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Food Access and Cost in American Indian Communities in Washington State

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ABSTRACT

Limited access to foods that make up a nutritious diet at minimal cost may influence eating behaviors and, ultimately, obesity. This study examined the number and type of food stores (convenience, grocery, supermarket) on federal reservations in Washington State, and the availability and cost of foods in the US Department of Agriculture Community Food Security Assessment Toolkit market basket, to describe the food environment of American Indians. Stores were identified by telephone survey of tribal headquarters, a commercial database, and onsite visitation. Foods were assessed using a standardized instrument containing 68 items in seven major food groups during April and May 2009. Store type and availability and cost of foods were recorded on a checklist. Fifty stores were identified on 22 American Indian reservations, including 25 convenience, 16 grocery, and 9 supermarkets. Across all stores, about 38% of checklist items were available, with supermarkets having the most and convenience stores the fewest. Foods from the dairy and sugars/sweets groups were the most prevalent, while fresh fruits/vegetables were the least. Cost of the most commonly available items was lowest in supermarkets. Seventeen reservations did not have a supermarket on their reservation, and the nearest off-reservation supermarket was about 10 miles from the tribe's headquarters, which was used as the standard for distance calculations. These results demonstrate that American Indians living on federal reservations in Washington State may have limited access to foods that make up a nutritious diet at minimal cost.

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The benefits of eating a healthy diet are well-established, yet long-term dietary changes in the population remain elusive. Food cost and availability influence dietary behaviors (1), particularly for individuals of low-income, members of minority groups, and those living in rural settings (2-4). Furthermore, energy-dense foods are less expensive on a per-calorie basis than low-calorie, nutritious foods (5). This suggests that individuals with limited financial resources may choose to purchase cheaper energy-dense foods to maximize their spending power.

Addressing food availability and cost in low-income minority communities that suffer disproportionately from chronic diseases could influence eating habits and, ultimately, health. Epidemic rates of obesity and type 2 diabetes among American Indian communities have been documented (6-8), and poverty among this group is widespread (9). American Indians have undergone a "nutrition transition" during the past several decades, characterized by a loss of traditional food practices and reduced physical activity supplanted by abundant energy-dense foods and sedentary lifestyles (10). Similar to reports in other low-income minority groups, evidence suggests that the nutrition environment on American Indian reservations is characterized by few supermarkets and many gas station–type stores, moderate availability of fresh produce, and a reliance on off-reservation stores for regular or bulk shopping (11).

The purpose of this short report was to characterize the nutrition environment of American Indian reservations in Washington State using the US Department of Agriculture (USDA) Food Security Assessment Toolkit, Food Store Survey Instrument market basket (12). For each reservation, the number, type, and location of food stores was determined; the availability and cost of the market basket was determined; and the availability and cost of the market basket on reservation and nearby off-reservation supermarkets was compared to each other and the market basket reference price. Finally, using Geographic Information Systems data, the distance from each tribe's headquarters to the nearest on-reservation or off-reservation supermarket was estimated.

METHODS

Setting

All food stores on all federally recognized American Indian tribes with reservation lands in Washington State (13) were assessed during April and May 2009. Reservation boundaries were defined using geospatial data. There are 29 federally recognized tribes in Washington State, 7 of which are landless, leaving 22 eligible tribes. Before collecting data, the researchers mailed a letter to

each tribe's headquarters that described the study, provided the researcher's contact information, and asked the tribe to contact the researcher with any concerns or questions. Tribal approval was assumed unless the tribe requested not to be included in the analysis. This strategy was discussed with faculty from the Native American Law Center at the University of Washington, and the study was considered exempt by the local Institutional Review Board.

Data Collection

The lead author (M.O.) collected data using standardized measurement tools and procedures (12); two research assistants aided the investigator on one large reservation. Food stores on each reservation were visited to document the type (convenience, grocery, or supermarket), identifying information (name, location), and availability and cost of the market basket. The USDA Food Store Survey Instrument (12) was used as the benchmark for characterizing the nutrition environment because it is based on the Thrifty Food Plan, which serves as the national standard for a minimally nutritious diet at minimal cost (14). The market basket used for assessing food availability and cost contains 68 individual food items categorized into seven major food groups (eg, bananas [fresh fruits and vegetables]; milk, 1% reduced-fat [dairy]; jelly, grape [sugars and sweets]). It also contains the Thrifty Food Plan shopping list commonly used in assessments because it provides a useful framework for studying the cost of a minimally nutritious diet, based on foods that provide a week's worth of recipes and menus for a reference family of four. Optional food items such as spices and condiments are listed under the "Other Food Items" category and are not included in the analysis. Item cost was the lowest price listed for the specified size; sale items were listed as the discounted rather than regular price.

Measures

The type, number, and location of food stores were assessed, along with the availability and cost of the Thrifty Food Plan market basket. All convenience, grocery, and supermarket-type stores located on each reservation were included. For tribes lacking a supermarket, the supermarket located at the shortest straight-line distance from the tribe's headquarters was determined. This was only done for reservations lacking a supermarket because it was assumed that people living on reservations with a supermarket could get most of the market basket items in that store. On-reservation food stores were first identified through a telephone survey of tribal headquarters and a commercial database (ReferenceUSA, Omaha, NE). For the telephone survey, each tribe's headquarters was contacted and an administrator was asked to enumerate the number of convenience, grocery, and supermarket stores on the reservation. Next, the commercial database was searched for all businesses with North American Industry Classification System codes 447110, 445120, and 445110 that were located in or adjacent to the ZIP code of each tribe's headquarters within the reservation boundaries. Convenience stores were defined as businesses with code 447110 (establishments engaged in retailing automotive fuels in combination with convenience store or food mart items) or 445120 (establishments known as convenience stores or food marts, except those with fuel pumps, primarily engaged in retailing a limited line of goods), grocery stores using code 445110 and annual sales <$2.5 million, and supermarkets using code 445110 and annual sales of at least $2.5 million.

Remotely collected data (ie, phone survey and database search) for on-reservation stores were verified through site visitation. The latitude, longitude, and street address of stores found through "ground-truth" methods were determined using a handheld global positioning system device.

The nearest off-reservation supermarket was identified using the ReferenceUSA database and Geographic Information Systems mapping, or by using the handheld global positioning system device, for each of the 17 tribes lacking a supermarket on their reservation.

Analysis

Each store type was identified in terms of total number, proportion, and weighted mean density, the latter using 2000 Census data for each tribe's reservation to establish population estimates. The second aim included the count and price of each market basket item. The number and percentage of available items, overall and by category, was calculated and stratified by store type, along with the mean and median prices for each item across all reservations, and the percentage of reservations on which each item was available in at least one store. Availability and cost of items by store type were compared using a one-way analysis of variance with Tukey's post hoc test. For aim three, we computed and compared average market basket cost in all on-reservation stores and the closest supermarket (either on or off-reservation) using an independent samples t test. This cost was also compared to the national market basket reference price during the period of data collection, again using an independent samples t test. If an item required a cost per pound but was sold on a per-item basis, price was estimated from the per-item price using the average weight for a medium size of the item as listed in the USDA National Nutrient Database. Some items, specifically white and wheat bread, bread crumbs, toasted oats, Grade A eggs, and tuna fish, were not readily available in supermarkets in the specified size, so standard alternative sizes were included in the analysis for these items. Analyses were performed using Statistical Analysis Systems software (version 9.2, 2008, SAS Institute, Cary, NC). Significance was established at $P<0.05$ a priori, with Bonferroni adjustment for multiple comparisons leading to an adjusted level of $P<0.006$ as the threshold for statistical significance.

RESULTS AND DISCUSSION

Food Stores

The telephone survey identified 36 convenience, 11 grocery, and 3 supermarket stores across all reservations. The database search identified 13 convenience, 16 grocery, and 8 supermarket stores. During on-site data collection, all stores found in the database search were lo-