risk factors and projected disease risk. *Am J Public Health* 1995;85(6):777-85.
 9. French SA, Story M, Jeffery RW. Environmental influences on eating and physical activity. *Annu Rev Public Health* 2001;20:309-35.
 10. Shaw K, O'Rourke P, Del Mar C, Kenardy J. Psychological interventions for overweight or obesity. *Cochrane Database Syst Rev* 2005;18(2):CD003818.
 11. SHARE-AP ACTION Study. www.phri.ca/SHARE-APACTION.
 12. Elder JP, Ayala GX, Harris S. Theories and intervention approaches to health-behavior change in primary care. *Am J Prev Med* 1999;17(4):275-84.
 13. Maddux JE, Rogers RW. Protection motivation and self-efficacy. A revised theory of fear appeals and attitude change. *J Exp Soc Psychol* 1983;19:469-79.
 14. Parcel GS. Social learning theory and health education. *Health Educ* 1981;12(3):14-18.
 15. Perry CL, Baranowski T, Parcel G. How individuals, environments, and health behavior interact: Social learning theory. In: Glantz K, Lewis FM, Rimer B (Eds.), *Health Behavior and Health Education*. San Francisco, CA: Jossey-Bass, 1990;161-86.
 16. Canada Food Guide to Healthy Eating. Available online at: <http://www.hc-sc.gc.ca/hppb/nutrition/pub/foodguid/index.html> (Accessed January 15, 2004).
 17. Canada Healthy Active Living – Consult Canada's Physical Activity Guide to Healthy Active Living to help build physical activity into your daily life. Available online at: <http://www.hc-sc.gc.ca/hppb/paguide/> (Accessed January 15, 2004).
 18. Weber JL, Lytle L, Gittelsohn J, Cunningham-Sabo L, Heller K, Anliker JA, et al. Validity of self-reported dietary intake at school meals by American Indian children: The Pathways Study. *J Am Diet Assoc* 2004;104(5):746-52.
 19. ESHA Website. Available online at: <http://www.esha.com/> Nutrition Analysis Software and databases (Accessed January 15, 2006).
 20. International Physical Activity Questionnaire. Available online at: <http://www.ipaq.ki.se/> (Accessed January 15, 2006).
 21. Going SB, Levin S, Harrell J, Stewart D, Kushi L, Cornell CE, et al. Physical activity assessment in American Indian schoolchildren in the Pathways Study. *Am J Clin Nutr* 1999;69(Suppl):788S-795S.
 22. Stevens J, Cornell CE, Story M, French SA, Levin S, Becenti A, et al. Development of a questionnaire to assess knowledge, attitudes, and behaviors in American Indian children. *Am J Clin Nutr* 1999;69(4 Suppl):773S-781S. Pathways KAB.
 23. Hsieh FY. Sample size formulae for intervention studies with the cluster as unit of randomization. *Stat Med* 1988;8:1195-201.
 24. Rychetnik L, Frommer M, Hawe P, Shiell A. Criteria for evaluating evidence on public health interventions. *J Epidemiol Community Health* 2002;56(2):119-27.
 25. Nader PR, Sallis JF, Patterson TL, Abramson IS, Rupp JW, Senn KL, et al. A family approach to cardiovascular risk reduction: Results from the San Diego Family Health Project. *Health Educ Q* 1989;16(2):229-44.
 26. Frank LD, Andresen MA, Schmid TL. Obesity relationships with community design, physical activity, and time spent in cars. *Am J Prev Med* 2004;27(2):87-96.
 27. Anand SS, Razak F, Davis AD, Jacobs R, Vuksan V, Teo K, et al. Social disadvantage and cardiovascular disease: Development of an index and analysis of age, sex, and ethnicity effects. *Int J Epidemiol* 2006;35(5):1239-45. Epub 2006
 28. Glanz K, Hoelscher D. Increasing fruit and vegetable intake by changing environments, policy and pricing: Restaurant-based research, strategies, and recommendations. *Prev Med* 2004;39(Suppl 2):S88-S93.
 29. Paradis G, Levesque L, Macaulay AC, Cargo M, McComber A, Kirby R, et al. Impact of a diabetes prevention program on body size, physical activity, and diet among Kanien'keha:ka (Mohawk) children 6 to 11 years old: 8-year results from the Kahnawake Schools Diabetes Prevention Project. *Pediatrics* 2005;115(2):333-39.
 30. Hebert JR, Ebbeling CB, Matthews CE, Hurley TG, Ma Y, Druker S, Clemow L. Systematic errors in middle-aged women's estimates of energy intake: Comparing three self-report measures to total energy expenditure from doubly labeled water. *Ann Epidemiol* 2002;12(8):577-86.

Received: August 4, 2006

Accepted: March 6, 2007

RÉSUMÉ

Contexte : L'obésité est un problème de santé publique majeur en Amérique du Nord, particulièrement chez les Autochtones.

Objectif : Déterminer si une intervention de modification du mode de vie centrée sur les ménages parvient à réduire l'apport énergétique et à accroître l'activité physique dans des familles autochtones au bout de six mois.

Méthode, participants et intervention : Essai ouvert aléatoire auprès de 57 ménages autochtones recrutés entre mai 2004 et avril 2005 dans la réserve des Six-Nations à Ohsweken (Ontario), au Canada. Des conseillers en santé autochtone ont fait des visites à domicile périodiques pour aider les familles à se fixer des objectifs de saine alimentation et d'activité physique. D'autres mesures ont aussi été instaurées : on a fourni de l'eau filtrée aux ménages, offert un programme d'activité physique aux enfants et organisé des activités de sensibilisation aux modes de vie sains.

Résultats : Les 57 ménages (174 personnes) ont été répartis aléatoirement en deux groupes, l'un recevant les mesures d'intervention et l'autre, les soins habituels. Les ménages recevant les mesures d'intervention ont diminué leur consommation de matières grasses, d'huile et de sucreries par rapport aux ménages recevant les soins habituels (-4,9 portions/jour contre -3 portions/jour, $p=0,006$), et cette diminution était associée à une baisse de la consommation d'acides gras trans (-0,2 contre +0,6 g/jour, $p=0,02$). Par ailleurs, leur consommation d'eau a augmenté (+0,3 contre -0,1 portion/jour, $p<0,04$), et leur consommation de boissons gazeuses a diminué (-0,3 contre -0,1 portion/jour, $p=0,02$). Nous avons aussi observé une amélioration des connaissances des enfants sur la saine alimentation, une augmentation de l'activité pendant les temps libres et une diminution des comportements sédentaires, mais ces changements n'étaient pas significatifs.

Conclusion : Une intervention centrée sur les ménages est associée à certains changements positifs dans l'alimentation et l'activité physique. Il faudrait élargir et prolonger l'initiative, en tenant compte à la fois des changements individuels et des obstacles structurels dans la communauté.