

# The Obesity Research Prevention and Evaluation of Intervention Effectiveness in Native North Americans (OPREVENT)

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American Indians have the highest burden of chronic diseases among all ethnic groups in the United States. Cardiovascular disease is twice that of the general US population and diabetes is diagnosed 2.2 times greater among American Indians than the general US population. The adjusted prevalence of obesity has increased more than 25 percent within a ten-year period across all U.S. regions from 1995-1996 to 2005-06. Health and economic consequences of chronic conditions that limit American Indians are serious, including higher prevalence of end-stage kidney disease and lower life expectancy than the U.S. average.

Interventions designed to address chronic conditions to date tend to focus upon individual behavior change with little impact upon reversing and stopping these trends. Novel interventions are needed at multiple levels of influence to address the rising obesity trend. In this newsletter article, we provide a synopsis of our most recent community-based obesity prevention intervention that is currently being implemented to tackle adult obesity. This effort is funded by the U.S. Department of Agriculture.

The Obesity Research Prevention and Evaluation of Intervention Effectiveness in Native North Americans (OPREVENT) is an intervention trial that is designed to address the following two research questions:

1. What is the impact of a multi-site, multi-institutional trial on the intake of (a) fruits and vegetables, total energy intake, and total fat intake; (b) total energy counts and percent of time spent in sedentary activity?; (c) body-weight index (BMI), waist circumference, and percent body fat?
2. Is exposure to the intervention associated with improvements in knowledge, self-efficacy, risk perception, outcome expectations, behavioral intentions, and social support?

Additional research questions are:

1. What are the feasible and sustainable intervention strategies that would permit children to serve as change agents in their homes to improve diet and increase physical activity of adult household members?

2. What are the feasible and sustainable intervention strategies that would occur in local worksites that would lead to increased physical activity and improved diet among American Indian (AI) community members?

Indigenous peoples globally suffer very high rates of obesity and related conditions, as a result of the role of multifactorial determinants. AI adult BMI in both urban and rural reservation settings have been on a steady rise, with women having higher burden of overweight and obesity than men. Obesity is a primary risk factor for diabetes mellitus, cardiovascular disease, and other chronic conditions. Research indicates a direct association between dietary fat and energy intake and obesity. On average, AI diets are high in fat and caloric content, and physical activity is low. Environmental factors such as the presence of food stores are associated with diet patterns. Limited worksite wellness programs in AIs have achieved diet and physical activity goals, increased energy expenditure, and led to a reduction in body fat. Body image perceptions also influence AI communities' motivation for action. Family environment and social support, particularly

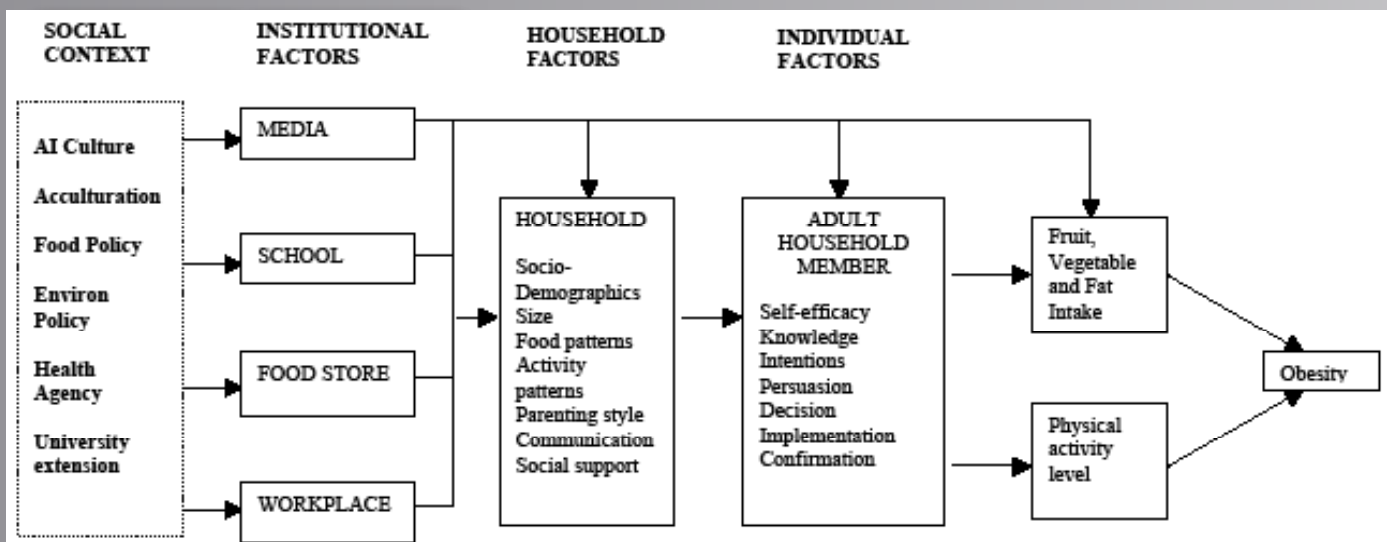


Figure 1. The conceptual framework of OPREVENT.

Table 1. Study Phases.

<b>Phase &amp; Description</b>	<b>Timeline</b>	<b>Sample Size</b>
<b>Phase 1: Tribal approvals/CACs, Formative Research, Measurement protocol preparation</b>	<b>Months 1-9</b>	<b>N=60 N=90</b>
<b>Phase 2: Baseline data collection, Intervention development, Process evaluation</b>	<b>Months 10-27</b>	<b>N=504 (84/community)</b>
<b>Phase 3: Intervention implementation (Round 2), maintenance data collection</b>	<b>Months 28-45</b>	<b>N=504 (84/community)</b>
<b>Phase 4: Data analysis and dissemination</b>	<b>Months 31-48</b>	<b>N=504 (84/community)</b>

through the extended family network, is vital to adult dietary and physical activity habits among AIs. Children can impact adult diets, such as increasing adult fruit and vegetable (FV) intake per day, and decreasing fat consumption. Overall, modest improvements in diet and physical activity can reduce the risk of obesity and heart disease among adults, such as walking 15 minutes per day and eating 100 kilocalories less at each meal or substituting high calorie drinks with diet drinks.

OPREVENT is being led by a multidisciplinary team that has years of experience designing, implementing, and evaluating community-based AI interventions. Our school-based, food store and multi-disciplinary projects have reported significant improvements in diet and physical activity related knowledge, self-efficacy, and intentions, reduced fat intake, increased healthy food purchasing habits, and positive policy changes. Our most recent project, Zhiwaapenewin Akinomaagewin (ZAFT) was implemented between 2003 and 2006 as a multi-level multi-institutional

program to improve diet and physical activity in seven First Nations communities. Our intervention improved overall knowledge and healthy food acquisition frequency.

Our project, OPREVENT, is theoretically informed by the Social Cognitive Theory and the Diffusion of Innovations Theory. The Social Cognitive Theory (SCT) suggests that individuals are both products and producers of their social environment, and that there is a dynamic, reciprocal relationship between personal factors, the environment, and health behaviors. The Diffusion of Innovations Theory provides a systematic framework for how an innovation gets adopted by the target population. Diffusion is the process by which an innovation is communicated (planned and spontaneous) through certain channels over time within social systems that involve interpersonal social networks. Antecedent variables that affect the process of innovation diffusion include the characteristics of the innovation, nature of the adopter, the social context, communication channels, and the nature of

the change agent.

The conceptual framework of OPREVENT depicts a visual graphic of how we envision the role of the media, food stores, schools, households, and worksites in the prevention of adult obesity among AI communities (Figure 1).

The OPREVENT study design is a randomized, controlled community trial in six American Indian communities in Michigan and New Mexico (Table 1). The four phases to OPREVENT are outlined in Table. 1.

There are three intervention and three comparison (delayed intervention) communities. Delayed intervention communities will receive all the benefits of the study including our training materials and intervention materials. The study consists of formative research and pre-post intervention surveys. OPREVENT involves community engagement, including Community Advisory Councils (CACs) and workshops and stakeholder participation, partnerships with health agencies and

Table 2. Intervention Components.

Phase	Theme	School Program		Food Store Program	Work Program	Health Services Program (incl. media)
		Curriculum	Child Change Agent			
1	Start Your Day Moving	3rd: What is Healthy? 4th: Body Class	Training basic principles	Breakfast demo	Group for PA challenge	Breakfast demo; Community media <sup>2</sup>
2	Living Lower Fat	3rd: Everyday Foods 4th: Activity Pyramid, Fat	Family goals: healthy cooking	Drain & rinse demo	Pedometer challenge	Cooking contest; Drain/rinse demo
3	Healthy Drinks	3rd: Sometimes Foods 4th: Sugar Facts	Family goals: food buying 1	Drinks taste test	Healthy Office Snacks	Family Fun Night; Drinks taste test;
4	Healthy Breaks	3rd: Being Active, Everyday Snack Attack, 4th: Fiber Facts	Family goals: snacks	Snacks taste test	Smart Lunch Choices	Take an exercise break; Healthy snacks taste test
5	5 a Day/Shop wisely	3rd: Next Year 4th: Label Reading	Family goals: food buying 2	FV taste tests	Cross-worksite challenge	Store tours, Gardening
6	Reinforcement	Additional teacher training	Summer family goal setting	Summer Materials	Team Walk-a-thon	Health Fair



Pictured: OPREVENT's two Michigan American Indian tribal communities.

Our school-based, food store and multi-disciplinary projects have reported significant improvements in diet and physical activity related knowledge, self-efficacy, and intentions, reduced fat intake, increased healthy food purchasing habits, and positive policy changes.

University extension personnel. There are four OPREVENT components: a community media campaign, school to home, worksite, and food stores (Table 2). For the school-to-home component, OPREVENT will modify existing school-based curriculum that was developed for grades three through five and that have been administered and evaluated in previous American Indian interventions by Dr. Gittelsohn and colleagues. OPREVENT will expand upon previous interventions by developing a curriculum for grades two and six. The study's program evaluation methods are outlined in Table 3.

Currently, our researchers are in the first phase of the study in both Michigan and New Mexico.

Overall, the goals of our study include the following:

1. To develop sustainable community

obesity prevention program through collaborative partnerships with tribal leadership, health agencies, schools, worksites, local USDA extension programs.

2. To advance knowledge of the relationship between behavioral and environmental factors and obesity among American Indian populations.
3. To reduce obesity in American Indians communities. This is the first study of its kind to address the multifactorial nature of adult obesity in these six communities.■

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For references, see next page.

Table 3. Program Evaluation Methods.

<b>Evaluation Method</b>	<b>Comments</b>
<b>Quantitative Food Frequency Questionnaire</b>	<b>Developed for American Indian/Alaska Native populations</b>
<b>Anthropometry, body composition, accelerometry</b>	<b>Pre- and post-intervention assessment</b>
<b>Impact Questionnaires</b>	<b>Pre- and post-intervention (Household adult, food stores, worksite, school)</b>
<b>Environmental observation checklists</b>	<b>Pre- and post-intervention (Worksites, food stores)</b>
<b>Process Evaluation forms</b>	<b>During intervention (Worksites, schools, food stores, family/household)</b>



**REFERENCES**

Bachar JJ, Lefler LJ, Reed L, McCoy T, Bailey R, Bell R. Cherokee Choices: a diabetes prevention program for American Indians. *Prev Chronic Dis.* 2006;3:A103.

Ballew C, White LL, Strauss KF, Benson LJ, Mendlein JM, Mokdad AH. Intake of nutrients and food sources of nutrients among the Navajo: findings from the Navajo Health and Nutrition Survey. *J Nutr.* 1997;127:2085S-2093S.

Bandura A. *Social foundations of thought and action.* Englewood Cliffs, NJ: Prentice Hall, 2001.

Beresford SA, Locke E, Bishop S et al. Worksite study promoting activity and changes in eating (PACE): design and baseline results. *Obesity (Silver Spring).* 2007;15 Suppl 1:4S-15S

Borys JM, Lafay L. Nutritional information for children to modify the food habits of the whole family. *Rev Med Suisse Romande.* 2000;120:207-209.

Burrows NR, Geiss LS, Engelgau MM, Acton KJ. Prevalence of diabetes among Native Americans and Alaska Natives, 1990-1997: an increasing burden. *Diabetes Care.* 2000;23:1786-1790.

Coble JD, Rhodes RE. Physical activity and Native Americans: a review. *Am J Prev Med.* 2006;31:36-46.

Davis M, Baranowski T, Hughes M, Warneke C, deMoor C, Mullis R. Using children as change agents to increase fruit and vegetable consumption among lower-income African American parents: Process evaluation results of the Bringing it Home program. In: Steckler A, Linnan L, eds. *Process Evaluation in Public Health Interventions.* San Francisco: Jossey-Bass; 2002:249-67.

Delisle HF, Rivard M, Ekoe JM. Prevalence estimates of diabetes and of other cardiovascular risk factors in the two largest Algonquin communities of Quebec. *Diabetes Care.* 1995;18:1255-1259.

Delisle HF, Ekoe JM. Prevalence of non-insulin-dependent diabetes mellitus and impaired glucose tolerance in two Algonquin communities in Quebec. *CMAJ.* 1993;148:41-47.

Denny CH, Holtzman D, Cobb N. Surveillance for health behaviors of American Indians and Alaska Natives. Findings from the Behavioral Risk Factor Surveillance System, 1997-2000. *MMWR Surveill Summ.* 2003;52:1-13

Eyler AA, Brownson RC, Donatelle RJ, King AC, Brown D, Sallis JF. Physical activity social support and middle- and older-aged minority women: results from a US survey. *Soc Sci Med.* 1999;49:781-789.

Felton GM, Parsons MA. Factors influencing physical activity in average-weight and overweight young women. *J Community Health Nurs.* 1994;11:109-119

French SA, Story M, Jeffery RW. Environmental influences on eating and physical activity. *Annu Rev Public Health.* 2001;22:309-335.

Galloway JM. Cardiovascular health among American Indians and Alaska Natives: successes, challenges, and potentials. *Am J Prev Med.* 2005;29(5 Suppl 1): 11-17.

Gittelsohn J, Anliker J, Ethelbah B et al. A food store intervention to reduce obesity in two American Indian communities: impact on food choices and psychosocial indicators. *FASEB.* 2005;19:Abstract #594.7

Gittelsohn J, Harris SB, Thorne-Lyman AL, Hanley AJ, Barnie A, Zinman B. Body image concepts differ by age and sex in an Ojibway-Cree community in Canada. *J Nutr.* 1996;126:2990-3000.

Glanz K, Lankenau B, Foerster S, Temple S, Mullis R, Schmid T. Environmental and policy approaches to cardiovascular disease prevention through nutrition: opportunities for state and local action. *Health Educ Q.* 1995;22:512-527.

Goran MI. Metabolic precursors and effects of obesity in children: a decade of progress, 1990-1999. *Am J Clin Nutr.* 2001;73:158-171.

Harris SB, Zinman B, Hanley A et al. The impact of diabetes on cardiovascular risk factors and outcomes in a native Canadian population. *Diabetes Res Clin Pract.* 2002;55:165-173.

Henderson KA, Ainsworth BE. A synthesis of perceptions about physical activity among older African American and American Indian women. *Am J Public Health.* 2003;93:313-317.

Hill DL. Sense of belonging as connectedness, American Indian worldview, and mental health. *Arch Psych Nurs* 2006;20(5); 210-216.

Hill JO. Can a small-changes approach help address the obesity epidemic? A report of the Joint Task Force of the American Society for Nutrition, Institute of Food Technologists, and International Food Information Council. *Am J Clin Nutr.* 2009;89:477-484.

Hill JO, Wyatt HR, Reed GW, Peters JC. Obesity and the environment: where do we go from here? *Science.* 2003;299:853-855.

Hill JO, Peters JC. Environmental contributions to the obesity epidemic. *Science.* 1998;280:1371-1374.

Ho LS, Gittelsohn J, Rimal R et al. An integrated multi-institutional diabetes prevention program improves knowledge and healthy food acquisition in northwestern Ontario First Nations. *Health Educ Behav.* 2008;35:561-573

Ho L, Gittelsohn J, Sharma S et al. Food-related behavior, physical activity, and dietary intake in First Nations - a population at high risk for diabetes. *Ethn Health.* 2008;13:335-349.

Ho LS, Gittelsohn J, Harris SB, Ford E. Development of an integrated diabetes prevention program with First Nations in Canada. *Health Promot Int.* 2006;21:88-97

Ho L, Gittelsohn J, Roscreans A, Sharma S, Ford E, Harris SB. Baseline Assessment for a Multi-institutional Diabetes Prevention Program for First Nations. *FASEB.* 2006;20.

Indian Health Service (IHS). *Regional differences in Indian Health.* Rockville, MD, 2000-01.

Jernigan VBB, Duran B, Ahn D, Winkleby M. Changing patterns in health behaviors and risk factors related to cardiovascular disease among American Indians and Alaska Natives. *Am J Public Health* 2010;100:677-683.

Johannsen DL, Redman LM, Ravussin E. The role of physical activity in maintaining a reduced weight. *Curr Atheroscler Rep.* 2007;9:463-471.

King H, Rewers M. Global estimates for prevalence of diabetes mellitus and impaired glucose tolerance in adults. WHO Ad Hoc Diabetes Reporting Group. *Diabetes Care.* 1993;16:157-177.

Knowler WC, Bennett PH, Hamman RF, Miller M. Diabetes incidence and prevalence in Pima Indians: a 19-fold greater incidence than in Rochester, Minnesota. *Am J Epidemiol.* 1978;108:497-505.

Knowler WC, Barrett-Connor E, Fowler SE et al. Reduction in the incidence of type 2 diabetes with lifestyle intervention or metformin. *N Engl J Med.* 2002;346:393-403.

Kwak L, Kremers SP, Werkman A, Visscher TL, van Baak MA, Brug J. The NHF-NRG In Balance-project: the application of Intervention Mapping in the development, implementation and evaluation of weight gain prevention at the worksite. *Obes Rev.* 2007;8:347-361.

Lee ET, Begum M, Wang W et al. Type 2 diabetes and impaired fasting glucose in American Indians aged 5-40 years: the Cherokee diabetes study. *Ann Epidemiol.* 2004;14:696-704.

Lee ET, Welty TK, Cowan LD et al. Incidence of diabetes in American Indians of three geographic areas: the Strong Heart Study. *Diabetes Care.* 2002;25:49-54

Lee ET, Howard BV, Savage PJ et al. Diabetes and impaired glucose tolerance in three American Indian populations aged 45-74 years. The Strong Heart Study. *Diabetes Care.* 1995;18:599-610.

Lichtenstein AH, Kennedy E, Barrier P et al. Dietary fat consumption and health. *Nutr Rev.* 1998;56:S3-19

Lytle LA, Kubik MY, Perry C, Story M, Birnbaum AS, Murray DM. Influencing healthful food choices in school and home environments: results from the TEENS study. *Prev Med.* 2006;43:8-13.

MMWR. Diabetes prevalence among American Indians and Alaska Natives and the overall population—United States, 1994-2002. *MMWR Morb Mortal Wkly Rep.* 2003;52:702-704.

Naylor JL, Schraer CD, Mayer AM, Lanier AP, Treat CA, Murphy NJ. Diabetes among Alaska Natives: a review. *Int J Circumpolar Health.* 2003;62:363-387.

Oser CS, Harwell TS, Strasheim C et al. Increasing prevalence of cardiovascular risk factors among American Indians in Montana. *Am J Prev Med.* 2005;28:295-297.

Rimal R, Flora J. Bidirectional familial influences in dietary behavior: Test of a model of campaign influences. *Hum Commun Res.* 1998;24:610-637

Ritenbaugh C, Teufel-Shone NI, Aickin MG et al. A lifestyle intervention improves plasma insulin levels among Native American high school youth. *Prev Med.* 2003;36:309-319

Rogers, EM. *Diffusion of Innovations*, Fourth Edition. New York, NY: The Free Press, 1995.

Rosecrans AM, Gittelsohn J, Ho LS, Harris SB, Naqshbandi M, Sharma S. Process evaluation of a multi-institutional community-based program for diabetes prevention among First Nations. *Health Educ Res.* 2008;23:272-286

Sallis JF, Hovell MF, Hofstetter CR, Barrington E. Explanation of vigorous physical activity during two years using social learning variables. *Soc Sci Med.* 1992;34:25-32.

Schmitz MK, Jeffery RW. Public health interventions for the prevention and treatment of obesity. *Med Clin North Am.* 2000;84:491-512, viii.

Seymour JD, Yaroch AL, Serdula M, Blanck HM, Khan LK. Impact of nutrition environmental interventions on point-of-purchase behavior in adults: a review. *Prev Med.* 2004;39 Suppl 2:S108-S136.

Sharma S, Cao X, Gittelsohn J et al. Dietary intake and development of a quantitative food-frequency questionnaire for a lifestyle intervention to reduce the risk of chronic diseases in Canadian First Nations in north-western Ontario. *Public Health Nutr.* 2008;11:831-840

Sharma S, Harris R, Cao X, Hennis AJ, Leske MC, Wu SY. Nutritional composition of the commonly consumed composite dishes for the Barbados National Cancer Study. *Int J Food Sci Nutr.* 2007;58:461-474

Sharma S, Cao X, Gittelsohn J, Anliker J, Ethelbah B, Caballero B. Dietary intake and a food-frequency instrument to evaluate a nutrition intervention for the Apache in Arizona. *Public Health Nutr.* 2007;10:948-956

Sharma S, Cruickshank JK. Cultural differences in assessing dietary intake and providing relevant dietary information to British African-Caribbean populations. *J Hum Nutr Diet.* 2001;14:449-456.

Story M, Stevens J, Himes J et al. Obesity in American-Indian children: prevalence, consequences, and prevention. *Prev Med.* 2003;37:S3-12.

Story M, Evans M, Fabsitz RR, Clay TE, Holy RB, Broussard B. The epidemic of obesity in American Indian communities and the need for childhood obesity-prevention programs. *Am J Clin Nutr.* 1999;69:747S-754S

Thompson JL, Allen P, Cunningham-Sabo L, Yazzie DA, Curtis M, Davis SM. Environmental, policy, and cultural factors related to physical activity in sedentary American Indian women. *Women Health.* 2002;36:59-74

Treiber FA, Baranowski T, Braden DS, Strong WB, Levy M, Knox W. Social support for exercise: relationship to physical activity in young adults. *Prev Med.* 1991;20:737-750.

Tremblay MS, Perez CE, Ardern CI, Bryan SN, Katzmarzyk PT. Obesity, overweight and ethnicity. *Health Rep.* 2005;16:23-34.

Warne D. Research and educational approaches to reducing health disparities among American Indians and Alaska Natives. *J Transcultural Nurs.* 2006;17(3):266-271.

Webber LS, Johnson CC, Rose D, Rice JC. Development of ACTION! Wellness Program for Elementary School Personnel. *Obesity (Silver Spring).* 2007;15 Suppl 1:48S-56S.

Welty TK, Rhoades DA, Yeh F et al. Changes in cardiovascular disease risk factors among American Indians: The Strong Heart Study. *Ann Epidemiol.* 2002;12(2): 97-106. Indian Health Service, Division of Diabetes and Treatment and Prevention, Fact Sheet, June 2008. Available at: [http://www.ihs.gov/MedicalPrograms/Diabetes/index.cfm?module=resourcesFactSheets\\_AIANS08](http://www.ihs.gov/MedicalPrograms/Diabetes/index.cfm?module=resourcesFactSheets_AIANS08). Last accessed on June 8, 2010.

Welty TK, Lee ET, Yeh J et al. Cardiovascular disease risk factors among American Indians. The Strong Heart Study. *Am J Epidemiol.* 1995;142:269-287.

White LL, Ballew C, Gilbert TJ, Mendlein JM, Mokdad AH, Strauss KF. Weight, body image, and weight control practices of Navajo Indians: findings from the Navajo Health and Nutrition Survey. *J Nutr.* 1997;127:2094S-2098S.

Will J, Denny C, Serdula M, Muneta B. Trends in Body Weight Among American Indians: Findings from a Telephone Survey, 1985 Through 1996. *American Journal of Public Health.* 1999; 89 (3).

Yeates K, Tonelli M. Indigenous health: update on the impact of diabetes and chronic kidney disease. *Curr Opin Nephrol Hypertens.* 2006;15:588-592.

Young TK, Reading J, Elias B, O'Neil JD. Type 2 diabetes mellitus in Canada's first nations: status of an epidemic in progress. *CMAJ.* 2000;163:561-566.

Yurgalevitch SM, Kriska AM, Welty TK, Go O, Robbins DC, Howard BV. Physical activity and lipids and lipoproteins in American Indians ages 45-74. *Med Sci Sports Exerc.* 1998;30:543-549.

Zapka J, Lemon SC, Estabrook BB, Jolicoeur DG. Keeping a Step Ahead: formative phase of a workplace intervention trial to prevent obesity. *Obesity (Silver Spring).* 2007;15 Suppl 1:27S-36S.

Zephier EM, Ballew C, Mokdad A et al. Intake of nutrients related to cardiovascular disease risk among three groups of American Indians: the Strong Heart Dietary Study. *Prev Med.* 1997;26:508-515.

Zimmet P, Alberti KG, Shaw J. Global and societal implications of the diabetes epidemic. *Nature.* 2001;414:782-787.

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