

Process evaluation of a store-based environmental obesity intervention on two American Indian Reservations

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Abstract

Obesity and other diet-related chronic diseases are widespread in American Indian communities. Inadequate access to healthy food on many reservations has led to a high-fat, high-sugar diet. The purpose of this paper is to report on the results of the process evaluation of a food store-based program to improve diet on two American Indian reservations. Process data were collected from 11 intervention stores to document the implementation of the Apache Healthy Stores (AHS) program. Process evaluation instruments recorded the stocking of promoted foods, presence of in-store communication materials, implementation of and participation in the cooking demonstrations and taste tests, and the transmission of mass-media messages. At the store level, the program was implemented with a high level of dose and reach, and a moderate to high level of fidelity. At the community level, the AHS program was implemented with a moderate degree of fidelity and dose. At the individual level, the cooking demonstrations and taste tests reached a large number of community members with a high

dose. Implementing the AHS program on multiple levels (store, community, individual) was challenging, and differed between levels. Overall, improvements were seen from start to finish as program staff monitored, documented and responded to barriers to implementation. Process data will be tied to outcomes and will be useful for the planning of future store-based programs.

Introduction

Background

The problem of obesity in America has reached epidemic proportions. In 2000, the prevalence of obesity among US adults was 19.8% (Mokdad *et al.*, 2001). Obesity and other diet-related chronic diseases disproportionately affect American Indian communities. Surveys conducted by the US Indian Health Services in the 1990s report obesity rates of 34% for American Indian men and 40% for American Indian women (Broussard *et al.*, 1991; Welty, 1991). Other studies indicate that the prevalence of obesity among American Indian adults has been increasing over the last decade (Sandstead *et al.*, 1956; Will *et al.*, 1999). American Indian children and adolescents are facing a similar public health predicament. In a recent study of schoolchildren from seven American Indian communities enrolled in the Pathways program, 30.5% of girls and 26.8% of boys were above the 95th percentiles for Body Mass Index for age (Caballero *et al.*, 2003). American Indian adults and children are burdened by an increased incidence of Type 2 diabetes, cardiovascular disease, gallbladder disease,

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joint disease and some cancers (National Research Council, 1999).

Both genetic and environmental factors interact to contribute to the obesity epidemic among American Indians. Broussard's research suggests that American Indians have a genetic trait that may predispose them to obesity given a 'Western' lifestyle (Broussard *et al.*, 1995). In the last 100 years, American Indians have largely shifted from a traditional subsistence lifestyle with a low-fat, high-fiber diet to a more sedentary lifestyle with a high-fat, high-sugar diet. This shift to a 'Western' lifestyle and diet has been compounded by a limited access to a variety of healthy foods (Broussard *et al.*, 1995).

The White Mountain and San Carlos Apache reservations have experienced both this lifestyle transition and inadequate access to healthy foods. Both reservations have just one large food store in a central location and a number of smaller food stores located in various neighborhoods. While the large reservation stores supply some healthy foods, small convenience stores overwhelmingly stock unhealthy foods such as sodas, chips and candy. Accessing a diverse supply of healthy foods often requires community members to travel off the reservation for 30 miles or more (Gittelsohn *et al.*, 2002).

Project description and study design

While a recent review of the impact of nutrition environmental interventions on point-of-purchase behavior in adults suggests that worksite and school interventions have the most potential for success, and grocery stores the least, the Apache Healthy Stores (AHS) project attempts to contradict these findings (Seymour *et al.*, 2004). AHS (July 2003–June 2004) was a store-based intervention program that aimed to reduce the high rates of obesity and chronic disease risk among two Apache tribes in east-central Arizona. Based on a conceptual framework including components from the Social Cognitive Theory and social marketing (Lefebvre and Flora, 1988; Baranowski *et al.*, 1997), this environmental intervention aimed to increase the availability of healthy foods in stores on the White Mountain and San Carlos Apache reservations, and

promote healthier food choices (observational learning) and cooking methods (behavioral pieces) among their residents. (Vastine *et al.*, 2005)

Formative research including a food-frequency questionnaire, a community workshop, and a refinement and feedback process guided the development of the year-long intervention which ultimately was divided into six 6- to 8-week phases. To increase the availability of healthy foods on the two reservations, a list of promoted food items derived from the formative food-frequency data was given to the store managers 1–2 weeks in advance of the start of a phase to allow time for ordering. This list was divided into two categories: all and minimum standard. The 'all' category included all foods that the AHS program staff had hoped for the stores to stock during each phase. The 'minimum standard' category included the foods that they felt were necessary for the stores to stock within the phase (see Table I).

To promote healthier food choices and cooking methods the project employed both in-store and mass-media strategies to communicate one or two key behavioral messages each phase (see Table I). In-store strategies included the hanging of shelf labels and posters. The four shelf labels (*Lower in Fat*, *Lower in Sugar*, *Higher in Fiber* and *Healthy Food Choice*) were to be hung beneath the appropriate promoted food at the beginning of the phase and maintained throughout the rest of the intervention. Approximately two posters were printed per phase to be posted on the walls of the intervention stores.

Mass-media strategies included the publication of newspaper cartoons and broadcast of radio announcements. Newspaper cartoons were designed by a local Apache artist to be submitted weekly to the two reservations' papers. The radio announcement which included key themes to the AHS program was recorded by the interventionist and submitted to the reservations' stations.

Cooking demonstrations and taste tests were the final component of the AHS project. Demonstrations were to be held 2–4 times at each intervention store (more often in stores with a larger clientele). Educational displays served as backdrops to the cooking demonstration and taste test set ups. Flyers

Table I. All promoted foods versus minimum standard promoted foods by phase

Phase	Behavioral objective	All promoted foods	Minimum standard
1	consume healthier snacks	pretzels, low-sodium pretzels, baked chips, baked tortillas, reduced-fat Ritz crackers	pretzels and baked chips
2	consume lower in sugar and higher in fiber cereals; consume low-fat or skim milk; eat fresh fruits for breakfast	2% milk, 1% milk, skim milk, fresh fruit, Cheerios, Wheaties, Nutrigrain, Shredded Wheat, Life, Corn Flakes, Chex, Total, Oatmeal	2% milk, fresh fruit, a low-sugar cereal, a high-fiber cereal, oatmeal
3	use cooking spray	cooking spray	cooking spray
4	choose pork and beans versus regular chili	pork and beans, lean ground meat	pork and beans
5	choose water over soda; choose diet over regular soda	diet sodas and water	diet sodas and water
6	eat fruits and vegetables for snacks; eat vegetables with low-fat dressing for snacks	fruit, vegetables, fat-free dressing	fruit, vegetables, fat-free dressing

and recipe cards were distributed during the cooking demonstrations and taste tests.

The AHS study, approved by the San Carlos and White Mountain Apache tribes and the Johns Hopkins Bloomberg School of Public Health Committee on Human Research, assessed both changes in store-level outcomes and consumer level factors. To determine the intervention's impact on the stores' healthier food ordering, sales and promotion, 11 stores on the two reservations were selected to implement the intervention and six stores served as comparisons. The comparison stores were located in more remote regions of the reservations to help reduce contamination. Letters of collaboration were collected from the participating stores. To examine levels of exposure to the intervention and changes in consumers' purchasing, preparation, consumption and self-efficacy, the quasi-experimental design included a pre-test/post-test, prospective longitudinal study of 270 randomly selected consumer respondents. Signed informed consent was obtained from all respondents and confidentiality and anonymity were assured.

In addition to these impact and outcome level assessments, process evaluation was measured throughout the delivery of the intervention. This paper presents the results of the process evaluation of the AHS program. It looks at the reach, dose and

fidelity of the intervention at three different levels. Reach, defined as the proportion of the intended target audience that participated in the intervention, was assessed at the store and community levels. Dose delivered, or the amount of intended units of each intervention component provided to the target audience, was evaluated at the store and community levels. Dose received, characterized as the extent of engagement of participants, was determined at the customer level. Finally, fidelity, or the extent to which the intervention was implemented as planned, was assessed at the store and community levels (see Table II) (Steckler and Linnan, 2002).

Methods

Instruments

Five instruments were used to collect the process evaluation data for the AHS project (see Table II). A full-time, independent process evaluator (lead author) collected all process data.

Store visit evaluation form (institutional)

The store visit evaluation form was completed 4 times per phase per intervention store during phases 1–4, 3 times during phase 5, and twice during phase 6 according to the availability of the process

Table II. *Process evaluation measures*

Data collection form	Intervention component	When planned	Process evaluation component
Store visit evaluation form	promoted foods; visual communication materials	3 times per phase per intervention store	fidelity (availability of promoted foods; presence and placement of shelf labels; existence and visibility of posters and educational displays, customer receipt of flyers); reach (store)
Mass-media log	visual and audio communication materials	once per phase per reservation	fidelity (existence of posters in community locations; airing of radio spots; publication of newspaper advertisement); dose delivered (community)
Cooking demonstration and taste test observation form	cooking demonstrations and taste tests; visual communication materials	once per phase per small intervention store and twice per large intervention store (i.e. half of all cooking demonstrations and taste tests)	fidelity (duration of activity and type of promotional food/recipe); reach (number of participants); dose delivered (number of food samples, flyers, and recipes distributed); dose received (reaction to and interest level in promoted food)
Self-administered customer evaluation form	cooking demonstrations and taste tests	one per willing customer	dose received (reaction to and intended use of promoted food)

evaluator and the length of the phase. This form assessed reach and fidelity by evaluating promoted food availability, appropriateness of shelf labeling, presence and visibility of posters and educational displays, and customer receipt of flyers. The process evaluator would place a check mark on the form beside the promoted food if the item was available, the shelf label if hanging appropriately, and the posters and educational displays if visibly displayed. The evaluator could additionally remark on external factors (e.g. milk delivery occurs on Mondays) contributing to the success or failure of the in-store implementation.

As part of the regular store visit, promoted food availability was assessed before, during and after its promotional phase (i.e. during phase 4 'pre' numbers were obtained for phase 5 and 6 promoted foods, and 'post' numbers were obtained for phase 1–3 promoted foods) Appropriate placement of the four shelf labels was considered during and after the phase in which the food was being promoted. The presence of promotional posters, educational displays and flyers was only evaluated during the phase for which the materials were used.

Mass-media log (community)

The mass-media log was completed once per phase on each reservation. This form evaluated the fidelity of intervention audio and visual communication materials as well as the dose of these materials provided to the community. During the last week of each phase, the process evaluator visited Whiteriver and San Carlos community locations, such as tribal offices, hospitals and laundromats, to record the presence of promotional posters. She reviewed the *White Mountain Apache Scout* every other week and the *San Carlos Moccasin* weekly to document the publication of newspaper advertisements. Finally, the process evaluator listened to the local radio station approximately 10–15 hours per week during office hours and spoke with station staff to report on the airing of radio spots.

Cooking demonstration and taste test observation form (individual)

The process evaluator conducted observations on approximately half of all cooking demonstrations and taste tests performed by the interventionist during each phase. For small reservation stores this

amounted to one observation per phase and for the larger reservation stores (Bashas) it amounted to two observations per phase. This instrument assessed the fidelity and reach of the cooking demonstrations and taste tests, and recorded the dose of visual communication materials delivered by the interventionist and received by community participants. More specifically, the process evaluator observed the duration of the cooking demonstrations and taste tests, and documented the type of food/recipe being promoted. She recorded the number of cooking demonstration and taste test participants, and whether they stopped on their own or were approached. She also recorded whether their visits were brief or prolonged. A brief visitor was characterized by the process evaluator as someone who accepted the food, but did not necessarily listen to the accompanying message, while the longer participant stayed around to pay attention to what the interventionist was saying and maybe even asked questions. Additionally the process evaluator documented the number of food samples, flyers, and recipe cards that the interventionist distributed. Finally, the process evaluator used this form to assess the reaction to and interest level in the promoted food being given away on the part of the participants.

Self-administered customer evaluation form (individual)

In addition to having the process evaluator document the dose received of the cooking demonstrations and taste tests, the self-administered customer evaluation form allowed the participants themselves to evaluate their own reaction to and intended use of the promoted food or recipe. While all participants who tasted the food were encouraged to fill out the customer evaluation by the distribution of free gifts such as T-shirts and chip-clips, not all chose to do so.

Data management and analysis

All process data were entered into a Microsoft Access database. The STATA statistical software package was used for analysis of quantitative data. Reach, dose and fidelity for each intervention

component were calculated as compared to a set standard (when available). Means and SDs are presented by phase so trends in implementation can be viewed.

Results

Store

At the institutional (store) level, the AHS intervention was implemented with a high level of reach. Seven of seven stores located in the White Mountain intervention area participated and four out of four stores in the San Carlos intervention area partook in the project.

The program achieved a moderate to high level of fidelity in terms of promoted food availability, appropriate shelf labeling, and the presence of posters and educational displays (printed as posters). This level of fidelity for the most part appeared to improve from one phase to the next.

Overall, the availability of the minimum standard of promoted foods was 78% (see Table III). As seen in Table III, excluding phase 6, the availability of all possible and minimum standard promoted food items increased from 31 to 100% and 71 to 100%, respectively.

We examined the availability of promoted foods both before and after their promotional phase. The availability of phase 1 and 2 promoted foods decreased once the phase was over, while the availability of the phase 3 promoted cooking spray improved after the phase. During phases 4–6 availability improved or stayed the same. Availability stayed the same post phases 4 and 5 (see Table III).

Overall, shelf labels were beneath the appropriate promoted food items 91% of the time. Promotional posters were present and visible 82% of the time. From phases 2–4, educational displays were present in the stores 73% of the time (see Table III). The correct placement and maintenance of shelf labels for promoted food items and the presence of posters improved as the intervention proceeded.

A high dose and fidelity at the institutional (store) level was also achieved in the number of store demonstrations/taste tests conducted. In six phases

Table III. Fidelity for availability of promoted foods, shelf labels, posters and educational displays by phase

Characteristic	Phase						Overall
	1	2	3	4	5	6	
Foods promoted (minimum standard)	pretzels and baked chips	2% milk, fresh fruit, low-sugar cereal, high-fiber cereal, oatmeal	cooking spray	pork and beans	diet sodas and water	fresh fruit, vegetables, fat-free dressing	all foods
Total no. store visits (visits/store) ^a	34 (3)	44 (4)	44 (4)	44 (4)	33 (3)	22 (2)	37
All possible promoted foods stocked (%)	31	43	81	98	100	35	65
Minimum standard promoted foods							
pre (%)	NA ^b	NA ^b	77	94	100	33	76
during (%)	71	81	81	98	100	35	78
post (%)	67	73	91	98	100	NA ^b	86
Shelf labels (%)	77	82	89	100	100	100	91
Posters (%)	57	74	91	95	100	100	86
Educational displays (%)	NA	68	66	84	NA	NA	73

^aDependent upon actual length of phase and availability of process evaluator.

^bNot available.

the interventionist conducted a total of 134 cooking demonstrations and taste tests. Overall, this amounted to 83% of the goal. On average the demonstrations lasted 1 hour and 23 minutes, or 69% of the goal (see Table IV). The duration of the demonstrations increased from phase 1 to 3 and then generally declined from phase 4 on.

Community

At the mass-media (community) level, the AHS program was implemented with a low to moderate degree of fidelity and dose. Whiteriver and San Carlos community locations where posters were hung during phases 1, 2, 4, 5 and 6 included the Indian Health Services Hospitals, the Tribal Administrative Offices, the *Apache Scout*, the Fitness Center and community laundromats. No phase 3 posters were hung in any community locations.

The AHS project did not meet their minimum goal of having a cartoon in the *Apache Scout* and the *Moccasin* at least once per phase. Newspaper cartoons appeared at least once per phase 58% of

the time. A total of seven AHS cartoons appeared in the *Apache Scout* on six separate dates. In the *Moccasin*, three project cartoons were run on three dates.

A radio announcement containing four key themes was recorded in English by the interventionist and the primary investigator of the intervention during phase 2 of the project. The minimum standard was to have the announcement broadcast once per phase on both reservations' radio stations. This occurred only 42% of the time. It aired on Whiteriver's KNNB radio station 5 times a day from 3 November to 10 December and then it stopped airing for several weeks. In February, the radio announcement was broadcast again once a day and continued this way throughout the end of the phase. In San Carlos, the same radio announcement was broadcast in February, twice on Tuesdays and Thursdays between the hours of 6 and 9 p.m. The radio announcement stopped being broadcast by the end of that month.

Table IV. Fidelity, reach and dose of cooking demonstrations and taste tests

	Phase (no. cooking demonstrations and taste tests observed)						Overall (14)
	1 (9)	2 (12)	3 (13)	4 (21)	5 (13)	6 (13)	
Foods demonstrated and tested	pretzels and baked chips	2% milk, 1% milk, skim milk, low-sugar cereal, high-fiber cereal	potatoes and eggs	pork and beans and low-fat chili	diet sodas	vegetables and fat-free dressing	all foods
Fidelity: percentage of goal attained (number completed) ^a	38 (10)	96 (25)	96 (25)	100 (26)	88 (23)	96 (25)	86 (22)
Fidelity: percentage of duration goal attained ^b	73	75	96	64	52	53	69
Reach: average number of brief visitors/demonstration (total) ^c	18 (145)	4 (42)	7 (87)	12 (254)	3 (36)	19 (240)	11 (134)
Reach: average number of long participants/demonstration (total) ^d	22 (200)	9 (112)	11 (141)	10 (200)	10 (125)	0 (0)	10 (130)
Dose delivered: average number of food samples/demonstration (total)	31 (282)	14 (164)	15 (200)	22 (455)	11 (149)	19 (240)	18.7 (248.3)
Dose delivered: average number of flyers/demonstration (total)	21 (186)	11 (137)	9 (119)	18 (374)	10 (136)	17 (223)	13 (196)

^aGoal was 2 per smaller store per phase and 4 per larger store (Bashas) per phase.

^bGoal was 2 hours.

^cSomeone who accepted the food, but did not necessarily listen to the accompanying message.

^dSomeone who stayed around to pay attention to what the interventionist was saying and maybe even asked questions.

Individual

At the individual (customer) level, the AHS project was implemented with a high reach and dose. A total of 1582 contacts were made with customers participating in the 81 cooking demonstrations and taste tests observed by the process evaluator. The average number of customer contacts/demonstration was 21 (see Table IV). The average number of brief visitors was 11 while the average number of long participants was 10.

The process evaluation of the cooking demonstrations and taste tests also indicated a significant dose of food, flyers and recipe cards delivered to and received by store customers. At the end of

phase 6, a total of 1490 food samples, 1175 flyers and 498 recipe cards had been distributed to customers during the 81 cooking demonstrations and taste tests observed by the process evaluator (see Table IV). Recipe cards were only available for phases 3 and 4.

The process evaluator observed the customers' reactions to and interest in the cooking demonstrations and taste tests. A mean score of 4.11 on a scale of 1–5 was measured for their reaction to the food, where a 5 indicated that the customer liked the food being promoted very much. A 3.95 on a scale of 1–5 was calculated for their interest in the food, where a 5 indicated that the customer was very

much interested in the food being promoted (see Table V).

The customers themselves were also able to evaluate the cooking demonstrations and taste tests. Their mean preference score of the promotional food tasted during the cooking demonstrations and taste tests was 4.41 on a scale of 1–5, where a 5 indicated that they liked the food being promoted very much (see Table V). When asked whether they would purchase a food being taste tested the mean response was 4.32 on a scale of 1–5 and when asked whether they would cook the demonstrated recipe at home the mean response was 4.79 on a scale of 1–5, where a 5 indicated that they most definitely intended to purchase or cook the food being promoted (see Table V).

In analyzing the responses to the open-ended question of how the cooking demonstrations and

taste tests could be improved, several themes emerged. All four themes, including offering the demonstrations at more locations, offering them more often, offering more foods and advertising the demonstrations more widely, suggested the need for even greater reach and dose.

Discussion

On the whole, the components of the AHS project were successfully implemented. The in-store components were implemented with a high level of dose and reach, and a moderate to high, but increasing, level of fidelity. The availability and maintenance of promoted foods (excluding phase 6), the appropriate placement and preservation of shelf labels,

Table V. Dose received as assessed by process evaluator and by customer

Phase	Food or beverage	Process evaluator assessment			Customer assessment		
		No. cooking demonstrations/ taste tests observed	Customer reaction [mean (SD)] [range]	Customer interest [mean (SD)] [range]	No. customer evaluations collected	Did you like? [mean (SD)] [range]	Would you buy/make? [mean (SD)] [range]
1	pretzels, baked chips, reduced-fat Ritz	9	4.44 (0.73) [3–5]	4.22 (0.83) [2–5]	92	4.53 (0.80) [1–5]	4.59 (0.87) [1–5]
2	lower-fat milks (2%, 1% and skim)	12	4.00 (0.50) [3–5]	3.83 (1.03) [2–5]	63	4.37 (1.13) [1–5]	4.37 (1.02) [1–5]
3	potatoes and eggs with cooking spray	13	3.93 (0.64) [3–5]	3.62 (0.87) [2–5]	129	4.57 (0.77) [2–5]	4.78 (0.52) [3–5]
4	pork and beans and chili con carne with 'drain and rinse' technique	21	4.67 (0.77) [3–5]	4.79 (0.57) [3–4]	67	4.67 (0.77) [1–5]	4.79 (0.57) [3–5]
5	diet sodas	13	3.77 (0.44) [3–4]	3.70 (0.48) [3–4]	9	3.89 (1.05) [2–5]	4.00 (1.20) [1–5]
6	vegetables, fat-free ranch dip and salsa	13	3.85 (0.38) [3–4]	3.54 (0.52) [3–4]	0	NA ^a	NA ^a

^aNot available.

and the presence and visibility of posters and educational displays generally increased from one phase to the next. Much of this improvement may be attributed to the increased acceptability of the intervention on the part of store staff as they became more aware and respectful of program goals.

The in-store improvements from phase to phase could also be attributed to the monitoring and feedback mechanism used to overcome initial barriers to project implementation. The process evaluator, who collected, entered and analyzed all process data, made frequent store visits enabling her to closely monitor intervention components and provide timely feedback to the interventionist and project staff during weekly conference calls.

One of the more significant barriers to the effective implementation of the AHS intervention was the financial state of the White Mountain Apache tribe. Tribal debt had an enormous impact on the five White Mountain Apache tribally owned stores participating in the intervention. During much of the intervention, these stores were unable to order any new food items.

As the AHS program depended on stocked promotional foods in each phase, this inability to order new foods had a negative effect on the in-store implementation. Phases 2, 3 and 6, which promoted fresh fruits, vegetables and lower-fat milks, seemed to be affected the most. One store during phase 3 was also unable to order the promotional cooking spray.

During phase 2, the interventionist offered to buy back any unpurchased lower-fat milks and fresh fruits that had reached or gone beyond their expiration date to ensure that they were at least on the shelves. Unfortunately this did not seem to persuade all store managers to carry these perishable items. Additionally, when one of the stores was unable to order cooking spray for the phase 3 promotion the project donated five cans to be put on the shelves. The store was allowed to keep the profit.

The phase 2 improvement in shelf labels additionally exemplifies the benefits of this monitoring and feedback mechanism. The process evaluator reported back to the interventionist and the rest of

the project staff that the shelf labels were ending up beneath the wrong food items. The staff decided to increase the size of the label and insert a blank space whereby the name of the promoted food item could be written in. In this instance the process evaluator's observation and admission led to immediate changes improving the efficacy of the implementation of this key in-store intervention component.

Unfortunately, not all in-store problems were caught by this mechanism during the intervention. Much thought, however, has been put into how improvements could have been made now that it is over. One way to have improved the phase 1 in-store results for instance would have been to lengthen its duration to allow time for the intervention to catch on. It also might have been useful to create a special shelf or endcap to display the promoted food items making customers more aware of their presence and purpose. Furthermore, if all shelf labels (for all phases) had been hung at the beginning of the intervention instead of as each phase started, customers may have been more likely to notice them on the shelves. Finally, items that were stocked by external vendors rather than internal staff should have been promoted towards the end of the intervention so that the external vendors would have had more time to catch on to the idea of the labels.

The mass-media components were carried out with a low to moderate degree of fidelity and dose. The reason behind the mass-media shortfall could be that these components were much less under the control of the AHS staff than were the others. Radio staff turnover, for instance, may have been responsible for the radio spot on Whiteriver's KNNB station going from over-saturation to desertion. When radio employees left and new ones took their place, spot tapes were apparently lost for a period of time. In San Carlos, radio spots were not aired at all until the middle of phase 4 because the Globe station could not afford to play them for free. It was not until the AHS staff offered to pay that the spots were aired. The newspaper advertisements did not fare much better than the radio spots for similar reasons. When cartoons appeared in the *Apache*

Scout or *Moccasin* they were often times during the wrong phase.

The airing of the radio spots and printing of the newspaper cartoons may have improved if the AHS staff had offered to pay for them before the intervention commenced. Staff should have been more specific about what time of day and how many times they wanted the spot to be played. They also could have requested that the newspaper cartoons appear in the same location every week so that community members knew where to look each time. Finally, the radio station and newspaper staff should have been reminded on a regular basis either in person or over the phone about when a spot needed to be played or cartoon run. In cases where they did not appear as planned, AHS staff should have followed up and questioned why.

The cooking demonstrations and taste tests became the key component of the intervention, reaching a large number of community members both from the White Mountain and San Carlos Apache tribes. High doses of food samples, flyers and recipes were delivered to the participants who reacted to the cooking demonstrations and taste tests with a high level of interest and satisfaction. The free giveaways became an important method of attracting customers, but did not always entice them to complete the evaluation forms. The goal number and duration of the cooking demonstrations and taste tests were not always met, partially because both interventionists resigned, leaving the remaining two staff members to take over their responsibilities.

Interventionist reliability and turnover was a second significant barrier to the overall AHS implementation. Two interventionists resigned during the first four phases of the intervention, leaving the remaining two staff members, one of whom was the process evaluator, to perform the interventionist's duties during the final three phases. In the future, projects should consider hiring more than one interventionist so that responsibilities can be shared and the burden of completing all components can be reduced. This becomes especially important when there is more than one intervention location.

Implications for practice

The most recent literature on process evaluation for public health interventions provides many examples of community-, worksite- and school-related process evaluation efforts. Additionally, while process evaluations have been performed on large cardiovascular disease prevention studies with point-of-purchase interventions such as the Stanford 5 City and the Minnesota Heart Health Program of the 1990s, this is the first to be performed on an exclusively store-based intervention, and is unique in that it included store-, community- and individual-level components in the evaluation (Corbett *et al.*, 1991; McGraw *et al.*, 1994; Pirie *et al.*, 1994; Helitzer *et al.*, 1999; Baranowski and Stables, 2000).

Process evaluation is essential to assessing the implementation of a study. The multi-level AHS process evaluation has helped to increase the efficiency and effectiveness of the project from phase to phase by monitoring, documenting and providing timely feedback on project implementation. Process evaluation data collection will help ensure that a type III error has not occurred, and will ultimately help to explain why certain community-, institutional- and consumer-level outcomes were achieved. Future analyses will tie results of the process evaluation to results of the project as a whole.

Project staff have learned many useful lessons from these data that will inform future store-based environmental obesity interventions on other American Indian reservations, in rural settings or in urban areas. More specifically, they discovered that certain foods or food-related behaviors could be promoted better than others. For instance, the two phases that promoted beverages seemed to be more successful than the rest. Participants seemed to be more receptive to switching to lower in fat milks and diet sodas than any of the other items. Also, project staff learned that part of a food's success was dependent on what phase it was being promoted in. For instance, the snack foods that were being taste tested in the first phase, when project recognition was still low, did not fare as well as those in latter

phases. Finally, they realized that there were greater challenges in working with the smaller stores where more foods had to be stocked and where there was less consistency with the management than with the larger stores. Future interventions should include the promotion of healthy beverages as well as foods, should consider during what phase a particular food will be promoted and should devise a way to work more effectively with smaller stores.

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