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Food Perceptions and Dietary Behavior of American-Indian Children, Their Caregivers, and Educators: Formative Assessment Findings from Pathways

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Abstract

Dietary findings from a school-based obesity prevention project (Pathways) are reported for children from six different American-Indian nations. A formative assessment was undertaken with teachers, caregivers, and children from nine schools to design a culturally appropriate intervention, including classroom curriculum, food service, physical education, and family components. This assessment employed a combination of qualitative and quantitative methods (including direct observations, paired-child in-depth interviews, focus groups with child caregivers and teachers, and semistructured interviews with caregivers and foodservice personnel) to query local perceptions and beliefs about foods commonly eaten and risk behaviors associated with childhood obesity at home, at school, and in the community. An abundance of high-fat, high-sugar foods was detected in children's diets described by caregivers, school food-service workers, and the children themselves. Although children and caregivers identified fruits and vegetables as healthy food choices, this knowledge does not appear to influence actual food choices. Frequent high-fat/high-sugar food sales in the schools, high-fat entrees in school meals, the use of food rewards in the classroom, rules about finishing all of one's food, and limited family resources are some of the competing factors that need to be addressed in the Pathways intervention.

Introduction

The prevalence of obesity among adults and children in the United States has reached epidemic proportions^{1,2} and is especially endemic among minority groups such as American Indians.^{3–5} Overweight and obesity rates are disproportionately higher among American-Indian youth compared with other U.S. reference populations.^{6–8} Childhood obesity predisposes to adult obesity,^{9–13} which, as a precursor for several chronic diseases, is associated with significant morbidity and mortality in the United States.^{14–16}

School-based health interventions focused on cardiovascular disease prevention have been successful in modifying behaviors^{17–20} but have shown little impact on cardiovascular disease risk factors. In 1993, the National Heart, Lung, and Blood Institute (NHLBI) initiated Pathways, a school-based study of the prevention of obesity in American-Indian school children.^{21–24} School-based health promotion and disease prevention interventions have been conducted on elementary school children, but little work has been done centered on obesity prevention or on American-Indian school children.^{17,25–27}

Little is known about food beliefs and food-related behavior of American-Indian school-aged children and, in particular, how the social context (school, family) influences these beliefs and behaviors. This lack of information is one of the factors that prompted a formative assessment component during the 3-year feasibility phase of Pathways.

The primary objective of the formative assessment was to gather information to assist in designing the intervention.²⁸ As a secondary objective, it served as a rapport-building exercise with the schools and permitted school staff and community members to contribute to the development of the Pathways intervention.

The Pathways formative assessment²⁹ employed qualitative and quantitative methods with third-, fourth-, and fifth-grade students; their caregivers; school officials; teachers; and school foodservice workers. The questions included issues about the respective school foodservice operations such as the range of foods served, student food preferences and perceptions about food, and the feasibility of modifying current trayline selections and/or introducing healthy and culturally acceptable foods into school meals and snacks. Other questions were directed toward children's snacking behaviors and foods eaten outside of school; food-based decisions and rules around eating in the home, including food procurement, preparation, and storage issues; and caregiver perceptions and communications about food, health, and nutrition with their children.

This information was subsequently used to identify food-related obesity risk behaviors most pertinent to the study populations and to develop a culturally appropriate school-based intervention strategy involving a classroom curriculum, food service, physical activity, and family components. This paper reports on formative assessment findings that pertain to food perceptions and dietary practices; findings relating to other aspects of the intervention have been reported elsewhere.^{21,28–30}

Methods

The formative assessment was undertaken during the feasibility phase of Pathways, from April to December 1994. Nine elementary schools participated from six different American-Indian nations (the Oglala Lakota and the Sicangu Lakota in South Dakota, the Dine/Navajo in New Mexico, the Gila River Indian Community in Arizona, the Tohono O'odham in Arizona, and the White Mountain Apache residing in Arizona). Four universities (Johns Hopkins University [JHU], University of Arizona, University of New Mexico, and University of Minnesota) were partnered with one or two of the nations, which jointly functioned as the four field centers; a fifth university (University of North Carolina at Chapel Hill) served as the coordinating center. The program office was at the NHLBI in Bethesda, MD.

Assessment methods

The Pathways formative assessment used both qualitative and quantitative methods, including direct observation,³¹ paired-child in-depth interviews,³² focus groups with child caregivers and teachers,^{33,34} and structured interviews with school foodservice personnel. Procedures for data collection were developed by the Pathways formative assessment working group and written down in the form of a detailed protocol. In-depth interviews and focus groups were conducted with the use of discussion guides that guided the data collection but permitted flexibility to probe in depth and follow up on new topics as they arose. Structured and semistructured interviews used standardized data collection instruments. Depending on the preference of the respondent, data collection was conducted in the appropriate local language or English. Brief descriptions of each method follow and are displayed in Table 1, along with the sample size for each method.

Paired-child interviews—Approximately 20 paired-child interviews were conducted at each field site (n = 85) to elicit the most common foods and beverages consumed and the places where different foods are eaten, using free listing techniques (where a respondent is asked to list all of the different kinds of an item that they can think of). Individual students representing a range of ability were selected by teachers from third-, fourth-, and fifth-grade classrooms. The students, in turn, chose a friend with whom to be interviewed.

Free listing and pile sorting activities are structured interviewing techniques used to elicit and explore the organization of items that comprise a cultural or cognitive domain.³⁵ By asking students “What are all the different foods you eat and drink?,” free listing revealed the most salient foods of students at each site, the foods that were the most important and relevant to the children themselves. A combined list from these site-specific data was then compiled to reveal the 20 most salient foods across sites and used in follow-up interviews to determine how children group and categorize foods.

Child food-sorting interviews—In addition to the paired-child interviews, an average of 17 children (range: 12–19) from each site participated in a food-sorting activity to elicit the ways in which they think about and group foods. Illustrated food cards were sorted by child respondents who were asked to first sort them into piles “in whatever way you think is best” and, second, in terms of frequency of consumption (i.e., everyday, sometimes, never).

Focus groups—Focus groups conducted with child caregivers helped to identify cultural norms around food, where foods are obtained, household food preparation methods, and patterns of food consumption within the household. Parents and other caregivers were invited to discuss household rules at mealtimes and their own perceptions about childhood obesity, physical activity, and behavioral change. Two to three focus groups were conducted at each field site, each consisting of four to eight caregivers of second-, third-, fourth-, or fifth-grade students from the nine schools. Caregivers proved difficult to recruit at most sites, so the focus groups represent an opportunistic sample of those caregivers who were available and willing to participate in the focus groups. A free meal was offered to participants as an incentive. Group sessions were led by two moderators and tape recorded for later transcription. Emphasis was on eliciting community-wide cultural patterns from these caregiver groups instead of individual practices. Follow-up semistructured interviews with child caregivers who had participated in the focus groups generated information about obesity risk behaviors in the household (e.g., household meal patterns, use of food for comfort and reward).

Focus groups with third-, fourth-, and fifth-grade teachers and teachers' aides were conducted in each study school to reveal information about students' dietary intake and physical activity patterns, particularly in school, and perceived barriers around implementing a new nutrition/health curriculum. All teachers and teaching assistants of grades 3 to 5 were invited to participate in the focus groups at each school. A subsequent round of semistructured interviews was conducted on randomly selected third-, fourth-, and fifth-grade teachers from each school to obtain more specific information on school meal “rules” (e.g., accepting all food and finishing all food before seconds) and related teacher behaviors (e.g., establishing and enforcing the above rules).

In-depth interviews—In-depth interviews with the head cook of each school elicited information about food preparation methods, types of foods commonly served to students, their perceptions of students' food likes and dislikes, availability of food choices on the trayline, and cafeteria rules regarding second helpings. The objective of these interviews was to determine resources in the foodservice department; beliefs and attitudes of foodservice personnel toward healthy eating; current procedures for ordering, preparing, and serving food in the school; practices to support healthier eating; and potential barriers to these practices.

Direct observation—Informal direct observations were made at each school and local convenience stores on two to three occasions per school with data recorded as textual field notes. Direct observation in the schools revealed what kinds of foods children eat on or near the school grounds during school hours, the nature of foodservice activities in the cafeteria, and classroom activities that concern health and nutrition. Observations of snack purchases by children appearing to be between 7 and 12 years of age were done at local grocery/convenience stores or vending sites closest to the schools. Children were also observed in school cafeterias during lunch to assess plate waste, availability of second portions, and amount of food sharing among students.

Training

At least two representatives of each site conducted the data collection. Of these two, at least one was an American Indian. Trainings in the formative assessment methods were conducted on three occasions, with each session lasting about 2 days. The training involved didactic presentation, demonstration, and role play of the different methods. During the actual data collection, feedback on data quality was provided by the JHU team.

Data analysis

All formative assessment data were centrally analyzed by the JHU site. The software package GOFER 2.0³⁶ was used to analyze all of the textual data (i.e., field notes and transcribed tapes). A combination of standardized data forms, interview guide sheets, and matrices (grids) for transcribing tape-recorded responses or observational data were developed to facilitate comparison across sites. Consumption of key foods is reported as percentage at a particular frequency of consumption. Multidimensional scalogram (MDS) analysis and hierarchical clustering analysis was conducted using ANTHROPAC 3.2³⁷ to produce a map of how the children grouped foods and the degree of association among the items within food groupings. In MDS analysis, a stress score is calculated, which indicates how well the figure represents the actual data³⁸; a stress below 0.15 is considered acceptable. A cultural consensus analysis was also run to determine the level of consensus present between respondents and the number of underlying cultural models suggested by the results.³⁹ In consensus analysis, a factor analysis is run on the responses and the ratio of the first factor to the second factor is examined. A very high ratio (>3.00) is considered indicative of a high level of agreement between respondents on how the data should be grouped and therefore of high cultural consensus. As we combined the data from six different sites, large intersite differences in responses would tend to yield a very low overall consensus.

The combined qualitative and quantitative findings provided a reference database for prioritizing the obesity risk behaviors to be targeted by the Pathways intervention. The process followed in this stage of the formative assessment has been described elsewhere.²⁹

Results

Children

Most salient foods of American-Indian school children—The combined list of foods across sites included responses from 85 child pairs, grades 3 to 5. Third-grade students identified 381 unique foods, while 451 and 612 unique foods were contributed by fourth- and fifth-grade students, respectively. The top 20 foods mentioned by all students are shown in Table 2; pizza, hamburgers, apples, milk, and oranges were the five most salient foods from the combined sites. The list included three fruits, two fruit juices, two vegetables, and six convenience items (i.e., pizza, hamburger, soda pop, taco, ice cream, and chips). Surprisingly, few traditional American-Indian foods, foods that are recognized by a tribal group as originating within that group, were mentioned by the children. One possible traditional food (Indian tacos) appeared for three of four field sites; no other differences

were noted across sites, nor was there any suggestion of geographic variability in the list of the top 20 foods.

Reported frequency of consumption of key foods—Children's reported frequency of consumption of the top 20 foods and beverages compiled across field sites from the free-listing results, along with water, diet soda pop, and 2% milk, are shown in Figure 1. Children were asked to sort each food into one of three piles: foods they ate “every day or almost every day,” “sometimes,” and “never or almost never.”

Water was the food most frequently reported as an “every day” item (84%). Whole milk, orange juice, and 2% milk were the next most frequently consumed “every day” beverages (71%, 56%, and 53%, respectively), whereas other beverages queried were more likely to be consumed “sometimes” or “almost never.” “Sometimes” beverages included soda pop (43%), Kool-Aid (50%), and diet soda pop (41%). Fruits were frequently reported as “every day” foods, including apples (74%), oranges (59%), and bananas (62%). Cereal and bread also ranked high as “every day” foods (62 and 56%, respectively).

In contrast, convenience foods were most frequently classified by children as “sometimes” eaten foods. This category included pizza (66%), fries (54%), hamburgers (56%), spaghetti (53%), tacos (62%), fry bread (53%), ice cream (53%), and chips (57%). Potatoes (fried) and carrots were nearly evenly distributed across the rating responses for “every day,” “sometimes,” and “almost never” intake. Eggs were reported with moderate frequency as “every day” (46%) and “sometimes” (35%).

How children group foods—In Figure 2, the results of MDS mapping are shown for the children's pile sort data, all sites combined. Concentric circles, based on hierarchical clustering analysis, help to identify the main groupings of foods according to the children, with smaller circles indicating increasing likelihood to sort foods together. The figure shows several main groupings of foods: drinks in the upper left-hand corner (cluster A), foods associated with meals on the right (cluster B), and fruits and vegetables in the lower left (cluster C). In general, the children categorized foods into those that are “good for you” and those that are “not good for you.” Foods that were considered good were those “things you drink,” “breakfast foods,” and “fruits and vegetables.” Drinks included things that “make you healthy” (2% milk, orange juice, water, and whole milk) and “sugary drinks” (diet soda pop, Kool-Aid, and soda pop). Little or no distinction was made between diet soda pop and regular soda pop or between 2% milk and whole milk. The children listed bread, cereal, and eggs as breakfast foods and carrots, bananas, oranges, and apples as fruits and vegetables. Fruits and vegetables were frequently labeled as good snacks. Foods that “have a lot of grease” (chips, fries, potatoes, fry bread) and are liked (e.g., tacos, spaghetti, hamburgers, pizza) were frequently considered “not good for you,” “junk,” or as having a lot of fat. Interestingly, ice cream was not sorted into any of the main clusters. Many of these foods were also grouped by some children because they had meat in them.

The stress of the MDS presented in Figure 2 was 0.127, indicating that the model was an acceptable representation of the pile sort data. Cultural consensus analysis run on these data indicates a high level of consensus and a single cultural model, with a ratio of 4.78 for the

first factor divided by the second. This is somewhat surprising when you consider that the sample was drawn from six different American-Indian Nations, spread out over a wide geographic area.

Some differences were observed among respondents by site. When level of respondent agreement was examined by site, one of the sites showed 25% of respondents with competency estimates below 0.30, whereas another site had over 52% of respondents with such low estimates. When closer attention was paid to those individuals with low competency estimates, the reason for their lack of agreement with the majority became more clear. Several of the children were not able to provide reasoning as to why certain foods were grouped together, suggesting a random response, possibly due to inadequate explanation of the task. On the other hand, the majority of those with low competency estimates grouped foods by what they liked and did not like. Interindividual differences in food preferences could have accounted for their lack of agreement with most student respondents.

Caregivers

Where foods are acquired—Focus groups with caregivers (n = 14 focus groups) revealed that at all sites, families appeared to travel considerable distances (i.e., 25–40 miles or more) in order to shop at larger grocery stores or discount warehouses. Some items were purchased at the more expensive reservation stores (e.g., trading posts), where shopping on credit is available. School children appeared to frequent these stores for their snack purchases, which consisted primarily of soda pop and candy. The availability and quality of fresh fruit, vegetables, and low- or reduced-fat dairy products (e.g., 2% milk) was very limited at these stores. Many of the caregivers interviewed reported receiving government assistance in the form of Food Stamps or commodity foods. Food Stamps seemed to be generally preferred over commodity foods because they permitted greater flexibility in food selection.

Where different foods are consumed—Among the top 20 foods mentioned by children, a high proportion of convenience items such as hamburgers, hot dogs, soda pop, tacos, pizza, fries, chips, and Kool-Aid were consumed in the home at one or more of the field sites. Other high-calorie foods reportedly consumed at home in at least one of the sites were ice cream, fry bread, bacon, and ham. Apples, oranges, orange and apple juice, bananas, beans, potatoes, corn, carrots, mashed potatoes, salad, peaches, and watermelon were also reportedly consumed in the homes of these children more frequently than in either school or other community locations (e.g., relative's or friend's home, restaurant, etc.).

Eating patterns at home—Follow-up semistructured interviews with caregivers (n = 38) disclosed more detailed household information about meal and snack consumption patterns. For example, 16 to 20 meals per week were eaten at home (mainly breakfast and dinner), with an average of one meal per week eaten at a fast-food place. Frying was the predominant home cooking method (42%), followed by baking (37%) and broiling (16%). This is an example of commonly heard comments: “I do a lot of frying...with lard. If I cook with

vegetable oil, they don't like the taste... Even fry bread they won't eat [made] with vegetable oil.”

Comments from caregiver focus groups (n = 14 focus groups) reinforced how pervasive frying and the addition of cooking fats were in the home. “We found out frying is not too good. ... we use Crisco and vegetable oil,” commented one caregiver. An average of two snacks was eaten daily. Chips and crackers were common snacks across all sites, followed by cookies, cheese, fruits, and popcorn at three sites. Between two and three fruits and vegetables were reportedly eaten daily; however, the availability of these foods appeared to be linked to the receipt of Food Stamps: “I get Food Stamps, and whenever I get them ... [the diet] really changes ... we eat more fresh fruit. We tend to eat a little more because they get a lot of goodies and stuff they like more towards the end of the month.”

Semistructured interviews with caregivers indicated that while water is commonly consumed at home meals (82% of caregiver respondents interviewed from all sites), across all sites, an average of 1.7 cups/cans of Kool-Aid, Powderade, or soda pop were reportedly consumed by the child daily at home. Fifty-nine percent of the children drank milk every day at home, and 49% of children were drinking whole milk. Caregivers therefore reported their children's beverage consumption at lower frequencies than what the children reported, but this probably reflected children reporting their consumption both at home and at school.

The two most common household rules that surfaced in the first round of focus groups with caregivers were prohibitions about wasting food and snacking before meals. The following quotations exemplify the kinds of food rules caregivers set for their children:

We tell them to finish their food on the plate and then they have to drink their milk before they can leave the table.

I don't give them anything to drink until they eat half their food. I make sure they eat all their food. I dish their food up. I make sure the tv is off. I don't let them hurry and eat.

Well, usually what I do is that I make sure they eat all their food, because during the day they might get hungry, so I want them to eat their food ... I would like them to eat all their food because, it's nutrients, and some food has vitamins and I want them to be healthy so they can eat the right food.

The drinks they can't drink before they eat half their food. They can't eat anything sweet before they eat. They have to stay out of the kitchen. I try to make them eat all of their food.

I tell him not to eat anything ... like ice cream, candy or chips ... unless he eats all his food.

In the follow-up interviews, it was confirmed that a high proportion of the caregivers (73%–80%) encouraged their children to finish all of their food. On the other hand, some caregivers described a more casual approach to their children's food intake:

Anybody can eat anything they want at anytime, but they have to eat it all up.

I tell them that if they [grandmother or aunt] ask you to eat, you should go ahead and eat. Also, I tell them if they are hungry just to run back to the house to eat. I tell them to open the can or something or anything

Use of food for comfort was only pertinent at one site, whereas households in three sites reported using food rewards.

Caregivers varied in their perceptions and information about the importance of weight control among children. For example, one caregiver shared this perspective about her son's overweight condition: "My son knows about his weight problem; his pants size are getting small around his waist... I don't worry about his weight he realize himself that he was gaining weight until his pants started getting too tight, so he took it upon himself to lose his weight by eating less. He was concern about the cost for new pants and so that is why he lost some weight." Another mother offered this response: "If a kid is going to be fat, he is going to be fat. If he going to be skinny, he is going to be skinny. There is nothing you can do to change that."

School personnel

School food service—The source of food for most of the schools studied was a combination of purchased foods from vendors (such as Novell Sysco) and receipt of free or low-cost (there was commonly a charge for delivery) foods from the USDA commodity foods program. School food services incorporated the commodity foods into their existing recipes, which was sometimes difficult due to shifts in the availability of specific foods from month to month and year to year. Some of the foodservice workers expressed dissatisfaction with certain commodity foods that they felt they had to incorporate into meals but that children did not like, such as tuna. With the exception of two of the nine schools examined, close to 100% of students received free breakfast and lunch. Traditional American-Indian foods were rarely featured on any of the school menus. In contrast, regional foods were served more frequently (e.g., beans, tacos, tamale pies). In general, high-fat lunch entrees such as pizza, fried chicken, hot dogs, (cheese) hamburgers, french fries, and pork chops were the most frequently served items reported by the cooks or observed by our field staff. According to the cooks, these foods coincided with student preferences at most of the schools. Whole milk was observed at all sites, although 2% milk was reportedly a choice available to students at four of the nine schools. Few other choices were available to students as they go through the trayline, or as one school principal put it, "I guess they have a choice between whole and 2% milk because we have both types of milk in the milk cooler. But, otherwise, it's pretty much planned for these little guys, because otherwise it would take us forever to get them through the line." One school did indicate the choice of two fruits on certain days. All but one school served seconds. It appears that students were most likely to request seconds on main entree items, such as meat, pork chops, chicken, and fried foods, and also desserts. Whereas only a small percentage of students were observed going back for seconds, one school did report serving more food on Mondays and Fridays, reportedly as a means of offsetting weekend food shortages at home.

School foodservice preparation—All nine schools described their food as prepared on site. Two schools reported a high use of preprepared convenience foods, and two other

schools participated in food vendor's menu planning service, which included preprepared items such as pizza, cheeseburgers, and tacos. Whereas most schools reported that they had made some efforts to lower the fat content of prepared foods (such as trimming meat, draining and rinsing ground meat, baking), trayline observations revealed large helpings of butter and grated cheese offered to students in some schools. Moreover, the bread offered to students was frequently prebuttered, and none of the schools were observed using low-fat cheeses or gravies.

Competitive foods—Most schools offered other sources of food besides the regular school food service. A foodservice worker further commented that a lot of school meal food is wasted because food sales are held before and after lunch, including cupcakes, popcorn, gum, candy, candied apples, pickles, chips, ice cream, and popsicles. School food sales were also a topic of discussion with caregivers; “After school they sell stuff... suckers, popcorn, honey stick, fruit juice,” commented one caregiver describing her child's snacking preferences. Another caregiver commented that eliminating the “sweet stuff” sold at school sales would be one way of improving students' eating habits.

High-fat and/or high-sugar snacks were commonly eaten outside of school and were either purchased in school bake sales or the school store or at local grocery stores or trading posts. The majority of snacks observed by our field staff as “typical” purchases by children 7 to 12 years of age were either high in fat or sugar, such as ice cream, candy, and soda pop. The children also consumed a lot of high-sugar drinks at home and special school events. Whole milk was commonly consumed at home and school, compared with 2% milk, skim milk, or water.

Schools varied greatly in their toleration of other sources of food. There was often discordance between the official school policy regarding food and how that policy was implemented at the classroom level. A third-grade teacher summarized the situation in her school:

I'll start with school wide—there is no pop allowed except for holiday parties. Not supposed to eat in the class except for holidays. No gum chewing to care for carpets, no suckers allowed, and popsicles are discouraged. I disagree with these rules because it is not meaningful to them. They don't know how and when to use these rules—so the kids tend to sneak. I usually let students finish their popcorn and pickles in the classroom after a bake sale. They don't have time to eat their goods during such a short lunch and recess break.

Over 50% (11/21) of teachers reported offering high-sugar or high-fat food rewards in the classroom. “I set up something special for them on Fridays, whether it's a party or going out to have pizza,” reported one fifth-grade teacher. In another school, ice cream cones were supplied by classroom teachers as a student reward.

Rules for eating in school—Of the 24 teachers interviewed, the most commonly reported rule about food was encouraging students to finish all of their food during the school meal (62%): “... if they are going back for seconds they have to have a clean tray, what they take they should eat. I encourage the students to finish their meal... I'm sure they

are told this at home pretty much too.” Other commonly mentioned school rules included washing hands (57%) and requiring the children to “at least taste foods” (38%). Other rules mentioned less frequently (<20%) included brushing teeth after meals, leaving dessert for last, accepting all food on the trayline, and drinking at least half of one's milk. The emphasis on children finishing all of their food was reinforced by the teachers, two-thirds of whom reported sitting with their students during lunch.

Discussion

The Pathways formative assessment proved useful in the identification of key food-related behaviors that were likely to put American-Indian school children at increased risk for obesity.²¹ The primary food-related risk behaviors observed in the feasibility study formative assessment included excessive intake of high-fat, fried, and high-sugar foods at home, at school, and in the community. There was limited accessibility to fruits and vegetables as snack options; instead, high-fat and/or high-sugar snacks were commonly eaten outside of school. High-fat or high-sugar snacks such as ice cream, candy, and soda pop were frequently sold at school fundraising events and were commonly offered as rewards within the classroom. The children also frequently consumed high-sugar drinks at home and special school events. School-wide bake sales and food stores were common and directly competed with the efforts of school food service to serve nutritious meals that would be well received by students. Whole milk was commonly consumed at home and school, compared with 2% milk, skim milk, or water. In particular, food rules both at home and at school may result in higher food intakes by American-Indian children. Children were encouraged by caregivers, teachers, and foodservice workers to finish all of their food.

Our findings related to food and eating behaviors of American-Indian children were consistent with findings from other studies. We found that soft drinks and high-fat foods were frequently consumed. Gilbert et al.⁴⁰ found that Navajo youth consumed sugared carbonated beverages at a rate of twice the national average. Other studies⁴¹ have also reported dietary practices that may contribute to obesity, including wide use of butter and lard, fried foods, and whole milk. The Navajo Health and Nutrition Survey⁴² found that fry bread, Navajo tortillas, home-fried potatoes, mutton, sausage, bacon, and soft drinks provided 41% of the energy consumed for participants aged 12 and older. Fruits and vegetables were consumed less than once a day per person. A recent study⁴³ found that the diets of Mohawk children aged 4 to 9 years exceeded recommended intakes for energy and fat.

Our findings regarding food perceptions and preferences of American-Indian school children from six different nations showed remarkable consistency in their selection of salient foods and how these foods should be grouped. Their primary distinction of foods that are “good for you” and “not good for you” indicates an awareness that foods have differential health benefits. They tended to sort foods that “have a lot of grease” as foods that are “not good for you” and described juices and fruits as foods that are “good for you.” These findings have been incorporated into the school health curriculum and the school foodservice, two of the major interventions of Pathways. The Mohawk study⁴³ also found that food preferences were the strongest predictor of eating behavior.

The high proportion of children eligible for free or reduced-price school meals was one indicator of the lower socioeconomic status of the families participating in Pathways. This fact was anecdotally supported in focus groups with caregivers and in the paired-child interviews. For example, when asked about the types of snacks they gave their children, caregivers frequently identified the cyclic availability of fresh fruits and vegetables corresponding with the receipt of Food Stamps. In general, American-Indian communities are economically disadvantaged at two and a half times the U.S. all-races rate of 13%.⁴⁴ Corresponding median family incomes in 1990 were \$21,750 and \$35,225 for American Indians and the total population, respectively. Thus, limited household resources, coupled with the limited availability of reasonably priced, high-quality fresh foods at reservation stores in some sites, led to a diet high in total fat and low in fruits and vegetables, a finding that coincides with reports of other low-income groups.⁴⁵

Many of the home-based rules for food consumption appeared to be linked to perceived (if not real) chronic food insecurity⁴⁶ (the inability to acquire nutritionally adequate and safe foods that comply with personal and socially acceptable standards and preferences). Caregivers stressed the importance of finishing all of one's food at mealtimes in order to avoid going hungry: "I make them finish their food before they leave the table; otherwise, they can't go out and play. I tell them to finish their food because they might [not] have much to eat later ... Never waste [food] or we might be starving because we only get Food Stamps once a month." An extreme example of how this rule may be applied was reported by one parent describing her daughter's need to gain weight: "Give her more food and that she doesn't want to eat ... [you need to] try to force her to eat it." One third grader indicated that kids eat food even when they're not hungry "... because their caregivers tell them to eat even though they are full. Their parents tell them to finish their food because they don't want food to go to waste."

School officials, including foodservice personnel and teachers, also reinforced rules about finishing food before leaving the table. It is difficult to challenge this common sense attitude when episodic hunger is or was likely a real phenomenon among families in previous generations. Eating beyond satiety may predispose to childhood and adult obesity.⁴⁷ In general, obesity is more prevalent among low-income groups.⁴⁵

Coupled with the socially and historically prescribed messages to eat beyond satiety, competitive foods were another source of potential energy imbalance by contributing empty calories from largely high-fat and high-sugar choices. In the school, food sales and use of foods as rewards were common forms of competitive foods. At home, competitive foods included high-fat and high-sugar snacks and high-fat entrees eaten at home, at other relatives' houses, or in restaurants, with frying or high-fat ingredients regularly featured. Finally, there was a mix of appropriate and inappropriate snacks reported by caregivers; some of the more acceptable choices included fruits and vegetables, cold cereal, diet drinks, cheese and crackers, fruit cocktail, graham crackers, peanuts and raisins, and juice and milk, although many of these foods are high in fat and/or calories.

It is important to describe the limitations of these data. The opportunistic selection of caregivers for focus groups and interviews may have sampled more involved caregivers, who

were willing to talk about how they fed their children. This may have led us to have a less accurate picture of food acquisition and consumption behavior in the home. The cross-site standardization of data collection procedures reduced the amount of flexibility normally desirable in exploratory, formative qualitative research. As a study, we were much less able to be responsive to emerging topics and findings. As well, centralized analysis of the formative assessment data, although necessary for the sake of standardization and logistics, probably reduced our ability to understand and interpret findings in context.

The information described in this paper has been used to develop interventions that are now being implemented and evaluated in 41 schools in seven American-Indian nations in the United States. Pathways has developed a culturally appropriate 3-year healthy eating and activity-boosting curriculum for third, fourth, and fifth grades.²¹ The curriculum addresses many of the behavioral risk areas identified above, such as how to identify and select lower fat, lower sugar food items at home, at school, and in the store. The Pathways foodservice intervention²³ was structured around a series of fat-lowering preparation and food selection and serving behaviors for foodservice personnel in the school, while not ignoring student food preferences and rules for eating related to American-Indian culture.

Some examples illustrate how the Pathways intervention has addressed these issues. First, we have found that it is not culturally appropriate to teach children simply to refuse food or leave food on their plates if they are not hungry because that can be very offensive to caregivers. So Pathways has had to emphasize teaching children other ways to moderate their food intakes, such as sharing food, saving some for later, taking smaller amounts when they serve themselves, and paying attention to their body cues that signal when they are full.

Second, Pathways has had to work carefully with food-service concerning their policy of serving seconds. As mentioned earlier, foodservice staff often served seconds of entrees or desserts to the students. Since many of these food-service staff thought it was important to make sure that the children have enough food, Pathways' approach has not been to ban seconds but to promote seconds on only fruits, vegetables, breads (without butter), and low-fat milk.

As it is clear from the formative assessment that interventions aimed exclusively at the school foodservice were likely to be weakened by lack of attention to competitive foods from teachers and other situations within the schools, efforts to encourage change in the availability of competitive foods have been implemented in Pathways' intervention schools. Teachers have received guidance as to healthy alternative rewards to use in the classroom. In addition, it was also clear that family socialization and access to food has a large potential of undermining what is taught in schools. This issue has been addressed in Pathways through the inclusion of a family component²² to the intervention, which aimed at involving caregivers and other family members in the educational process and encouraging reinforcement of key health concepts at home.

Implications for Research and Practice

Progress toward a healthier America will depend substantially on improvements for certain populations that are especially at high risk. Two population groups at high risk for poor nutrition and health status are low-income groups and certain ethnic and minority groups.⁴⁸ Roughly 20% of American children live in poverty.⁴⁸ Racial and ethnic diversity has grown dramatically in the last three decades and is projected to increase even more in the decades to come.⁴⁸ In order to develop effective, culturally appropriate health and nutrition programs and interventions, a clear understanding of the food beliefs and food-related behaviors is needed, as well as how the social and environmental context (school, family, friends, availability) influence these behaviors.

In this study, we employed a combination of qualitative and quantitative methods to better understand food behaviors and identify risk behaviors associated with child obesity at home, in school, and in the community. This use of multiple data gathering methods from multiple sources (caregivers, school personnel, children) enabled us to describe the problem of overnutrition in American-Indian children; explore potential environmental, sociocultural, and economic determinants; and develop an informed intervention strategy.

A major implication of this study is that nutrition education developers for this age group need to explore the entire context of the children's environment using multiple approaches. Although caregivers provided useful information on how children ate at home, interviews with food-service workers and teachers shed much more light on how they ate at school and why. We found that children in grades three through five themselves can help with our understanding of their food consumption considerably, including how they value and classify foods. In addition, many food consumption events and their contexts would not have been captured without the contributions of teachers, observations of school events, and children's food purchases in or near the school.

A second major implication for research and practice lies in the specific findings of this study. Persons working toward improving diet in the American-Indian population need to be aware of the values, beliefs, and consumption patterns of foods presented. Knowledge of the pressure on children to eat all of their food, concerns about food shortages, school policies (formal and informal) about eating meals and getting seconds, and the availability of foods both in and outside of the school environment can help nutritionists to better understand the context of food consumption for American Indians. With these insights, nutrition programmers and policy makers can address nutrition-related issues such as obesity and diabetes with a sensitivity to socioeconomic and cultural factors that is otherwise not possible.

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Figure 1.
Percent of students who reported eating key foods every day, sometimes, or never.

Figure 2.
Multidimensional map of children's pile sort of commonly consumed foods.

Table 1

Qualitative and quantitative methods used to obtain food-related information from American-Indian nations: Pathways.

Method Used	Sample	Type of Information Obtained
Paired-child interviews	85 child pairs	Nutrition knowledge and conceptual thinking around food: free lists of common foods and drinks, places of eating, frequency of eating (everyday, sometimes, never)
Child food-sorting interviews	68 children	Free (unprompted) food sorts of top 23 free-listed foods Sorting into frequency of consumption
Focus groups with caregivers	14 groups	Cultural norms around eating, home dietary practices (food procurement, preparation, and family meal patterns) Mealtime table rules, use of food for comfort and rewards Perceptions of childhood obesity, physical activity, behavioral change
Follow-up semistructured interviews with caregivers	38 caregivers	Meal and snack consumption patterns Household food serving and consumption behaviors
Focus groups with teachers	12 groups	Student food preferences, eating and physical activity patterns Lunchroom rules at school meals (hand washing, accepting all foods, finishing all food), use of foods for rewards Nutrition content in classroom curriculum, perceived barriers to change
Semistructured interviews with teachers	24 teachers	Type of media used in classroom teaching, role modeling during meals
Interviews with foodservice personnel	10 foodservice workers	Procedures for ordering, preparing, and serving food; operational resources (equipment and personnel) Foods commonly served, perceived student preferences, availability of food choices, rules concerning second helpings Beliefs and attitudes about healthy eating, suggestions for promoting healthier eating, perceived barriers to change
Recess and school event observations	24 observations ^a	Types of snacks sold on school grounds (vending machines, bake sales, etc.), types of snacks purchased/eaten in or near school
Trayline and lunchroom observations	24 observations ^a	Types of foods served; availability of choices, second portions; portion size adjustments (by grade) and uniformity of servings Plate waste, food sharing or trading, frequency of second-helping requests
Classroom observations	24 observations ^a	Activities that promote health and sound nutrition practices
Store observations	46 observations ^a	Types of snacks purchased by children 7–12 years of age

^aEach observation was roughly 1 hour in length.

Table 2

American-Indian children's top 20^a most frequently mentioned foods, across Pathways field sites (n = 85 child pairs).

Food	Response Rate	
	%	n
Pizza	88	75
Hamburger	85	72
Apple	71	60
Milk	71	60
Orange	69	59
Soda pop	67	57
Taco ^b	60	51
Orange juice	59	50
Banana	56	48
Cereal	55	47
Spaghetti	52	44
Egg	51	43
Chicken	48	41
Ice cream	47	40
Corn	46	39
Chips	45	38
Kool-Aid	45	38
Apple juice	44	37
Salad	42	36
Grapes	41	35

^aOf 613 different foods mentioned.

^bThe term “tacos” was used by children to refer to Mexican-style tacos as well as Indian tacos.