Short-term Temporal Stability in Observed Retail Food Characteristics

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ABSTRACT

Objective: Use of direct observation to characterize neighborhood retail food environments is increasing, but to date most studies have relied on a single observation. If food availability, prices, and quality vary over short time periods, repeated measures may be needed to portray these food characteristics. This study evaluated short-term (2-week), within-season temporal stability in retail food availability, prices, and quality.

Design: In-person observations of retail food stores at 2 time points, 2 weeks apart.

Setting: Southwest Chicago, IL.

Sample: 157 food stores.

Main Outcome Measures: Availability and prices of food items selected from the following food groups: fruit, vegetables, grains, meats and beans, and dairy, as well as fresh produce quality.

Analysis: Temporal stability was tested for availability using a McNemar test and for price and quality using a Wilcoxon signed-rank test.

Results: Measures of food availability and prices as well as fresh produce quality at stores were generally stable at the 2 time points.

Conclusions and Implications: This study suggests that a single observation may be sufficient to accurately characterize within-season food availability, food prices, and fresh produce quality.

Key Words: food environment, measurement, food prices, food supply, reliability, food quality (*J Nutr Educ Behav*. 2010;42:26–32.)

INTRODUCTION

Use of direct observation to characterize neighborhood retail food (eg, availability, prices, quality) is increasing.[1-13] Studies in the United States (US) have generally highlighted barriers to healthful eating for residents in black and low-income neighborhoods[14] and have helped to identify points for intervention at the environmental level consistent with an ecological model. Yet few have documented the reliability or validity of their measures.[5] Furthermore, with notable exceptions,[5,7] most studies have relied on a single observation to characterize food availability, prices, and quality. Although seasonal variations in these food characteristics are recognized,[5,7] little is known about whether retail food characteristics are stable over a short period of time. This understanding is important to inform future studies involving direct observation of retail food. Specifically, temporally stable measures would support the sufficiency of a single observation to portray food characteristics within season. On the other hand, if food characteristics are variable over short periods, repeated measures may be needed to more accurately assess them. The purpose of this study was to evaluate short-term (2-week), within-season temporal stability in retail food availability, prices, and quality in diverse neighborhoods in Chicago, IL.

METHODS

Setting and Sample

The city of Chicago is divided into 77 officially designated neighborhoods, or "Community Areas."[15] This study was conducted in 5 contiguous, racially/ethnically and socioeconomically diverse Community Areas in southwest Chicago: Chicago Lawn, West Lawn, Ashburn, Englewood, and West Englewood. Chicago Lawn and West Lawn are involved with the Illinois Prevention Research Center, with which the authors collaborated for this project. In 2000, the 5 Community Areas included populations between 29,235 (West Lawn) and 61,412 (Chicago Lawn). The percentage of non-Hispanic blacks in these areas ranged from 2.6 (West Lawn) to

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97.8 (Englewood and West Englewood), whereas the percentage of non-Hispanic whites ranged from 0.4 (Englewood and West Englewood) to 42.9 (West Lawn). Further, there was wide variation in the percentage of Hispanic residents: 0.9 (Englewood) to 51.9 (West Lawn). Socioeconomic conditions also differed among the Community Areas, and the percentage of residents below the poverty level ranged from 6.9 (Ashburn) to 43.8 (Englewood).

Based on a 2006 Chicago Department of Revenue list, the authors identified food outlets in zip codes that roughly corresponded with the Community Area boundaries. The list did not classify outlets by type or include information useful for categorization (eg, North American Industry Classification System codes, annual sales, square footage) beyond the outlet name. Therefore, guided by definitions from the Food Marketing Institute,[16] the authors used store names and in-person observations to classify outlets into 1 of 4 categories: grocery stores, liquor stores, convenience/corner stores, and other food stores (bakeries, delis, drug stores). Briefly, grocery stores had both fresh produce and fresh meat sections; liquor stores sold liquor as the primary product or had "liquor" in the store name; "other" food stores were identified by primary product sold or store name (eg, bakery, pharmacy such as Walgreen's); and convenience/corner stores sold gasoline (39%) or were classified by exclusion from the other categories.

Measures

Overview. The authors drew on data from a project whose objectives included understanding the relative availability and prices of more and less healthful food choices and identifying fruits and vegetables in racially/ethnically diverse neighborhoods. The measurement instrument was adapted from 3 existing instruments.[1,11,13] It included a fairly comprehensive list of fresh, frozen, and canned fruits (n = 35 varieties) and vegetables (n = 73 varieties). For the subset of fruits and vegetables selected for price and quality assessments and for the other food groups (grains, meats and beans, dairy), inclusion of

food products was guided by dietary recommendations (ie, MyPyramid),[17] food items commonly consumed in the US,[18] and food preferences of the 2 predominant, nonmajority racial/ethnic populations (black, Hispanic) in the Community Areas.[19] Drawing on food items identified in MyPyramid,[17] grains, meats and beans, and dairy were subdivided into "more healthful" choices (eg, brown rice, fresh skinless chicken breast, skim milk) or "less healthful" choices (eg, white rice, fresh split chicken breast with skin, whole milk). Thus, this paper includes food products of the following types: fruit (fresh, frozen, canned); vegetables (fresh, frozen, canned); grains (more healthful, less healthful); meats and beans (more healthful, less healthful); and dairy (more healthful, less healthful).

To help ensure it was appropriate for the study area and to improve clarity of operational definitions, the instrument was pretested and revised prior to observer training and the field period. More specifically, using an iterative process, the authors collected practice data at different store types located in Chicago communities that were demographically similar to the study Community Areas and revised the instrument and instructions based on questions that arose. Because the authors wanted to identify product sizes that would be most commonly sold in the study area, modifications to the identified product sizes for the price assessment (described below) were among the most common revisions. Pretesting also resulted in many other clarifications (eg, not to consider instant or "boil in the bag" types of rice for availability or price assessment; only unseasoned, fresh ground beef and turkey; navel oranges only for price assessment) to promote observation consistency.

Retail food characteristics. The authors measured *availability* as presence or absence of each of 35 varieties of fruit (fresh, canned, and frozen), 73 varieties of vegetables (fresh, canned, and frozen), and 25 other food products, representing the food types described above. Table 1 shows the specific food products assessed.

The authors measured *prices* for a subset of 13 fresh fruits and vegeta-

bles and the 25 other food products (Table 1). For fresh fruits and vegetables, the authors recorded prices as either price per pound or per item, depending on how the item was sold at the store. With 3 exceptions (avocado, mango, head of iceberg lettuce) that were most commonly sold per item, the assessed fruits and vegetables were typically sold per pound. For those stores at which the fruit or vegetable was sold in the less common unit (eg, apples sold per item), the authors converted prices to the more common unit (eg, apples sold per item were converted to per pound) using average gram weights per product from the United States Department of Agriculture (USDA) (the weight of a medium-sized item was used when more than 1 weight was provided in the database).[9,20] Across the 13 produce varieties and the 2 time points, 11.6% of the prices were converted using this method. For grains, meats and beans, and dairy, the authors measured prices of each food product using a preselected size (eg, 20-ounce loaf of bread, gallon of milk), but not brand. Pretesting informed the sizes selected with the goal of attaining sizes commonly available and comparable for more and less healthful choices. If more than 1 brand was available at the chosen size, then the price of the lowest cost brand was recorded.

Using measures from a prior study,[13,21] the authors assessed *quality* for a subset of fresh fruits and vegetables (n = 8) (Table 1). Briefly, for each of these produce varieties, a unique, high-quality description for external appearance and condition that covers the domains of color, texture, form, and damage or defects is available. These quality descriptions were developed from standards provided by the USDA.[22-24] Using these high-quality descriptions, observers rated each produce variety on a 4-point scale based on the estimated proportion of items at the store that did *not* meet the high-quality standard: excellent (0%-4%), good (5%-24%), fair (25%-49%), or poor (50%-100%). After reverse-coding the quality scores so that higher scores correspond to higher quality, the authors calculated the mean score for each store; this mean score was used in the analysis. In a prior study using this measure, based on data from 3 stores (1 assessed