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A Nutrition Environment Measure to Assess Tribal Convenience Stores: The THRIVE Study

Marianna S. Wetherill, PhD, RDN-AP/LD¹, Mary B. Williams, PhD¹, Tori Taniguchi, MPH¹, Alicia L. Salvatore, DrPH¹, Tvli Jacob, MPH¹, Tamela Cannady, MHA², Mandy Grammar, BA², Joy Standridge, MPH, RDN/LD³, Jill Fox, MSPH³, Jennifer Spiegel, MSHR³, and Valarie Blue Bird Jernigan, DrPH¹

¹University of Oklahoma Tulsa Schusterman Center, College of Public Health, Tulsa, OK, USA

²Choctaw Nation of Oklahoma Health Services, Talihina, OK, USA

³Chickasaw Nation Nutrition Services Department, Ada, OK, USA

Abstract

In rural American Indian (AI) communities, where supermarkets are rare, tribally owned and operated convenience stores are an important food source. Food environment measures for these settings are needed to understand and address the significant diet-related disparities among AIs. Through a tribal-university partnership that included tribal health and commerce representatives from two Native Nations in rural southeastern Oklahoma, we developed the Nutrition Environment Measures Survey for Tribal Convenience Stores (NEMS-TCS) to inform the development and evaluation of a healthy food retail intervention. The NEMS-TCS assessed four scored domains of the rural convenience store food environment—food availability, pricing, quality, and placement—and included 11 food categories that emphasized ready-to-eat food items. Trained raters administered the NEMS-TCS using a sample of 18 rural convenience stores (primarily ranging between 2,400 and 3,600 square feet). We assessed interrater reliability with kappa statistics for dichotomized variables and intraclass correlation coefficients (ICC) for continuous variables. NEMS-TCS demonstrated high inter-rater reliability for all food categories (>85% agreement), subscores (ICC = 0.73–1.00), and the total score (ICC = 0.99). The NEMS-TCS responds to recent calls for reliable measures for rural food environments and may be valuable for studying food environments of large convenience stores in other Native Nations as well as other rural settings.

Keywords

Native American/American Indian; minority health; rural health; environmental and systems change; surveys; program planning and evaluation; community-based participatory research; health research; community assessment; nutrition; health disparities; business partnerships; partnerships/coalitions

INTRODUCTION

Convenience stores, broadly described as retailers that provide consumers with “a convenient location to quickly purchase from a wide array of consumable products (predominantly food or food and gasoline) and services” (The Association for Convenience and Fuel Retailing, n.d.) are an important food source in rural communities where supermarkets are rare (The Association for Convenience and Fuel Retailing, 2017; Johnson et al., 2014; Pinard, Byker Shanks, Harden, & Yaroach, 2016). While findings from a recent systematic review suggest that urban convenience stores are less likely to offer healthful food selections compared with similarly sized retailers (Pinard et al., 2016), less is known about healthy food availability in rural convenience stores. Rural convenience stores often dedicate the vast majority of their food inventory to meet the immediate food needs of commuters and long-distance travelers rather than the home grocery needs of local residents, which may result in a limited supply of healthy food inventory. For example, one study found that rural convenience stores offered even fewer healthy options than fast-food outlets in the same areas (Creel, Sharkey, McIntosh, Anding, & Huber, 2008).

American Indians (AIs) living in rural Oklahoma experience significant diet-related disparities (Jernigan et al., 2017a) and have limited access to healthy, fresh foods (Jernigan et al., 2017b). Convenience stores represent a significant economic opportunity for sovereign tribal nations, and these settings may be leveraged to increase the availability of healthy foods for tribal citizens in rural communities. In 2014, the most recent available data, there were 180 tribes with 293 tribally owned convenience stores in 25 states, with Oklahoma having the largest number of tribal convenience stores (Robinson, 2014). Our survey of 513 AIs residing in the Chickasaw Nation and the Choctaw Nation of Oklahoma found that more than 60% reported purchasing food at tribal convenience stores, at least three times per week, often more than other food retailers (Jernigan et al., 2017b). Thus, research measures to effectively assess rural convenience store food environments, including tribally owned convenience stores, are needed to develop, implement, and evaluate healthy food retail interventions that aim to understand and address the significant diet-related disparities among AIs.

BACKGROUND

The Chickasaw Nation and the Choctaw Nation of Oklahoma are among the largest sovereign nations in the United States. Together, these Nations comprise one quarter of the land mass of Oklahoma and have nearly 300,000 tribal citizens (U.S. Census Bureau, 2017). Both Nations each own and operate over a dozen convenience stores. Most of the tribal convenience stores range between 2,400 and 3,600 square feet and are categorized as using the Association for Convenience and Fuel Retailing (National Association of Convenience Stores [NACS]) criteria as traditional or expanded convenience stores, operating for extended hours or 24-hours per day, with some locations offering tables and chairs for in-store dining (The Association for Convenience and Fuel Retailing, 2017). Store patrons include tribal and nontribal local residents in addition to long-distance commuters. Like other convenience stores operating in rural Oklahoma, tribally owned and operated

convenience stores sell a combination of ready-to-eat foods, such as snacks, bottled drinks, and sandwiches, and nonfood items, such as fuel and small gift items.

Along with urban corner stores, convenience stores are categorized as nontraditional food stores. Measures to assess the food environments of nontraditional food retailers include the Nutrition Environment Measures Survey for Stores (NEMS-S), which has been used to assess small urban gas-mart food stores (Glanz, Sallis, Saelens, & Frank, 2007), and the Nutrition Environment Measures Survey for Corner Stores (NEMS-CS), which was developed to assess small urban corner stores that were primarily under 2,000 square feet, had four aisles or less, and only one cash register (Cavanaugh, Mallya, Brensinger, Tierney, & Glanz, 2013; Glanz et al., 2007). These two surveys, in addition to the Nutrition Environment Measures for Restaurants (NEMS-R) (Saelens, Glanz, Sallis, & Frank, 2007), are part of a group of reliable and validated observational measures—the Nutrition Environment Measures Surveys—designed to assess and quantify the healthy food availability, pricing, and quality domains of retail food environments (Glanz et al., 2007). A recent systematic review found that several aspects of the food environment are generally associated with healthier diets, including higher healthy food availability and acceptability (i.e., perceived quality) scores typically correlating with higher intake of fruits and vegetables (Caspi, Sorensen, Subramanian, & Kawachi, 2012).

While rural convenience stores and urban corner stores are both nontraditional food retailers, key differences exist. Rural convenience stores, particularly tribal convenience stores located in rural and reservation areas, lack access to a wide selection of vendors and thus rarely carry produce. Furthermore, these rural convenience stores cater to the needs of long-distance commuters and truckers, who demand ready-to-eat food items, and consequently do not allocate the shelf space to grocery staples like ground beef, iceberg lettuce, bread loaves, and eggs, all of which can be typically found in urban corner stores. However, no food environment measures have been developed to assess the food environments of rural convenience stores, including tribal convenience stores, in order to assess and intervene on the healthfulness of these food environments.

This article describes the development and validation of a Nutrition Environment Measures Survey for Tribal Convenience Stores (NEMS-TCS), to longitudinally assess changes in fruit and vegetable availability in rural convenience store food environments as part of the Tribal Health and Resilience in Vulnerable Environments (THRIVE) study. A primary aim of this community-based participatory research study was to design and evaluate healthy retail interventions in tribally owned and operated convenience stores to increase intake of ready-to-eat vegetables, fruits, and other healthier foods among tribal members who regularly access these stores on a weekly basis. The NEMS-TCS was co-developed by a team of public health researchers at the University of Oklahoma Health Sciences Center and tribal health leaders of two Native Nations—the Chickasaw Nation and the Choctaw Nation of Oklahoma. The THRIVE study was approved by the University of Oklahoma Health Sciences Center, the Chickasaw Nation, and the Choctaw Nation of Oklahoma Institutional Review Boards.

METHOD

Instrument Development

The NEMS-TCS was developed for rural convenience stores, which included 19 stores owned and operated by the Chickasaw Nation and the Choctaw Nation of Oklahoma at the time of this study. Our tribal-university team developed the tool following a review of existing NEMS-S (Glanz et al., 2007), NEMS-CS (Cavanaugh et al., 2013), and NEMS-R (Saelens et al., 2007) tools, which all have been validated in previous studies of urban food environments. The NEMS-S measures the availability and pricing of 10 indicator food categories (fresh fruits, fresh vegetables, milk, ground beef, raw hot dogs, frozen dinners, beverages including soda and juice, baked goods, whole grain bread, and baked chips) as well as the perceived quality for foods in two of these categories (fruits and vegetables). The NEMS-CS, later developed as an adaptation of the NEMS-S to measure urban corner store food environments, allows for further assessment of frozen and canned fruits and vegetables, as well as healthy cereals. Both of these instruments measure three domains of the food environment: availability, pricing, and quality. Food items reflected in food categories include a combination of foods for home use (e.g., raw meat, heads of lettuce, bread loaves) and ready-to-eat foods (e.g., whole fruit, bottled beverages). The total composite score for the NEMS-S ranges from -8 to 50 (0–27 availability, 0 to 6 for quality, and -8 to 17 for pricing) and for the NEMS-CS ranges from -9 to 58 (0 to 34 availability, 0 to 6 for quality, and -9 to 18 for pricing).

Tribal partners, including representatives from tribal health and commerce, reviewed these existing tools and provided input to identify candidate food categories and individual food items that could be used to assess the tribal convenience store food environment. Members of the tribal-university research team conducted field observations at four tribal convenience stores (two from each tribe), to observe and photograph existing food and beverage placement, promotion, and pricing, as well as overall healthy food availability. These images and observations were shared for reference and group discussion during the NEMS-TCS development meetings. Food vendor catalogues were also reviewed by tribal community nutrition researchers to identify the types of healthy foods that could be obtained by tribal convenience stores. The tribal-university research team used “ready-to-eat” as the main criterion for inclusion of items from the NEMS-S (Glanz et al., 2007) and the NEMS-CS (Cavanaugh et al., 2013), which resulted in the exclusion of grocery items, such as raw ground beef, frozen dinners, and bread loaves. Additional food items and categories were added to more comprehensively evaluate the convenience store food environment, including prepackaged sandwiches and salads. The NEMS-R (Saelens et al., 2007) was consulted to establish healthy criteria for salads. Since as many as 75% of AIs are lactose intolerant (Escott-Stump, 2012), the milk food category was also modified to include lactose-free milk, milk alternatives, and lower lactose options, including yogurt.

The NEMS-TCS contained 11 core food categories that were scored for availability, which represented the majority of foods sold in the convenience store industry according to the NACS (The Association for Convenience and Fuel Retailing, 2017). Food items representing the NACS categories of perishable groceries (i.e., items intended for home consumption),

frozen foods, hot dispensed beverages, and frozen dispensed beverages were not included, primarily because they were not feasible candidates for modification through the intervention, which focused on ready-to-eat foods containing fruits and vegetables. Consistent with previous NEMS tools, the NEMS-TCS also included pricing (for six food categories) and quality (for fruit and vegetable categories) domains. The team added a new fourth domain of placement to assess whether bottled water was stocked at eye level (Table 1).

Quantitative Scoring Components and Rationale

Tribal partners identified fruits, vegetables, healthy beverages, and ready-to-eat food items (lower fat sandwiches, healthy salads, and canned lean meats) as six priority food categories for the NEMS-TCS because they reflected the strongest opportunities for narrowing healthy eating disparities. Thus, points from these six food categories of the NEMS-TCS comprised the majority (68%) of the NEMS-TCS total score (Table 1). The remaining five food categories were included so that the NEMS-TCS measure could more comprehensively reflect healthier alternatives to most foods sold in convenience store environments. Additionally, availability domain scoring proportionately assigned more points to those food categories that contained fruits and vegetables (i.e., fruits, vegetables, and salad categories), consistent with the U.S. Dietary Guidelines for Americans recommendations that encourage fruit and vegetable-rich diets (U.S. Department of Health and Human Services & U.S. Department of Agriculture, 2015). The research team consulted with developers of the original NEMS tools to ensure face validity and to finalize scoring consistency with other NEMS tools, such as negative points when the pricing of an unhealthy food is lower than the healthy alternative and additional points as the availability of healthy food options increase within a food category. Additionally, expert dietitians and community nutritionists from the tribal and university research team qualitatively evaluated food categories and scoring of the NEMS-TCS to ensure that each item represented its assigned food category and depicted healthy food options for convenience store environments.

Points were assigned for each food category within the domains of availability, price, quality, and placement as outlined in Table 1. Food category subscores were calculated by summing points across all domains for foods within that category. Domain subscores were calculated as the sum of points across all food categories for that domain. The availability domain included all categories, the price domain included six food categories, the quality domain included two food categories, and the placement domain included one food category. Pricing scores were derived for food categories that contained both healthy and unhealthy foods for the purposes of pricing comparisons. Consistent with the NEMS-S and NEMS-CS, quality scores were initially assigned to assess fresh fruits and vegetables only. An additional placement domain was developed by the team to assess visibility of bottled water as a healthy alternative to sugar-sweetened beverages. Food category maximum subscores ranged from 4 points for canned meats, baked goods, and ready-to-eat cereal categories to 10 for vegetables, 11 for fruits, and 13 for beverages. Possible domain subscores ranged from 0 to 49 for availability, -6 to 14 for price, 0 to 6 for quality, and 0 to 1 for placement. The total NEMS-TCS composite score for a store was the sum of each domain score with a maximum score of 70 points.

Training

All tribal and university partners completed the NEMS online training course to gain familiarity with the standard NEMS administration procedures (University of Pennsylvania, n.d.). After the NEMS-TCS was finalized, all tribal partners attended a 4-hour training to review each NEMS-TCS section. The NEM-STCS was field tested after training by two university research team members and seven tribal partners between May and June 2015 prior to baseline data collection. This field testing was used to estimate administration time and feasibility.

Store Selection, NEMS-TCS Administration, and Intervention Development

Between June 16 and 30, 2015, the NEMS-TCS was administered in 18 tribally owned travel stores ($n = 11$ in one tribe and $n = 7$ in the other), which included all stores in operation, except one store that was undergoing renovations. Six of the trained tribal researchers (three from each tribe) shared NEMS-TCS administration for stores operated by their respective tribe. Two raters from each tribal team completed the NEMS-TCS assessment at their assigned store on the same day using paper forms.

The research team reconvened after baseline data collection to review results from the availability domain for the 11 scored food categories to discuss strategies for increasing the availability of healthy options. The intervention foods primarily included ready-to-eat fruits and vegetables; healthy sandwiches, wraps, and salads; water; and vegetable juice.

NEMS-TCS Quality and Placement Domain Refinements

After the baseline data collection was complete, the team discussed opportunities for improving the measure. On the expert recommendation by the tribal research dietitian and community nutrition research team members who participated in baseline data collection, quality measures for ready-to-eat sandwiches and salads were added because the quality of these perishable items could influence purchasing decisions. These additional quality measures increased the maximum-quality domain points from 6 to 10. Additionally, the team added placement measures for fresh fruit, vegetable, healthy sandwich, and salads to indicate whether these priority food categories were visible from the store entry. The decision to add items to the placement domain was based on recent marketing recommendations for small food retailers who reported that positional factors influence healthy food purchasing decisions (Laska & Pelletier, 2016). The addition of these food items to the bottled water placement item increased the maximum-placement domain points from 1 to 5. These refinements increased the maximum points for the total NEMS-TCS score from 70 to 78. These additions to the quality and placement domains are noted in Table 1.

The group also reformatted the NEMS-TCS to reduce administrative burden, including consolidation of the sandwich measure to reflect the total count of low-fat varieties available instead of a full inventory of all low-fat options available. The group also consolidated the other healthy snack availability measure by eliminating unhealthy snack comparison items and pricing information for all snacks since these data were not needed in the original scoring calculations for that food category. The refined NEMS-TCS was administered by

two raters in all but one of the study's intervention and control stores ($n = 7$) between April 7 and May 12, 2017.

Statistical Analysis

We calculated interrater reliability of the NEMS-TCS with two raters using the same version of the NEMS-TCS at the same store to estimate percent agreement and kappa statistics for dichotomized variables (availability of food items within a food category) and intraclass correlation coefficients (ICC) for continuous variables (domain subscores and the total score). We calculated inter-rater reliability for the original version of the NEMS-TCS in 18 stores and again separately using the refined version in 7 stores, which were involved in the intervention study. For price agreement, only prices reported for the same food item were compared. Multiunit prices were transformed into single-unit prices before assessing price reliability.

All statistical analyses were performed in SAS, version 9.4. Statistical significance was evaluated with an alpha of .05.

RESULTS

Administration time for the refined NEMS-TCS averaged 46.1 minutes ($SD = 8.0$, range 37–61 minutes), which was reduced from the time required for the original version ($M = 58.1$, $SD = 18.1$, range 23–101 minutes). Since both raters at all stores reported that no low-fat baked goods were available at either time point, no reliability statistics were calculated for this category. Inter-rater reliability for item availability using the original NEMS-TCS was high with percent agreement ranging from 70.6% for trail mix to 100% for 17 food items, including fresh, canned, and dried fruits; canned vegetables and vegetable soup; sandwiches; salads; fruit and vegetable juices; canned lean meat; low-fat milk; diet coke; bottled water and unsweetened tea; granola bars; ready-to-eat cereal, and nuts besides peanuts. Related kappa values for the original NEMS-TCS were all acceptable ($\kappa \geq 0.27$), with the majority indicating moderate agreement or better ($\kappa > 0.41$). Reliability of item availability improved for most items on the revised survey, with more than 80% agreement for all items, except canned fruit (71.4%), and 100% for 25 items. Kappa values for all food items in the revised version indicated substantial agreement ($\kappa \geq 0.70$), except low-fat milk ($\kappa = 0.59$) and healthy salads ($\kappa = 0.58$). Furthermore, interrater reliability of prices for four food items with prices at seven or more stores indicated perfect agreement ($ICC = 1.00$).

Interrater Reliability for Food Categories and Consumer Food Environment Domains

Interrater reliability across food categories on the original NEMS-TCS was high with percent agreement ranging from 84.8% (healthy snacks) to 100% (fruit, canned lean meats, sandwiches/wraps/burritos, and ready-to-eat cereal), which were confirmed with kappa statistics indicating substantial or better agreement ($\kappa > 0.61$) for all categories except the healthy snacks category ($\kappa = 0.34$) (Table 2). Reliability for the refined NEMS-TCS remained high with $\geq 85\%$ percent agreement and kappa statistics indicating substantial agreement for all categories ($\kappa > 0.61$). Furthermore, interrater reliability of category subscores was high with ICCs ranging from 0.74 (healthy snacks) to 1.00 (canned lean

meats) on the original NEMS-TCS and from 0.77 (fruit) to 1.00 (baked chips and ready-to-eat cereals) on the refined NEMS-TCS.

The inter-rater reliability of the original NEMS-TCS total score was high (ICC = 0.94), as were the domain subscores (0.86 for placement, 0.89 for pricing, and 0.95 for availability). The quality domain subscore could not be calculated due to insufficient scoring variability. After reformatting, the ICCs increased for the availability domain subscore (from 0.95 to 0.99) and the pricing domain subscore (from 0.89 to 0.97). After incorporating the quality and placement refinements into the domain subscore, the inter-rater reliability for the placement domain was 0.93 and the quality domain was 0.85. In addition, the inter-rater reliability for the total NEMS-TCS score increased to 0.99 after refinements.

DISCUSSION

This study describes the process used to develop a reliable and valid NEMS tool, the NEMS-TCS, which can be used to assess rural tribal convenience store environments and facilitate the planning and evaluation of healthy food retail interventions that focus on ready-to-eat foods. The final NEMS-TCS demonstrated inter-rater reliability similar to NEMS-S (Glanz et al., 2007) and NEMS-CS (Cavanaugh et al., 2013), with percent agreements exceeding 90% and substantial Kappa values for most comparable food items. In addition, intraclass correlations of food category subscores and the total score were similar to those reported for other NEMS adaptations (Lo, Minaker, Chan, Hrgetic, & Mah, 2016; Martins et al., 2013).

The NEMS-TCS incorporates two key indicators of food purchasing decisions that may be of special importance in a hurried food shopping environment: perceived quality and placement (Caspi et al., 2012; Laska & Pelletier, 2016). Previous NEMS tools have prioritized scoring based on product availability and comparative pricing, with fewer points based on quality (Cavanaugh et al., 2013; Glanz et al., 2007). The NEMS-GG (Lo et al., 2016) was recently developed to measure “grab-and-go” university establishments frequented by members of college communities, including availability, signage, and pricing of ready-to-eat foods, but to our knowledge the NEMS-TCS is the first NEMS tool adapted to emphasize assessment of ready-to-eat foods in rural convenience store settings and to place a higher scoring priority on healthy food placement. Unlike the NEMS-GG, the NEMS-TCS includes quality and placement of select food items in the score calculations. Specifically, while our scoring emphasizes the total availability of healthier food options, more items are assessed and more points are allocated for quality since perceived quality is positively associated with dietary intake of fresh foods (Caspi et al., 2012). The NEMS-TCS also integrates water and other healthy food placement into its scoring design. Food placement should be considered in future NEMS adaptations since this may have a larger influence over purchasing behaviors than total availability (Laska & Pelletier, 2016).

One unique aspect of the process used to develop the NEMS-TCS is the participatory orientation involving cross-sector collaboration between commerce and health stakeholders within both tribal nations. Because AI communities face distinct challenges in healthy food access, cross-sector collaboration is key for improving tribal food environments (Pinard et al., 2016). The features of these tribal convenience store food environments, as well as rural

food environments, limit the direct application of healthful food/beverage stocking practices developed for urban settings (Laska & Pelletier, 2016), primarily due to the product needs of on-the-go consumers, existing retail space constraints, and inventory acquisition challenges. The NEMS-TCS emphasizes healthy foods that can be more feasibly acquired by tribal and rural convenience store retailers, which allows for a more direct translation of NEMS findings into healthy food retail interventions.

Limitations

We administered the NEMS-TCS in all but one tribally owned store in the two tribal jurisdictional areas. It is unknown how generalizable the NEMS-TCS would be for assessing the food environments of other convenience stores. However, since NACS distinguishes convenience stores based on size and services, this tool may be useful in assessing the food environment of other large convenience stores and could be validated in these environments. Due to resource limitations, we were unable to perform test-retest reliability of the tool, which could be included in future NEMS-TCS validation studies. Furthermore, since this instrument was evaluated in convenience stores most closely resembling the NACS classification of traditional or expanded convenience stores, evaluation and further instrument modification may be needed for use in mini and limited-selection convenience stores, as well as hyper convenience stores (The Association for Convenience and Fuel Retailing, 2017).

Conclusion

As food environment research advances, nutrition and public health practitioners are challenged to select tools that not only provide descriptive knowledge of these spaces but can also be used to inform intervention development. The NEMS-TCS responds to the need for reliable and valid instruments that can be applied longitudinally to address knowledge gaps in the rural food environment literature (Lytle & Sokol, 2017), especially in communities where convenience stores serve as a primary food source.

Policy priorities for healthy food access in tribal communities, as well as nontribal rural communities, include improvements in local retail food systems (Johnson et al., 2014). Descriptive data gathered from the NEMS-TCS can be used to facilitate discussions between tribal health and retail stakeholders about needed systems-level change for building healthy food access. Trends in convenience store foodservice suggest that more consumers expect “fresh, healthy and quick” options (Lisanti, 2017), and the NEMS-TCS can be used to assess existing food inventory and identify opportunities for new healthy foods that can better meet consumer demands, while also establishing benchmarks for improving the nutrition environments of these spaces.

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TABLE 1

Scoring System and Maximum Score for Each Food Category on the Nutrition Environment Measurement Survey for Tribal Convenience Stores (NEMS-TCS) by Domain

Food Category	NEMS-TCS Domain and Points						
	Availability	Points	Pricing	Points	Quality ^a	Points	Maximum Score
Fruit	Low fat/skim milk, and yogurt	1	Lowest-fat milk < whole	2	—	—	7
	Lowest-fat milk to whole milk 50%	1	Lowest-fat milk = whole	1	—	—	
	Lactose-free milk	1	Lowest-fat milk > whole	-1	—	—	
	Dairy alternative (soy, almond)	1					
	Reduced/nonfat/Greek yogurt	1					
	Fresh varieties:		—	—	Fresh acceptable varieties:	1	11
						<i>Fresh only: Visible from store entry</i>	
Vegetables	1-2	1			1-2	1	
	3-5	2			3-5	2	
	>5	3			>5	3	
	Canned varieties:						
	1-2	1					
	3	2					
	Pop-top/peel-away lid on can	1					
	Any dried fruit	1					
	Fresh varieties:		—	—	Fresh acceptable varieties:	1	10
						<i>Fresh only: Visible from store entry</i>	
Canned lean meats	1-2	1			1-2	1	
	3-5	2			3-5	2	
	>5	3			>5	3	
	Any canned or dried vegetable	1					
	Pop-top/peel-away lid on can	1					
	Ready-to-eat vegetable soup	1					
	Tuna	1	Lean < high fat ^b	2	—	—	4

Food Category	NEMS-TCS Domain and Points						
	Availability	Points	Pricing	Points	Quality ^a	Points	Maximum Score
Lower-fat ^c sandwiches, wraps, and burritos	Chicken	1	Lean = high fat ^b	1			
	Varieties:		Lean > high fat ^b	-1			
	1-2	1			Acceptable:	1	7
	3-5	2			>75%	2	
	>5	3			50%-74%	1	
Healthy salads ^d	Lower fat to regular	1					
	Any salad	1			Acceptable:	1	8
	Healthy salad	1					
	Healthy salad dressing choices ^e :				>75%	2	
	1	1			50%-74%	1	
Low-fat ^f baked goods	2	2					
	3	3					
	Varieties:		Low fat < high fat	2			4
	1-2	1	Low fat = high fat	1			
	>2	2	Low fat > high fat	-1			
Healthy beverages	Diet soda	1	Diet < regular soda	1			13
	100% fruit juice	1	100% fruit juice juice drink	1			
	100% vegetable juice	1	Unflavored bottled water < regular soda	2			
	Unflavored bottled water	1	Unflavored bottled water = regular soda	1			
	Unsweetened or artificially sweet tea	1	Unflavored bottled water > regular soda	-1			
	Low-calorie flavored water	1					
	Low-calorie sports or energy drink	1					
	Low-calorie fountain	1					

Food Category	NEMS-TCS Domain and Points						
	Availability	Points	Pricing	Points	Quality ^a	Points	Maximum Score
Baked chips	beverages to regular	50%					
	Varieties:		Baked < regular	2	—	—	5
	1–2	2	Baked = regular	1			
	>2	3	Baked > regular	–1			
Other healthy snacks	Peanuts	1	—		—	—	5
	Other nuts	1					
	All-beef jerky	1					
	Granola or low-sugar, lower-fat protein bars	1					
	Fruit and nut trail mix	1					
Ready-to-eat cereals	Healthy cold cereal (<7 g sugar)	1	Cold cereal:	1	—	—	4
	Oatmeal (<7 g sugar)	1	Healthy < regular	2			
			Healthy = regular	1			
			Healthy > regular	–1			

NOTE: Italics indicate refinements to the quality and placement domains.

^aQuality is visually assessed for perceived and/or objective freshness.

^bHigh-fat canned meats include potted meats and Vienna sausage.

^cLower-fat sandwiches, wraps, and burritos contain <30% calories from fat and fewer than 500 calories.

^dHealthy salads contain spinach, romaine, or other dark-green leafy vegetable and ≤2 high-fat toppings.

^eHealthy salad dressings include low-fat, fat-free, or oil-based salad dressings.

^fLow-fat baked goods include bagels and English muffins.

TABLE 2

Interrater Reliability of Food Category Availability for the NEMS-TCS

Food Category	Kappa (κ) Interrater ^d		Percent Agreement (%)	
	Original (n = 18)	Refined (n = 7)	Original (n = 18)	Refined (n = 7)
Dairy	0.88	0.93	97.2	96.3
Fruit	1.00	0.68	100	85.0
Vegetable	0.94	0.87	97.2	96.2
Canned lean meats	1.00	— ^b	100.0	100.0
Lower-fat sandwiches, wraps, burritos	1.00	— ^b	100.0	100.0
Salads	0.68	0.79	90.6	89.5
Beverages	0.88	0.96	95.7	98.4
Baked chips	0.75	1.00	88.9	100.0
Healthy snacks	0.34	— ^b	84.8	97.6
Ready-to-eat cereal	1.00	1.00	100.0	100.0

NOTE: NEMS-TCS = Nutrition Environment Measures Survey for Tribal Convenience Stores.

^aKappa statistic calculations included availability of healthy items in each food category and all healthy items for the availability domain.^bNo Kappa statistic was computed because there were less than or equal to two levels per cross-tabulation.