

**Do the Poor Pay More for Food? *Item Selection and Price Differences Affect Low-Income Household Food Costs.*** By Phillip R. Kaufman, James M. MacDonald, Steve M. Lutz, and David M. Smallwood. Food and Rural Economics Division, Economic Research Service, U.S. Department of Agriculture. Agricultural Economic Report No. 759.

## **Abstract**

Low-income households may face higher food prices for three reasons: (1) on average, low-income households may spend less in supermarkets—which typically offer the lowest prices and greatest range of brands, package sizes, and quality choices; (2) low-income households are less likely to live in suburban locations where food prices are typically lower; and (3) supermarkets in low-income neighborhoods may charge higher prices than those in nearby higher income neighborhoods. Despite the prevailing higher prices, surveys of household food expenditures show that low-income households typically spend less than other households, on a per unit basis, for the foods that they buy. Low-income households may realize lower costs by selecting more economical foods and lower quality items. In areas where food choices are limited due to the kinds and locations of foodstores, households may have sharply higher food costs.

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## Summary

America's poor face slightly higher food prices than the national average, but economize by using cost saving techniques, such as buying lower quality foods, generic brands, and larger package sizes, and by using coupons and shopping for sale items. Consequently, low-income households spend less per unit of weight or volume for many foods, such as beef, and their total grocery bill is lower than the national average. However, poor households spend a higher proportion of their income on food than wealthier households which confirms a fundamental principle of economics — the percentage of income spent on necessities falls as income rises.

Food security—the availability to everyone of nutritionally adequate and safe foods—is a goal of the Nation's nutrition programs, including Food Stamps, school feeding, and WIC (Special Supplemental Nutrition Program for Women, Infants, and Children). Achieving an adequate diet depends on sufficient purchasing power, but also on access to reasonably priced food. Reducing food insecurity requires understanding why the prices the needy face at the grocery store may be different from higher income people as well as how the poor cope with a limited budget.

The report found that suburban supermarkets typically have the lowest food prices and widest selection, but poor people tend to live in central cities and rural areas. Grocery stores in central cities have higher operating costs and tend to be smaller and unable to take advantage of economies of size. In rural areas, food prices also tend to be higher than in suburban areas because supermarkets are likely to be smaller, fewer, and experience higher costs per unit sold. Together, these factors increase the food prices faced by poor households by 1 percent above the national average.

Analysis of household food spending patterns found low-income people pay less per unit of nearly every major food group, except vegetable and fruit juices, and eggs, than wealthier households. This suggests that the poor's food shopping practices more than offset the higher prices they face.

The study identifies the complexities of comparing food prices across income groups. The task is difficult because of the tremendous variety of foods offered for sale, differences in the kinds and locations of stores, and the fact that low-income families purchase a different market basket of foods than higher income households. Another complication is that the Federal Government does not routinely collect detailed data on the food prices that low-income households pay. Consequently, this study carefully examines findings from several food price and household food consumption and spending surveys, the U.S. Census, and statistics on USDA Food Stamp redemptions. Some of the findings were:

- Prices for food items vary with store size, with small stores charging an average of 10 percent more than supermarkets. Supermarkets can charge lower prices because of their “economies of size” and by offering store label and generic items.
- Small foodstores are more likely to locate in low-income, central-city neighborhoods and rural areas than in the suburbs, and supermarkets are more likely to locate in the suburbs.

- Supermarkets in central cities tend to have higher prices than those in suburban areas because central-city business costs are higher and they may face less competition.
- The combined effects of store location and store mix suggest that, on average, low-income households face slightly higher prices than other households for the same food items, with the likely average difference being less than 1 percent.
- In 1992, the poorest 20 percent of the Nation's households (household income averaging \$6,669) spent \$1,249 per person on food, compared with \$1,997 per person for the wealthiest 20 percent (household income averaging \$77,311).
- Low-income consumers tend to have lower per unit (pound or gallon) food costs than all-income consumers for nearly every major food category. For example, in 1987-88, low-income households paid on average about 78 percent of the price households nationwide paid for poultry, fish, and seafood.

# Do the Poor Pay More for Food?

## Item Selection and Price Differences Affect Low-Income Household Food Costs

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### Introduction

Whether or not the poor pay more for food is a recurring policy question. U.S. agricultural policy aims in part to ensure an adequate, safe, and affordable food supply, while Federal food assistance programs aim to provide low-income and other needy people with the financial means to select nutritious diets. A better understanding is needed to determine the impact on low-income households and Federal food assistance budgets of potential differences in food prices, food costs, and access to large retail foodstores.

At first glance, it may seem to be a simple question to answer—compare the prices low-income households pay for food with other households. However, neither the Federal Government nor private industry routinely collects the detailed data on the food purchases of low-income households that is necessary to fully answer the question. Some information is available, such as household consumption and expenditure data and supermarket scanner data on food prices, that can be used to shed some light on the question of price differences. The problem is exacerbated by the abundance and variety of foods offered for sale and the fact that low-income households typically buy different items or market baskets than other households. A typical supermarket may offer over 25,000 unique food items, differentiated not only by product category (rice or canned soup, for example), but by brand, flavor, and package size. Nationwide, more than 200,000 specific grocery items (excluding fresh meat and poultry and produce) are offered by foodstores.

Thus, constructing a representative market basket of food for any household group is a complex issue. The market basket must be representative of where the household group shops and the foods purchased, including

brand type and package sizes. Due to the potential for wide-ranging differences in foods purchased, a representative market basket for any household group may prove elusive. In addition, the high costs of collecting data often undermine the development of ideal price indices.

Household expenditure and quantity data can be used to compare food costs. Household surveys are able to directly link information about household income, size, and other demographic characteristics to food purchases. The surveys gather data on household food expenditures and quantities for a specified period—a week, for example. One can then use the survey data to calculate per unit food costs (expenditures per pound, per ounce, or per gallon). However, for purposes of food-cost comparisons, household surveys are not designed to obtain the level of item detail available in store surveys—typically aggregating to less than 100 relatively broad food groupings. Food groups in a household survey may contain a wide range of food items and quality variations having significant unit-cost differences. Consequently, per-unit food costs may vary widely across households depending on the set of brands and package sizes that a household purchases in a food category as well as price differences for similar items.

In contrast to household surveys, store surveys can be used to compare prices of like items across many different locations and kinds of stores. However, the more narrowly defined an item, the less likely it will be carried by all stores. As a result, researchers must find ways of selecting like items for price comparison when identical items are not offered for sale. Researchers have used different approaches to select like items for comparison. The approach taken is important because different approaches can give different conclusions. Moreover, the researcher must decide how to aggregate sample price observations into a market basket for a

storewide index of prices using information on household consumption patterns for selected demographic groups. Finally, in order to use store data to compare average prices across locations, researchers need a way to aggregate store price indexes to areawide indexes.

The evidence suggests that low-income households spend less for food, on average, compared with all-income households. Low-income households appear to select more economical foods, such as store label and generic items, larger package sizes, and lower quality items, in order to spend less on food. In contrast, for a fixed market basket of identical or highly similar foods, analysis of foodstore prices shows that low-income households would spend more on average due to the slightly higher prices low-income households face.

## **Store Surveys Show That Low-Income Households Face Higher Prices**

Surveys of foodstores often conclude that low-income households face higher item prices, on average, for similar food items, with estimates of differences varying considerably. In the analysis that follows, “prices faced by households” are the store’s listed price for a food item uniquely identified by package size, brand, flavor, color, or other distinguishing features. For purposes of price comparison, items are aggregated into market baskets and average basket prices are compared. Key methodological issues include the selection of items to be sampled and the aggregation into market baskets.

### **Methodological Issues in Comparing Store Prices**

Developing a market basket of items for comparison is a complicated task, and the researcher must make several key decisions when designing the analysis. Different researchers make different choices, and the results can be affected by the choices made. The important decisions include the following:

- food item selection for price comparisons;
- the choice of geographic areas for comparison;
- the choice of stores within geographic areas;
- the method of averaging prices over items and across stores; and
- how to treat missing items.

### **Food Item Selection for Price Comparisons**

Supermarkets contain thousands of specific food items; price comparisons are based on samples of those items. Ideally, the sample of items chosen for pricing should be representative of the products that households actually buy. It also should contain items that are actually present in sample stores so that prices can be collected. Those two requirements may seem to amount to the same thing (if households buy it, it must be in the store), but they are not always equivalent because different stores may stock different brands and different sizes of a brand. Some stores may carry private-label and generic items, while others do not.

There are several approaches to item selection used to address differences within a sample of stores. The simplest is a comparison across a set of stores, of a limited list of well-known food items that are precisely defined as to size, flavor, and brand. But such a list will cover only a small fraction of food purchases; that is, the products will not represent all purchases. Furthermore, only a very limited set of items is likely to be carried by all stores. The analyst will then have to proceed with a small set of items or a small set of stores. Because the set of comparable items diminishes with the number and kinds of stores, the identical-item approach has been used only in small studies with limited numbers of stores and items.

Most foodstore studies attempt to price a market basket representing a wide range of food commodities (such as fresh meats, packaged meats, green vegetables, yellow vegetables, canned soups, and whole wheat flour). But households do not buy commodities; they buy specific brands, qualities, and sizes of commodities. The challenge then becomes how to choose comparable items to appear in the market basket.

Some researchers choose the lowest cost (per unit of weight) item carried by a store in each commodity category for their studies. This approach aims to capture what is available to a household that seeks to minimize food costs, but readers need to be careful in evaluating comparisons using these market baskets. In practice, the approach will involve choosing the largest size (price per ounce typically falls as container size increases) and a private label or generic item, if available.

Smaller stores are far more likely to carry only small container sizes of popular branded products, while large supermarkets are likely to carry larger sizes and



private-label products. A sampling methodology that selects the lowest priced item in a food category will often compare small sizes of branded items in small stores to large sizes and private-label items in large supermarkets. The resulting market basket price indexes could easily differ by 30-40 percent, and they can do so even if the prices of individual items carried are the same in all stores, as long as some stores do not carry more economical brands and package sizes. These price indexes will largely reflect differences in item availability across stores rather than differences in price for comparable items.

An alternative approach would aim to compare a more narrowly defined group of like items, yet not so narrow as to preclude selection of items for comparison. That approach would restrict item choice for the market basket to a narrow range of the most commonly purchased sizes (a range is needed because stores often stock slightly different size combinations) and the most popular brands, allowing substitution only if the designated sizes and brands were not offered. The aim here is to limit measured price differences that are due solely to differences in the variety of items offered for sale. For example, in its average price series for food items, the Bureau of Labor Statistics places some restrictions on package size and product characteristics and then randomly selects an item from a food category in each sample store, with higher selling items having a higher probability of being selected. Another approach used a nationally representative sample of items that allowed for brand and package size differences between stores, while limiting the range of acceptable items to avoid unlike comparisons (Kaufman and Handy, 1989).

The market-basket approach allows for a more comprehensive coverage of food purchases than the identical item approach. Of the two methods, one is not necessarily better than the other because they really measure different things: lowest available prices as opposed to prices of the most commonly purchased items. Analysts need to be aware of the implications of each choice when comparing studies because the first method is likely to generate larger price differences across stores. The second approach is preferable if the goal is to measure price differences in items that are most commonly bought.

### ***The Choice of Geographic Areas or Price Comparison***

Store prices may vary in small but consistent ways in different geographic locations. Prices within central

cities are likely to be somewhat higher than prices in suburban areas, and supermarket prices in rural areas may also be higher than suburban prices. Because of these differences, researchers need to be aware of sample differences due to location. Some studies may include only central-city stores, some only rural stores, and others may include combinations of central-city, rural, and suburban locations. Furthermore, central cities are not all alike, but differ markedly in population, land area, density, and population characteristics.

Geographic choices matter most when they form the basis for comparing prices paid by low-income households with other households. Some analyses specify a set of low-income neighborhoods (defined as having a high proportion of poor households in the population) and then compare prices of stores in low-income neighborhoods with prices elsewhere. But low-income neighborhoods often have few food stores (the population may shop in another neighborhood), which limits sample sizes and opportunities for comparison. Moreover, a relatively small proportion of low-income households lives in low-income neighborhoods. For example, more than half of low-income households located in central-city metro areas live outside poverty neighborhoods.<sup>1</sup> When trying to compare average prices faced by low-income households with averages faced by the population at large, low-income households that live or shop outside low-income areas need to be included.

### ***The Choice of Store Types for Price Comparison***

Comparisons of average store prices need to account for differences in the compositions of outlets in samples. The most consistent finding in price comparisons is that supermarkets have lower prices than smaller foodstores. We also know that small stores are more likely to locate in low-income central-city neighborhoods and rural areas than in the suburbs and that supermarkets are more likely to locate in the suburbs. Samples that only include supermarkets will report smaller price differences between city and suburban locations than samples that include supermarkets and small independent stores in price comparisons.

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<sup>1</sup>Census tracts with 20 percent or more of the population living below the poverty threshold are designated as low-income areas.

### ***Averaging Prices Across Stores***

Store price studies typically will calculate the average of market-basket prices across one group of stores and compare that to the average calculated over another group. The comparison groups may be supermarkets and small independents, central-city and suburban stores, or supermarkets in central cities and supermarkets in suburbs. Readers should be alert when reviewing such comparisons. Comparing groups of stores based on a simple average of prices within each group can be misleading if sales are not evenly distributed across stores. For example, if store A had a price index of 110 and store B's price index was 100 (that is, A's prices were 10 percent higher than B's), then a simple average of their indexes would be 105. But suppose that 90 percent of neighborhood food expenditures were at B, a large supermarket, while 10 percent were at A, a small food-store. An appropriate measure of the prices faced for most purchases would give more weight to B; if we weighted by sales, the weighted average index would be 101, well below the unweighted average. Unweighted averages can convey information for a homogeneous group of foodstores. But unweighted averages do not necessarily convey useful information about the prices faced by most buyers, and analysts should be aware that average store prices may need to be weighted, by sales volume or quantities, to arrive at more accurate measures of average prices across a group of stores.

### ***Treatment of Missing Items***

Careful specification of the sample of food items can reduce the potential for unlike comparisons. However, the presence of missing observations is probably unavoidable in most store price surveys. Researchers have used a number of methods to address missing items. One approach is to impute a price for the unobserved item that is relative to a store's observed item prices. If Store A's prices are 10 percent higher than the all-store sample average, then the missing item price could be imputed to be 10 percent more than that of the all-store average for that item. This method is not recommended when sample size is small due to the potential for large statistical error. Another approach is to delete missing items from price comparisons, thereby limiting analysis to those item prices common to all stores in the sample. Significant numbers of missing prices would tend to limit both the range of items and the stores to be included for comparison.

### ***Evaluation of Price Studies***

To determine whether low-income households face prices that differ from those faced by all households, the ideal store sample would contain individual prices of identical food items representative of low-income household purchases as well as items representative of all-household purchases. Prices of individual items would be aggregated into storewide price indexes in accordance with the importance of each item in market baskets representative of low-income and all households. Prices would be collected from a sample of retail outlets, which would then be weighted in accordance with volumes of food sold. The sample of retail outlets would also be stratified according to geographic location (urban, suburban, and rural) and include oversampling of stores in low-income neighborhoods. Although no current source fully meets these requirements, the importance of price data that reflect comparisons of like food items, and the kinds of outlets in which households shop cannot be overemphasized. To the extent these criteria are not met, the potential for bias and error in any estimate of price differences looms large.

No single study meets the criteria needed for a conclusive analysis of price differences by income. But, a variety of analyses provide useful information of different elements of the issue. This report draws upon those studies and combines them with information from a variety of sources, including the Census of Retail Trade, the Census of Population, and USDA food stamp redemptions data. The results were used to estimate the degree to which low-income consumers spend more, compared with all households, for a market basket of similar food items.

### ***Potential Sources of Price Differences***

Low-income households may face different prices for specific food items for three reasons: (1) on average, low-income households may rely less on supermarkets than other households, shopping instead at smaller outlets that have higher prices, (2) low-income households may be less likely to live in suburban locations where supermarkets typically offer lower prices, and (3) low-income neighborhood supermarkets may charge higher prices than a comparable supermarket located in a nearby higher income neighborhood. Our review focuses on the evidence for the three propositions.

To gauge the extent to which poorer households face prices that differ from other households, 14 studies



were reviewed that met our criteria for relevance and for soundness of methods (see Appendix A). Some are rather dated, and few attempted to make simultaneous comparisons of price differences between urban, suburban, and rural geographic areas. But, taken together and combined with more recent information on the structure of the retail food industry and food stamp redemption patterns, the 14 studies provide reasonable estimates of the range of price differences affecting low-income households.

### ***Retail Outlet Mix***

Among the studies reviewed, the most consistent finding is that supermarket prices are lower than prices in small foodstores. Only one study found no difference, but it was based on a small sample of stores and items and an unusual market basket from one metropolitan area (Ambrose, 1979).

Food prices are likely to be lower in supermarkets because supermarkets can take advantage of scale economies (as sales increase, per unit costs decline). As a result, supermarkets have lower store margins—the markup over cost of goods sold—compared with smaller sized outlets, allowing for lower prices. The larger physical size of supermarkets also allows for greater product variety, including many lower cost private-label and generic items.

Our estimate of the size of the price difference between small stores and supermarkets is 10 percent, on average. This number is far less certain than the finding that there is a difference, and we arrive at it with the following reasoning. The largest reported price gaps are in the range of 20-30 percent (Appendix A, #1 and #3), but those are based on an item-selection methodology (lowest cost available item) that should exaggerate supermarket/small store differences for like items. The smallest differences (2-3 percent) are reported by studies in which the smallest stores are still relatively large as these outlets go (Appendix A, #4 and #6). Studies with a wide range of store sizes and price comparisons based on comparable items report results between the two extremes.

### ***Geographic Location***

The evidence strongly suggests that supermarkets located in central cities tend to have somewhat higher prices

than those in suburban areas. Supermarket prices were found to be higher in the central cities of large metropolitan areas than in their suburbs (#1, #2, #4; see also #5) by about 4 percent on average (#2 finds a larger difference in New York City, which has unusually high prices, and #1 finds a smaller gap, using a definition of urban that includes suburban locations). If central-city prices are higher than those in suburbs, then low-income households could, on average, face higher prices for food if they are more likely to live in central cities.

Central-city supermarket prices seem to be higher than suburban supermarket prices both because central-city costs are higher and because of more limited competition among supermarkets in central cities. Specifically, central-city supermarkets are smaller, thereby missing the gains from scale economies, and certain input prices (such as insurance) are higher (#3 and #5). As to competition, central-city households are less mobile and therefore less able to respond to price differences among stores.

One study (#1) explicitly compared prices in rural areas (containing about 12 percent of the U.S. population in this definition) with prices in “urban” locations (about 56 percent of the U.S. population) and “mixed” locations; the study clearly includes many suburban locations in its definition of urban. Rural supermarket prices were about 4 percent above prices in urban areas and 6 percent above mixed areas. While no tests of statistical significance were offered, the study suggests that rural locations may have a slightly higher price gap.

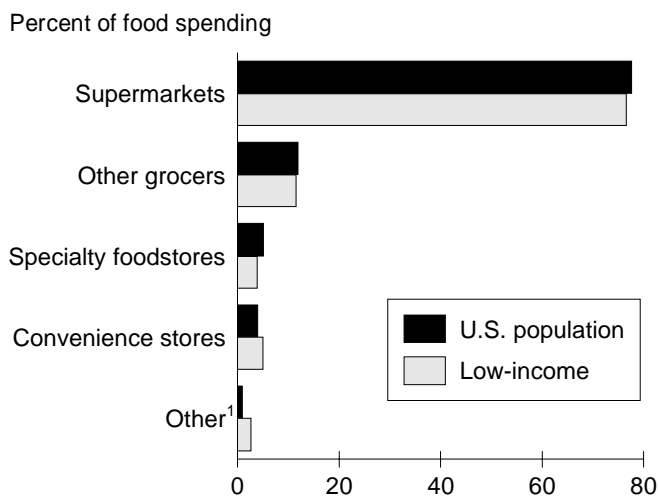
### ***Price Differences and Neighborhood Income***

The studies found little evidence that supermarket prices are higher in the low-income areas of central cities than in the rest of the central city (#1, #2, #4, #5, #9, #10, #11, #12, #13, and #14). One study (#1) found generally lower prices for supermarkets and groceries in low-income rural areas, but the results were based on very small samples and reported no tests of significance. Overall, the evidence suggests that locational factors rather than incomes drive store costs and pricing strategies. That is, once one controls for store characteristics (such as size) and locational factors (such as mobility and factor prices), average neighborhood income has no additional effect on prices.

## Estimating Price Differences Faced by Low-Income Households

The existing evidence strongly suggests that food prices vary with store type and location, but prices do not vary with neighborhood income, given location. Low-income households are likely to face higher average food prices, as a result, because relative to the U.S. population, a greater share live in central-city and rural areas where supermarket prices are generally higher.

Figure 1  
**Food shopping sources are similar among income levels**



<sup>1</sup>Includes gas stations, drug stores, warehouse clubs, and other retail outlets.

Source: USDA Food and Consumer Service, 1996.

**Table 1—Food sales, by type of store**

Store type	Retail food sales	Share of food sales
	<i>Billion dollars</i>	<i>Percent</i>
All retail outlets	303.1	100.0
Supermarkets	216.3	71.4
Small groceries	36.4	12.0
Specialty foodstores	15.9	5.2
Gas stations	8.6	2.8
Drug stores	3.6	1.2
Warehouse clubs	11.6	3.8
Mass merchandisers	7.7	2.5
Other retail outlets	3.0	1.0

Sources: Economic Research Service based on data in U.S. Bureau of the Census, *1992 Census of Retailing, Subject Reports on Merchandise Line Sales and Establishment and Firm Size*. Derivations are described in Appendix B.

Several of the reviewed studies suggest that small foodstores are disproportionately located, relative to population, in central-city and low-income neighborhoods (#1, #3, #4, #8, #10, #11, #13, and #14). That in turn suggests that low-income households may face higher average prices because they are less likely to shop in supermarkets. However, the use of supermarkets and other food shopping sources by low-income households is similar to that of the U.S. population (fig. 1). Total food stamp redemptions by low-income households in supermarkets are only slightly less than the supermarket share of food spending by all households nationwide (tables 1 and 2). USDA data show that 76.7 percent of food stamp redemptions are made in supermarkets or other large retailers, while data from the Census of Retailing show that supermarkets and other large retailers (warehouse clubs and mass merchandisers) account for 77.7 percent of nationwide food sales.<sup>2</sup> The estimated 1-percentage-point difference in supermarket purchases between food stamp recipients and

<sup>2</sup>The food stamp redemption data are based on 1993 redemptions at supermarkets, defined in the source as stores with over \$2 million in annual sales (table 2). We use 1992 Census of Retailing data to develop estimates of food sales in supermarkets (also defined as over \$2 million in annual sales) and other large retailers (table 1); those estimates are derived by us from Census data because supermarket sales data are not routinely reported (see Appendix B).

**Table 2—Food stamp redemptions, by location and store type**

Redemptions	Level of urbanization			
	Urban	Mixed	Rural	All areas
	<i>Million dollars</i>			
Total, all outlets	12,912	6,714	1,317	20,944
	<i>Percent</i>			
Share in supermarkets <sup>1</sup>	74.6	84.1	58.9	76.7
	<i>Million dollars</i>			
Total, low-income areas	5,594	2,507	543	7,128
	<i>Percent</i>			
Share in supermarkets <sup>1</sup>	64.3	79.9	52.8	66.3

<sup>1</sup>Supermarkets are defined as outlets authorized to offer food stamps and having \$2 million or more in annual sales.

Source: Economic Research Service based on data from U.S. Department of Agriculture, Food and Consumer Services, Office of Analysis and Evaluation. *Authorized Food Retailer Characteristics Study, Technical Report IV*. Prepared by Macro International, Inc., July 1996.

all households translates into a 0.1-percent difference in average prices if supermarket prices are 10 percent less than prices in other stores.

The redemption data also show that food spending in supermarkets varies by location and within low-income areas. For example, supermarkets accounted for 74.6 percent of redemptions in urban areas—slightly less than the all-household share. But within urban areas, low-income neighborhood supermarkets accounted for only 64.3 percent of redemptions. The reduced spending in low-income urban supermarkets would result in prices 1.0 percent higher than the all urban household average ( $1.0=(74.6-64.3)*0.1$ ), assuming households did not travel to more distant supermarkets outside these areas. In rural locations, low-income rural supermarkets accounted for barely more than half of all food stamp redemptions—a level that would result in prices up to 2.5 percent higher than the all-rural household average.<sup>3</sup> Given the range of price differences between small foodstores and supermarkets, some local low-income areas with limited access to supermarkets may indeed face substantially higher prices.

Our analysis above relies on food stamp redemption data to represent the pattern of food purchases across outlet types by low-income households. Two objections can be raised: first, some important food outlets, such as club stores, often do not accept food stamps; second, some low-income households do not participate in the food stamp program. If nonparticipants are less likely to shop at supermarkets than participants, then redemption data will overstate the share of low-income food expenditures going to supermarkets. But studies show that eligible nonparticipants have higher incomes than participants and are more likely to reside in suburban locations with easy access to supermarkets. Therefore, if the use of redemption data imparts any bias, it is likely to be toward understatement of supermarket use among low-income households. Moreover, club stores tend to have lower prices than supermarkets; to the extent that our method misses low-income households' cash pur-

chases of food from club stores, it again overstates prices faced by low-income households.

Supermarket prices do vary with urban, suburban, and rural location, and the pattern affects the food prices low-income households face. Table 3 summarizes data on the location of residence of the low-income population and compares it to the U.S. population as a whole. Less than a quarter of the low-income population live in poverty area central-city neighborhoods, while almost a third reside in suburban locations (metro area, noncentral city), and about a quarter are in nonmetro areas. But there are some important distinctions: low-income households are more likely than the population at large to live in central cities (42.4 vs. 30.1 percent) and in nonmetro areas (25.8 vs. 22.3 percent). This difference yields a small price gap: if prices in suburban areas are 4.0 percent below prices in central-city and rural areas, then national average supermarket prices will understate the supermarket prices paid by the low-income population by about 0.63 percent, based on the

**Table 3—Distribution of all-U.S. population and low-income population by urbanization location**

Location	Share of population	
	All-U.S.	Low-income <sup>1</sup>
	Percent	
Metro area <sup>2</sup>	77.7	74.2
Nonmetro area	22.3	25.8
Metro area:	77.7	74.2
Central city/urban	30.1	42.4
Noncentral city/suburban	47.6	31.8
Metro, central city/urban:	30.1	42.4
Poverty area <sup>3</sup>	7.5	4.5
Nonpoverty area	22.6	37.9
Nonmetro/rural:	22.3	25.8
Poverty area	5.1	9.6
Nonpoverty area	17.2	16.2

<sup>1</sup>Population classified as poverty households by U.S. Department of Commerce, Bureau of the Census, 1992.

<sup>2</sup>Population located in Census Metropolitan Statistical Areas (MSA's).

<sup>3</sup>Census areas in which poverty households comprise 20 percent or more of all households.

Source: Economic Research Service based on data from U.S. Department of Commerce, Bureau of the Census, *Poverty in the United States: 1992*. Current Population Reports, Series P60-185, 1993.

<sup>3</sup>But table 2 does not show that low-income rural residents necessarily buy less of their food at supermarkets. Note that outlets located in rural areas account for 6.3 percent of food stamp redemptions in table 2. But 14.8 percent of the poverty population lives in those same rural areas. The implication is that rural residents may shop at supermarkets in towns, cities, and suburbs, while making smaller purchases at more conveniently located rural stores.

geographic distribution of the low-income population.<sup>4</sup> The difference in store mix, noted above (low-income residents are slightly less likely to purchase in supermarkets), adds 0.10 percent, giving a total price gap of 0.73 percent.

This price gap assumes that rural prices approximate urban prices and that they are 4 percent higher than prices at suburban stores. Suppose instead that an important source of price difference has been overlooked and that suburban prices are 10 percent below prices elsewhere (a very large price difference for these studies). The effect will be a 1.7-percent understatement of average prices faced by the low-income population as a whole. Although a smaller share of the low-income population lives in the suburbs, the effect is not enough to make a large difference in nationwide average prices.

The combined effects of store mix and location suggest that, on average, low-income households face slightly higher food prices than other households for the same food items, with the likely average difference being less than 1 percent, although the difference could average up to 3.1 percent higher (2.5+.63) in some low-income neighborhoods due to lower rates of food stamp redemptions in supermarkets. Some households in some places undoubtedly face much-higher-than-average prices. In particular, unit prices for the lowest price item in a category can vary widely across stores and particularly across store types, with differences in the availability of large package sizes and store and generic brands. Households that would otherwise purchase large sizes and store or generic labels can face large price differences if they do not have access to stores that offer those items. But the integration of the low-income population into the population as a whole as well as the limited variation in average supermarket prices across locations means that it is highly unlikely that, on average, a price gap between low-income households and all others could be as large as 5 percent.

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<sup>4</sup>Assume that prices are 100.0 in the suburbs and 104.0 everywhere else; then overall average household prices, adjusted for location, will be  $102.1 = (100 \cdot .476 + 104 \cdot .524)$  while average low-income household prices will be  $102.73 = (100 \cdot .318 + 104 \cdot .682)$ , thus prices are understated by 0.63 percent, on average.

## Household Surveys Show That Low-Income Households Choose Lower Cost Foods

What households spend for food is determined by both item prices and selections. Household food surveys show that the poor tend to spend their food dollars differently and spend less per pound for nearly all broad food groups than do all households combined. They are able to do this by purchasing lower cost items within the broad food groups. Interestingly, while spending less for food, low-income households usually get more nutrients for their food dollar than do other households (Peterkin and Hama, 1983; and Morgan and others, 1985). Hence, low-income households tend to purchase foods higher in nutrients and lower in cost than foods purchased by other households.

Foodstore surveys, while providing excellent detail on food item prices and total sales, provide little insight into the actual purchases made by different types of households. The best means of looking at what households actually buy and how it differs across households with differing characteristics is through household surveys. Household surveys allow researchers to delineate food purchases by such factors as household income, race, household size, age of householder, and other socioeconomic characteristics. By examining these surveys, researchers can gain insight into the differences in food purchases by different kinds of households.

The Federal Government conducts two large household surveys that include data on food expenditures and/or quantities: The Bureau of Labor Statistics' Consumer Expenditure Survey (CES) and the U.S. Department of Agriculture's Nationwide Food Consumption Survey (NFCS). The CES collects expenditure information used for developing the market basket for the Consumer Price Index. It includes expenditure information on roughly 130 broad food groups. This information can be used to examine how low-income households allocate their income across different food groups compared with all households. The NFCS provides data on the food consumption behavior and the nutritional content of American diets (USDA, 1994). The survey information is applied to a wide variety of policy issues, including food assistance programs, food production and marketing, nutrition education, food security, and food safety. Since 1977-78, the NFCS has consisted of two samples:



an all-income sample that targets all households in the 48 contiguous United States and a low-income sample of households whose incomes fall at or below predetermined poverty thresholds (Lutz and others, 1993). The NFCS collects both quantities and money value of food consumed but does not report direct information on food prices. The cost per pound can be estimated by dividing the money value of food by the quantity of food.

CES data reveal that food purchases made by low-income households differ markedly from purchases by higher income households. Food spending increases with household income for both food at home and food away from home, as wealthier households buy higher quality food items and more convenience foods (Smallwood and others, 1994). In 1992, households in the poorest 20 percent of the Nation's income distribution (household income averaging \$6,669) spent \$1,249 per person on food, compared with \$1,997 for the wealthiest 20 percent (household income averaging \$77,311). Nevertheless, poor households devoted a greater share of their income to food spending than did wealthier households.

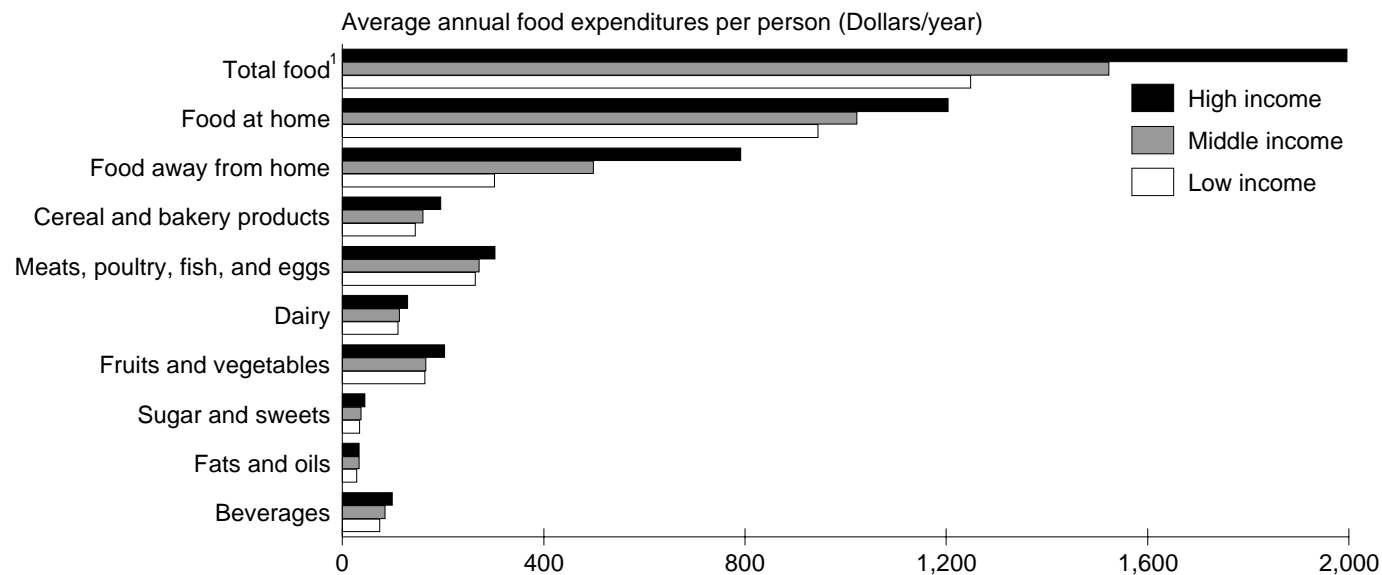
Wealthier households tended to spend more money and a larger share of their food budget on food away from home. In 1992, the poorest group spent 24 percent of

their food budget on food away from home while the wealthiest group spent 40 percent (fig. 2). Households also allocate their at-home food budget differently across food groups depending on their income. For example, the highest income group bought \$48 worth of fish and seafood per person, while the lowest income group spent \$26 per person. Meanwhile, fruit and vegetable expenditures have been increasing for all income groups: those with the highest incomes purchased \$64 per person in 1992 versus \$50 per person for the lowest income group.

While these trends hold true for most foods, there are exceptions for some food products. For example, the highest income group spent about \$12 more per person for beef than did the lowest income group, but low-income households spent \$35 per person for ground beef while the highest income group spent \$32 per person. Conversely, the highest income group spent nearly twice as much (\$9 per person) on sirloin steak than did the low-income group (\$5 per person).

CES data are useful for comparing overall spending levels as well as expenditures for fairly specific food products. However, the CES does not report any quantity information. Consequently, one cannot use it to examine food prices or unit costs.

Figure 2  
**Food spending increases with household income**



<sup>1</sup> Excluding alcoholic beverages.  
 Source: Economic Research Service compiled from Smallwood and others, 1994.

## Household Consumption Data

The NFCS contains a wealth of information on the socioeconomic and demographic characteristics of American households and is the only major survey that couples this information with detailed records of the quantities and values of foods used in the households. This information allows researchers to calculate unit food costs for different food groups for a variety of socioeconomic groupings, including household income (Lutz and others, 1992 and 1993).

Some analysts have criticized the 1987-88 NFCS because of its low response rates (37 percent). The response rate of surveys is often used as an indicator of potential sampling bias. Sampling bias may lead to inaccurate estimates of the true population amounts if the respondents and nonrespondents differ in their consumption patterns in a systematic manner (see box). While no evidence has been uncovered that shows the NFCS data suffer from sampling bias, in-depth investigations by the Federation of American Societies for Experimental Biology and the U.S. General Accounting Office raised

### Sources of Error in Household Survey Data

Household survey data are subject to two broad sources of error—sampling and nonsampling (Groves, 1989). The estimates from a survey may not be as precise as a complete and accurate census of the population. Moreover, survey data are often used to answer questions that are beyond the original purposes of the survey. This practice, while useful in policy analysis, can lead to specification and other types of nonsampling errors (Judge and others., 1982).

Sampling errors occur because a sample, as opposed to the entire population, is surveyed. Random variation or inherent variability arises because a legitimate observation is unusually large or small. For example, if a researcher is collecting data on the heights of people, observing an 8-foot man or woman is possible but not very likely. A proper sample design, large enough sample, and properly used statistical techniques can minimize the influence of unusually large or small observations on parameter estimates (Lutz and others, 1991).

Nonsampling error is more complicated. Nonsampling errors occur for a number of reasons (Barnett and Lewis, 1978). One error particularly applicable and potentially harmful to food consumption and expenditure data is measurement error. Measurement error can occur for a number of reasons, including mistakes in recall or recording on the part of the respondent or interviewer, errors in coding responses, or keypunch errors. In a consumption survey, for example, the respondent

may not know the weight of a bunch of radishes used by the household because it was purchased as a bunch rather than by the pound. In this case, the organization conducting the survey must make assumptions about the weight of a typical bunch of radishes to put the quantities on a per-pound basis. While these assumptions may be justifiable from a scientific standpoint, there is still considerable room for error.

A major source of measurement error lies in the inaccurate reporting by respondents (U.S. Dept. of Labor, 1966). The ability of respondents to remember the types of foods they use, misunderstanding a question, or deliberately not telling the interviewer of certain foods or beverages they may have consumed all lead to inaccuracies in data. Methods typically used to minimize measurement error include conducting pilot studies, requiring extensive interviewer training, refining questionnaires, and developing more precise coding schemes and quality control measures. Still, measurement error will continue to be a problem in surveys, and some errors inevitably remain on the computer tapes and disks.

An important source of nonsampling error may arise when a survey is used for reasons beyond its original purpose. What appears to be measurement error in food consumption data, for example, is actually a problem of aggregating specific foods into various food groups (Lutz, and others, 1991). This process takes place from the time data are actually collected from survey

respondents until they are analyzed. For example, in a food consumption survey the respondent might report eating a cheeseburger from a national chain restaurant, such as McDonald's or Burger King. Survey coders will then classify this product into a generic cheeseburger classification that includes cheeseburgers from numerous restaurants, fast-food establishments, and convenience stores, as well as those that are homemade. Once this classification is put on computer tapes or disks, an analyst may further aggregate specific products into a broad food category, such as beef mixtures. Most of the literature refers to this process as quality variation in food data (Deaton, 1987, and Cox and Wohlgenant, 1986).

Another source of nonsampling error is termed execution error, which occurs when the sample is selected or the data are collected. Nonresponse is one form of execution error, but it is not particularly bothersome from a statistical point of view as long as the nonresponses occur in a random manner. Unfortunately, surveys are often designed to target people who are difficult to sample. Response rates are typically low for low-income households, Hispanic and Native American populations, and teenage mothers. Systematic differences between respondents and nonrespondents can lead to biased parameter estimates. However, properly constructed sampling weights can be constructed to reduce the bias that may be contained in parameter estimates.



serious concerns about the representativeness of the data. These concerns were mainly directed to studies that use small subsets of the sample, which is not the case in this study.

Comparisons of the 1987-88 NFCS data with other food consumption and expenditure surveys have shown that the general trends are fairly consistent. For most food groups, the different data sources show the same trends despite differences in collection methodologies. Beef, poultry, fish and shellfish, eggs, fresh vegetables, juices, and many other products show similar trends in consumption levels when the low-income NFCS data are compared with food supply data. Conversely, the food supply data show an upward trend for fats and oils, potatoes and sweet potatoes, and pork, while the low-income NFCS data show downward trends. Food reported in the NFCS as mixtures may account for some of the discrepancies. For example, pork sausage used on pizza is reported as pork in the food supply data but as a mixture in the NFCS data. This report also presents data from both the 1977-78 NFCS and 1987-88 NFCS, and the general patterns between low-income and all-income households have held up over time.

### Tabulation Procedures

The unit costs of food categories in this report were calculated for 65 detailed food categories (table 4). The calculations were made for both low-income households and for all households and were made for 1977-78 and for 1987-88 in order to provide a snapshot of changes that took place over the decade; individual household observations were weighted to make the samples representative of the respective populations (Lutz and others, 1992 and 1993). Calculated in this manner, unit cost differences between low-income and all-income households in the sample reflect differences in the types of stores where foods are purchased, the locations where the households reside, the types of foods that are purchased, shopping practices, tastes, preferences, and other quality factors.

Within a food category, such as vegetable juice, individual households record total quantities used by households and their purchase prices over a given time interval, such as 7 days. The NFCS includes several thousand highly detailed food categories, but analyses of per unit food costs generally rely on a limited number of aggregated categories. From the data collected, average per person food quantities and expenditures are obtained for each food group. Expenditures represent money-equivalent values and

include the value of foods not purchased, such as home-produced or donated food. Unit food costs can be calculated by dividing the total expenditures on all items in a category by the total quantity purchased. Where different package sizes are purchased, total quantity reflects a common measure, such as ounces and pounds. Thus, the implicit price, or food cost, represents the average per unit (pounds) expenditure for a given food category.

Unit costs within a food category may vary among households due to differences in items purchased, prices, package type and size, and quality differences within NFCS food groups. For example, low-income households likely have fairly limited budgets for food, thus these households must often economize in their food expenditures by limiting purchases of convenience foods, prepared foods, more expensive foods such as natural cheeses, exotic produce items, and higher quality meat, poultry, and seafood items. Item selection differences likely account for a significant share of unit-cost variation across households in NFCS survey data.

### Results of NFCS Food Cost Comparisons

Table 4 shows food costs (in 1988 dollars) on a per pound basis for aggregate food categories in both all-income and low-income households. Also included in table 4 is a comparison between the 1977-78 and 1987-88 NFCS's. The Bureau of Labor Statistics produces components of the Consumer Price Index (CPI) for detailed food categories, and those CPI components were used to set 1977-78 expenditures to 1988 dollars for comparison purposes. The final two columns of table 4 express the low-income cost per pound as a share of the all-income cost value. The results show that low-income households have lower per-unit food costs for nearly every major food category except vegetable and fruit juices and eggs. While the data in this report do not quantify the various factors affecting the category food-cost differences, researchers can speculate that low-income households may tend to look for bargains, buy a lower quality mix of items, and/or choose foods sold in bulk that may tend to lower the unit value of the foodstuffs purchased.

Low-income consumers tend to have lower unit costs than all-income consumers that vary by different food categories (fig. 3). For example, in 1987-88, low-income households paid on average, about 78 percent of the price that all-income households did for poultry, fish, and seafood, and about 92 percent of the price for fresh vegetables. The pattern was consistent in both NFCS data sets, suggest-

**Table 4—Comparison of all-income and low-income food costs per pound based on the NFCS, 1977-78 and 1987-88**

Food group	All-income		Low-income		Low-income cost per pound as percent of all-income cost per pound	
	1977-78	1987-88	1977-78	1987-88	1977-78	1987-88
	----- 1988 dollars per pound -----				--- Percent ---	
Dairy products (fresh equivalent)	0.36	0.36	0.33	0.35	90	97
Fresh fluid milk	0.26	0.25	0.26	0.25	100	102
Processed milk	0.38	0.66	0.41	0.60	106	92
Cream, cream substitutes, and dips	1.19	1.34	1.07	1.50	90	112
Frozen desserts with milk	0.80	0.97	0.78	0.85	97	87
Cheese	0.53	0.49	0.48	0.45	90	91
Fats and oils	1.10	1.02	1.00	0.88	91	86
Table fat	1.16	0.99	1.04	0.81	90	82
Shortening	0.84	0.72	0.84	0.69	100	96
Salad and cooking oils	1.16	1.04	1.11	1.00	95	95
Salad dressings	1.12	1.15	1.03	1.06	92	92
Flour and cereals	1.00	1.16	0.87	0.98	87	84
Flour, not in mixes	0.32	0.22	0.31	0.22	97	100
Flour mixes	1.24	1.04	1.15	0.97	93	94
Breakfast cereals	1.75	2.00	1.75	1.96	100	98
Other cereals	0.81	0.82	0.71	0.60	88	74
Bakery products	1.24	1.21	1.08	1.04	87	86
Bread	0.80	0.76	0.72	0.69	90	91
Other baked goods and doughs	1.76	1.65	1.57	1.47	90	89
Meat	2.18	1.87	1.86	1.64	86	87
Beef	2.24	1.84	1.93	1.59	87	86
Pork	2.00	1.87	1.73	1.64	87	88
Veal	3.04	3.09	2.65	2.36	87	76
Lamb, mutton, and goat	2.83	2.60	1.95	1.85	69	71
Variety meat, game, and substitutes	2.47	1.44	1.81	1.40	73	97
Lunch meat	2.14	1.96	1.92	1.76	90	90
Poultry, fish, and shellfish	1.69	1.53	1.38	1.20	82	78
Poultry	1.15	1.11	1.01	0.90	88	81
Fish and shellfish	3.12	2.73	2.61	2.16	84	79
Eggs (fresh equivalent)	0.55	0.55	0.58	0.55	105	100
Sugars and sweets	1.02	0.98	0.86	0.79	84	81
Sugars	0.44	0.38	0.43	0.36	96	94
Syrups, molasses, and honey	1.25	1.20	1.09	1.09	87	91
Jellies, jams, and preserves	1.41	1.45	1.24	1.18	88	82
Candies and nonfruit toppings	2.69	2.42	2.38	2.41	89	100
Miscellaneous sweets	1.65	1.49	1.72	1.40	104	94
Potatoes and sweet potatoes	0.42	0.43	0.37	0.36	87	85
Fresh	0.27	0.23	0.26	0.21	95	90
Commercially canned	0.70	0.66	0.69	0.64	99	98
Commercially frozen	0.76	0.88	0.80	0.83	107	95
Dehydrated, instant	1.43	1.64	1.22	1.56	85	95
Chips, sticks, and salad	2.25	1.73	2.21	1.71	98	99

—Continued

**Table 4—Comparison of all-income and low-income food costs per pound based on the NFCS, 1977-78 and 1987-88—cont'd**

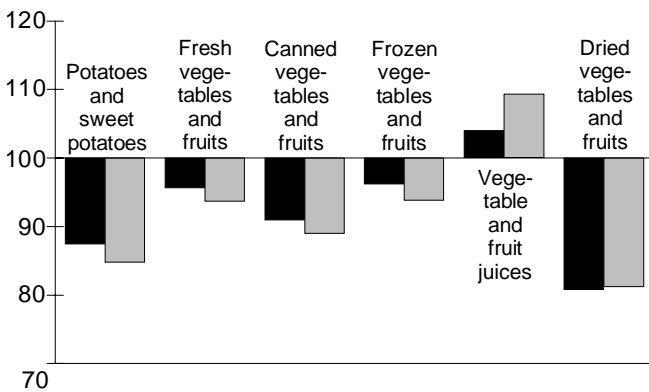
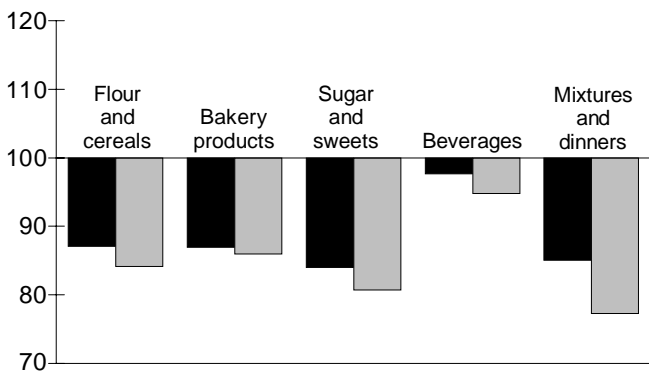
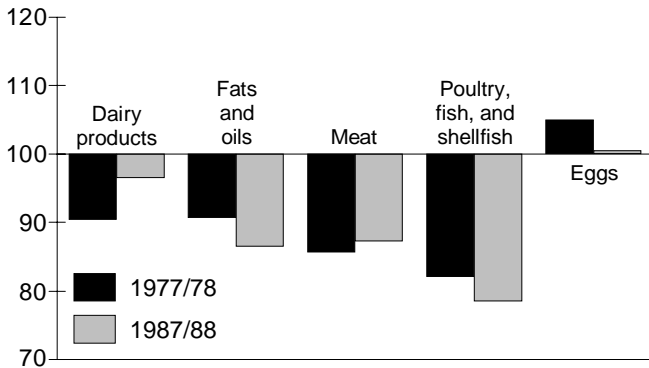
Food group	All-income		Low-income		Low-income cost per pound as percent of all-income cost per pound	
	1977-78	1987-88	1977-78	1987-88	1977-78	1987-88
	----- 1988 dollars per pound -----				--- Percent ---	
Fresh vegetables	0.72	0.62	0.70	0.57	97	92
Dark green	0.92	0.67	0.86	0.68	93	103
Deep yellow	0.56	0.46	0.59	0.46	106	101
Tomatoes	0.82	0.79	0.85	0.78	103	99
Light green	0.65	0.57	0.59	0.48	90	84
Other vegetables	0.74	0.61	0.75	0.56	101	91
Fresh fruits	0.63	0.46	0.59	0.43	94	94
Citrus	0.49	0.41	0.47	0.41	97	100
Other vitamin C-rich	0.57	0.43	1.11	0.43	194	99
Other fruits	0.69	0.47	0.68	0.43	97	91
Canned vegetables and fruits	0.71	0.63	0.65	0.56	91	89
Vegetables	0.66	0.58	0.60	0.52	92	89
Fruits	0.90	0.82	0.88	0.79	98	96
Frozen vegetables and fruits	1.13	1.11	1.09	1.04	96	94
Vegetables	1.11	1.10	1.07	1.02	96	93
Fruits	1.59	1.58	1.79	1.53	112	97
Vegetable and fruit juices	0.44	0.38	0.45	0.41	104	109
Vegetable juice	0.44	0.48	0.45	0.51	102	106
Canned fruit juice	0.54	0.49	0.50	0.50	92	103
Frozen fruit juice	0.36	0.29	0.38	0.30	105	104
Fresh fruit juice	0.49	0.41	0.50	0.44	101	108
Dried vegetables and fruits	1.09	0.97	0.88	0.79	81	81
Vegetables	0.79	0.72	0.77	0.63	98	88
Fruits	2.17	1.69	1.90	1.85	87	110
Beverages	0.72	0.56	0.70	0.53	98	95
Coffee	4.29	3.20	4.76	3.44	111	107
Tea	3.79	3.41	4.61	4.01	122	118
Cocoa and baking chocolate	1.90	1.90	1.83	1.94	96	102
Soft drinks	0.29	0.30	0.31	0.28	106	95
Ade, punches, and nectars	0.57	0.66	0.53	0.68	94	103
Alcoholic beverages	1.04	0.85	0.84	0.80	81	94
Soups, sauces, and gravies	0.89	0.79	0.84	0.78	95	99
Ready-to-serve	0.93	0.91	0.84	0.91	91	100
Condensed, frozen, and dried	0.88	0.72	0.85	0.71	96	99
Nuts, condiments	1.52	1.62	1.47	1.37	97	85
Nuts and peanut butter	2.16	2.39	1.95	2.06	90	86
Catsup, chili sauce, etc.	1.08	0.96	1.04	0.87	97	90
Pickles and relishes	1.17	1.21	1.11	1.05	95	87
Mixtures, dinners	1.90	2.64	1.61	2.04	85	77
Canned, frozen, and dried	1.97	2.72	1.66	2.10	84	77
Baby or junior, jarred	1.26	1.16	1.29	1.14	102	98

Source: Economic Research Service.

Figure 3

**Low-income households continue to spend below the national average for most foods**

Prices paid by low-income households  
(Percent of national average)



Source: Economic Research Service compiled from Lutz and others, 1992 and 1993.

ing that low-income consumers select a different mix of food products and qualities to lower their food costs, and that this relationship held up over time.

**Item Selection Results in Food Cost Differences**

Household food expenditure surveys found that low-income households spend less, on a cost-per-pound basis, than do other households, while foodstore surveys found that low-income households are likely to face slightly higher prices for comparable food items (table 4 and fig. 3). Taken together, the two observations suggest that low-income households buy a different, lower priced set of food items.<sup>5</sup>

To show the importance of differences in item selection on estimated unit-food-cost and food-price measures, we analyzed detailed food price data from the A.C. Nielsen Scantrack Database (NSD). NSD information is derived from the information read into electronic scanners at supermarket checkout counters. The information, based on the item's bar code, identifies the brand, flavor, packaging type, and container size—those factors that uniquely identify an item. Nielsen files aggregate scanner data from a sample of 3,000 supermarkets with an annual sales volume from all products of at least \$4 million.

At the time of sale, the retail price and quantity in the purchase are also recorded, as well as some promotion information. The Nielsen Company provides national projections of dollar volume and quantity of sales for each of over 200,000 unique items for each month of the file (current coverage of the data received by USDA is April 1988 through December 1995). Given volume and quantity, the file can also report average prices (sales volume divided by quantity). For example, suppose that one month the NSD reported that 5 million cans of a

<sup>5</sup>Issues of item selection from broad food categories are also important in designing market baskets for store price comparison. Some price comparison studies select the lowest priced item (on a per-ounce basis) in a given food category for inclusion in any given store's market basket. We argued earlier that this approach will result in large estimated price differences between large and small supermarkets and between supermarkets and other stores because the lowest priced item in large supermarkets are likely to be private label and large package size items, while the lowest priced items in smaller stores are likely to be branded and smaller package size items.

brand of cream of mushroom soup, in a 10.7-ounce can, were sold at a dollar volume of \$3.3 million. The average retail price would be 66 cents.

We selected 34 NSD staple food categories. In each category, the leading brand was identified, and the most popular package size for that brand was selected.<sup>6</sup> Average item prices were used to make three types of price comparisons after converting all prices to a price-per-ounce basis.

First, we compared the unit price of the largest package size of the leading brand to that of the most popular package size (in some cases, the most popular was also the largest, so the price ratio would equal 1). Second, we compared the price of smallest package size to that of the most popular (the ratio could also be 1). Finally, we compared the price of the private-label brand to the leading brand, using the same package size. We restricted our small and large comparisons to package sizes that appeared in at least 20 percent of the Nielsen sample stores to avoid package sizes that might be used primarily in institutional settings with little retail distribution.

Table 5 lists the food categories and their relative prices. For example, the price ratio of the small container size of apple juice to the popular size was 1.729; that is, the small container was 72.9 percent more expensive per ounce than the leading container size in this nationwide sample of supermarkets. The ratio for largest container size was 0.996, or 0.4 percent less expensive. At a ratio of 0.694 the private-label brand was 30.6 percent lower in price than the leading brand.

The results for the apple juice category are consistent with the pattern in the entire sample. We provide sample means in the bottom row of table 5 in order to summarize the results across all 34 categories. For the entire sample, the largest container sizes are on average 2.6 percent less expensive than the most popular package size of that brand, while small package sizes are 52.5 percent more expensive, on average. Finally, private-label brands are 24 percent less expensive, on average, than the leading brand for comparable size categories.

Table 5 suggests that there are large price differences between popular and small package sizes of the same product, and large price differences between branded

**Table 5—Price relative comparisons of large-size, small-size, and private-label brand item, with leading brand and package size item**

Food category	Share of leading item price		
	Large-size item	Small-size item	Private-label item
	<i>Percent</i>		
Apple juice	0.996	1.729	0.694
Butter	1.000	1.000	0.750
Catsup	0.850	1.211	0.735
Cereal	0.951	1.305	0.612
Cheese	0.968	1.575	0.731
Chili, canned	1.128	1.854	0.651
Cocoa, baking	0.961	1.000	0.674
Corn meal	1.000	1.471	0.799
Cooking oil	0.832	1.919	0.870
Coffee, ground	1.000	1.152	0.898
Flour, all-purpose	1.032	4.339	0.911
Graham crackers	0.779	1.000	0.478
Green beans, frozen	1.000	1.220	0.915
Honey	0.905	1.226	0.887
Macaroni	1.289	1.258	0.887
Mayonnaise	0.861	1.658	0.541
Olives	1.000	1.000	0.778
Orange juice, frozen	1.194	1.548	0.696
Peaches, canned	0.844	1.396	0.899
Peanut butter	1.010	1.382	0.760
Peas, frozen	1.000	2.042	0.761
Potatoes, canned	1.000	1.025	0.741
Rice	0.928	1.089	0.624
Ravioli, canned	0.968	1.534	0.775
Salt, table	1.062	1.000	0.842
Soft drinks	0.784	2.933	0.737
Soup, canned	0.855	1.000	0.910
Spaghetti	0.949	1.199	0.883
Spaghetti sauce	0.724	1.543	0.650
Sugar	1.071	2.154	0.884
Tea, bags	0.966	2.038	0.538
Tomatoes, canned	1.000	1.126	0.770
Tomato sauce	0.811	1.000	0.740
Tuna, canned	1.409	1.914	0.810
Group mean (n=34)	0.974	1.525	0.760
Standard deviation	0.139	0.663	0.117

Source: Economic Research Service.

<sup>6</sup>Individual item sales for each brand were combined to determine total brand sales. In each category, the leading brand had the largest combined item sales.



and private-label products. The evidence in table 5 refers to package sizes and branding, but quality issues also arise in the comparisons. Note, for example, that table 4 reports that low-income households spend about 12 percent less per pound on fresh beef than all households but about the same per pound in several categories of fresh vegetables. A supermarket will offer fresh beef as steaks and as ground beef while offering fresh vegetables in bulk or packaged form, with little quality difference among items. Given their limited food budgets, low-income households are more likely to select lower quality items when offered, and that choice will result in lower unit costs.

Three conclusions follow from these results. First, the methods used in selecting market baskets for store price comparisons matter. Strategies that compare prices of the lowest priced item across store types are likely to find large differences, even if identical items are identically priced. Second, modest differences in purchase patterns among household groups (manifested in a greater propensity to purchase branded products or small package sizes) can yield noticeable differences in measures of unit food costs within food categories. Third, the results emphasize the importance of product variety and selection to household food costs. Larger stores (typically supermarkets) are more likely to carry private-label and generic products as well as branded products, and larger stores are more likely to carry a range of package sizes (while the smallest stores are more likely to offer only small or limited package sizes). As a result, actual household food costs may vary substantially depending on the range of items offered for sale and the specific item choices made by households.

## Conclusions

This report presented three empirical findings derived from food price surveys and household food consumption and expenditure surveys to address the question: Do the poor pay more for food? First, data based on surveys of store prices show that low-income households likely face slightly higher prices, by nearly 1 percent, than the national average for a given set of food items. Second, surveys of household food consumption and expenditures show that within most food

categories, low-income households spend less on a per unit basis for the foods that they buy. Third, detailed supermarket average price data reveal large price differences on a per-unit basis between different package sizes of a given brand and between private-label and branded products.

The evidence suggests that low-income households spend less for food, on average, compared with all households. Low-income households select more economical foods such as store label and generic items, larger package sizes, and lower quality items in order to realize lower food costs. In contrast, analysis of foodstore prices shows that a fixed market basket of identical or highly similar foods would cost more than foods actually purchased, on average, due to the slightly higher prices low-income households typically face. Although geographic location was the single most important contribution to higher nationwide average prices faced by low-income households, the aggregate results could mask large differences due to individual locations and types of stores utilized.

Adjusting the observed differences in food costs to account for quality differences is complex and beyond the scope of this report. Depending on what one is interested in, quality aspects can include the nutritional content of food, freshness of agricultural products, convenience of preparing food, tenderness of meat products, taste and palatability of a meal, ambiance and uniqueness of food from a gourmet restaurant, or simply the satisfaction of a home-cooked meal. Food quality is probably a combination of these and other attributes that are unique to each individual. Further research in this area, however, will help us better understand why people make particular food choices and how these characteristics are valued by individuals at differing levels of income.

Access to larger retail food outlets, such as supermarkets, most likely provides the greatest benefit to low-income households. Not only do they often have lower prices, larger stores typically offer the greatest range of choices that partly determine household food costs. Research is needed to assess the extent to which low-income households lack access to supermarkets and other sources offering wide assortment and availability of foods.



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## Appendix A: A Review of the Literature on Food Price Differences

We provide brief summaries of 14 published price analyses. Appendix table 1 lists each study's choices for the selection categories listed above. The text summarizes the relevant results and offers comments aimed at linking the studies. Summaries are ordered by date of publication, starting with the most recent.

- (1) **R. Mantovani and L. Daft. *Authorized Food Retailer Characteristics Study. Report prepared for U.S. Department of Agriculture, Food and Consumer Service, Office of Analysis and Evaluation, July 1996.***

**Findings:** Reports large differences in minimum prices by store types: lowest priced items in supermarkets were 13 percent below lowest priced items in large groceries and 33 percent below lowest priced items in small groceries and convenience stores. Also found noticeable price differences by location; minimum supermarket prices in rural areas averaged 3.9 percent above those in urban areas, which in turn exceeded those in mixed (primarily suburban) areas by 2.3 percent. Results by income were more equivocal and based on very small samples of supermarkets in low-income areas (no significance tests were reported); minimum supermarket prices in low-income urban areas were 1.5 percent above those in other urban locations, while minimum supermarket prices in low-income mixed areas were 6 percent below, and those in low-income rural areas were 12 percent above, minimum prices in corresponding other areas.

**Comments:** The study selected the lowest priced (on a per ounce basis) item in a food category for price comparisons. As noted in the text, this procedure is likely to lead to large estimated price differences across store types and store sizes, and is likely to be based on comparisons of items of significantly different package sizes, qualities, and brand recognitions.

Stores for the pricing study sample were randomly selected from the universe of stores redeeming food stamps. As a result, the sample contains large numbers of small stores, but relatively small numbers of supermarkets, especially in low-income areas. The study also contains a large amount of infor-

mation on product quality and availability, and store types, locations, and food stamp redemptions.

- (2) **G. Crockett, K. Clancy, and J. Bowering. "Comparing the Cost of a Thrifty Food Plan Market Basket in Three Areas of New York State," *Journal of Nutrition Education*. 24 (January 1992): 71S-78S.**

**Findings:** Reports that there were no significant price differences between low-income areas and others within store types and regions. That is, Brooklyn supermarkets do not have different prices, on average, in low-income areas of Brooklyn compared with other areas of Brooklyn. There were important price differences by type of store. Supermarket prices were 15 percent below smaller store prices in Onondaga County (Syracuse and environs), 11 percent in rural Tioga County, and 7 percent in Kings County (Brooklyn). Locations mattered for a given store type. Supermarket prices in the most urbanized county (Brooklyn) were 11 percent above those in the most suburban county (Onondaga) and 6 percent above the rural county (Tioga).

**Comments:** Although covering only three geographic areas, this study's design allows for several useful comparisons. Prices differ by store type and by geographic area, but there is no evidence of higher prices in low-income areas. Note that the price gap between supermarkets and other stores is much narrower than in the following study, which used a different item selection method. Also notice that this is one of the few studies to attempt a rural comparison.

- (3) **P. Morris, L. Neuhauser and C. Campbell. "Food Security in Rural America: A Study of the Availability and Costs of Food," *Journal of Nutrition Education*. 24 (January 1992): 52S-58S.**

**Findings:** Reported important price differences between store types: average supermarket prices were 21 percent lower than small/medium store prices in this sample of low-income rural counties. There was a strong implied area price difference: the national average Thrifty Food Plan cost was 8.5 percent below the average supermarket cost and 26.5 percent below the average small store cost. The difference is implied because the sample covers only low-income areas and uses a nationally based market basket price (estimated elsewhere)

for comparison. In this sample, a lower proportion of food dollars are spent in supermarkets (68 percent versus 75 percent nationally).

**Comments:** The supermarket/small store price difference is unusually large (also note the enormous range of prices between the most and least expensive stores in appendix table 2). The gap is probably driven by the method of item selection; this study prices the lowest cost item in a commodity group, regardless of size or brand. The methodology section shows that the procedure is likely to compare different container sizes and brands across store types.

Other studies find that prices are lower in supermarkets and that they are lower still in larger supermarkets. In turn, large supermarkets are likely to be located where local demand for food is dense, with suburbs being the ideal location from that perspective (large populations and mobility combining to create a large market). Low-income rural areas will generate very limited demand for food and will often be unable to support a large supermarket, due to lower population densities and greater distances. Rural areas tend to be served by a larger number of smaller supermarkets and other outlets. Higher food prices are the result of this retail structure.

(4) **J. MacDonald and P.E. Nelson. "Do the Poor Still Pay More? Food Price Variations in Large Metropolitan Areas," *Journal of Urban Economics*. 30 (December 1991): 344-59.**

**Findings:** Reported that prices were 4 percent higher, on average, in central cities compared with prices in suburban locations. Within central cities or suburbs, there were no systematic price differences between low-income and other neighborhoods. Larger stores have slightly lower prices; all else equal, prices in a 25,000-square-foot store will be 1.4 percent below those in a 10,000-square-foot store. Neighborhood characteristics mattered; prices were lower where buyers were more mobile and where households were larger; larger stores, with more services, were more likely to locate in higher income zip codes and in zip codes where car ownership was high.

**Comments:** The data set did not include small foodstores, an important central-city source. It did,

however, isolate reasons why central-city supermarket prices might be higher: limited local demand (due to small households, lower incomes, and limited mobility) deters the entry of large supermarkets. Larger stores, if they can generate enough sales to be profitable, can offer lower prices and a wider variety of services than smaller stores.

(5) **B. Hall. "Neighborhood Differences in Retail Food Stores: Income versus Race and Age of Population." *Economic Geography*. (July 1983): 282-95.**

**Findings:** Prices were 10 percent lower at larger stores and were about 3 percent lower at chains than at independents. For a given store size and affiliation, prices were 1-3 percent higher in neighborhoods with high crime rates or large populations of black or elderly residents. Larger stores also offered a substantially wider range of item sizes and brands. Given the above store and neighborhood characteristics, neighborhood income had no significant association with prices.

**Comments:** The study compared prices, offerings, and qualities at 191 stores in three areas of New York State: Buffalo and the rest of Erie County, Poughkeepsie and the rest of Dutchess County, and Manhattan, Brooklyn, Queens, and the Bronx in New York City. The sample thus included central-city, rural, and some suburban locations. The study is difficult to compare with others: it did not explicitly compare stores by locational differences (central-city, suburban, rural); it used some unusual measures (measuring store sizes by number of cash registers, for example); price measures were based on limited samples of products; and the estimation method (stacking as many as 30 item price observations per store to greatly expand the sample size) likely led to an overstatement of statistical significance for the various coefficients. But the demographic variables (race, age, crime rates) yield results that are consistent with other findings that prices are somewhat higher (together, 3-6 percent) in central cities than in suburbs, for given store characteristics.

- (6) **R. Cotterill. “Market Power in the Food Industry: Evidence from Vermont,”** *Review of Economics and Statistics*. 68 (August 1986): 379-86.

**Findings:** Prices at independent stores were, on average, 2.24 percent higher than at chain supermarkets. There were size effects, at small sizes. Prices at a 15,000-square-foot store were predicted to be 2.7 percent below those at a 5,000-square-foot store.

**Comments:** This study did not aim at asking whether poor households paid higher food prices. It is nevertheless relevant for our purposes because of its findings on price differences due to store type and store size.

- (7) **D. Ambrose. “Retail Grocery Pricing: Inner City, Suburban, and Rural Comparisons,”** *Journal of Business*. 52 (January 1979): 95-102.

**Findings:** Prices were lowest in small foodstores in the inner city and highest in small rural foodstores. Supermarket prices showed minor variation but were 1 percent higher in the suburbs.

**Comments:** The findings on prices in small urban stores run counter to the strong findings of all the other studies. Note that the findings are based on a very small sample (14 stores to cover 7 location/store type cells in 1 metro area) and on an unusual price index (to be included in the index, a food category must have a specific brand that appears in the same size in all stores).

- (8) **H. Kunreuther. “Why the Poor May Pay More for Food: Theoretical and Empirical Evidence,”** *Journal of Business*. 46 (July 1973): 368-83.

**Findings:** Reported that prices were consistently higher in small foodstores by an average of 15 percent in a small sample of item-by-item comparisons. Larger stores have lower prices per unit of weight than smaller stores. In a household survey, low-income households are less mobile, have less storage space, and shop more frequently than middle-income households. They are also more likely to use small stores as their primary food source.

**Comments:** Using Kunreuther’s data on shopping choices by income level and his limited price data, we can estimate that households in low-income neighborhoods in his survey face prices 5.7 percent higher than households in middle-income neighborhoods. The difference arises from differences in patronage of store types (and, one may presume, from differences in store location) by neighborhood. That finding does not imply that all low-income households face higher prices because some substantial share of the low-income population resides in middle-income neighborhoods.

- (9) **R. Alcaly and A. Klevorick. “Food Prices in Relation to Income Levels in New York City,”** *Journal of Business*. 44 (October 1971): 380-97.

**Findings:** Reported that branded product prices were higher in small foodstores than in supermarkets in New York City. Given store type, there was no systematic relation between neighborhood income and store prices (that is, supermarket prices bore no relation to income, and small store prices did not change as income increased).

**Comments:** The report did not offer an estimate of the average price difference between supermarkets and small stores, nor did it provide importance on the share of food sales in small stores, ordered by neighborhood income.

- (10) **B. Marcus. “Similarity of Ghetto and Nonghetto Food Costs,”** *Journal of Marketing Research*. 6 (August 1969): 365-68.

**Findings:** For packaged groceries, mean supermarket prices were 4 percent higher in the low-income Watts neighborhood (Los Angeles, CA) than in nearby Culver City (the supermarket average was 1.2 percent higher and the small store average was 7 percent higher). Meat prices were no different, but meat qualities differed. Small store prices appear to be higher than supermarket prices, although the author does not discuss it.

**Comments:** No tests of statistical significance were offered.



- (11) **D. Dixon and D. McLaughlin. "Do the Inner City Poor Pay More for Food?" *Economic and Business Bulletin*. 3 (Spring, 1968): 6-12.**

**Findings:** Small foodstore prices exceed supermarket prices by 6.4 percent. There is no clear difference in supermarket prices between a low-income area and other areas of Philadelphia. Small store prices are 4 percent lower, on average, in the poor area.

**Comments:** No significance tests were performed, and the sample was limited to one central city.

- (12) **C.S. Goodman. "Do the Poor Pay More?" *Journal of Marketing*. 32 (January 1968): 18-24.**

**Findings:** Small store prices were 5 percent higher than supermarket prices and 10 percent higher than large independent prices. Although there were no supermarkets in the neighborhood, 80 percent of the respondents in the household survey did their primary shopping at supermarkets. Small stores are the primary source for less than 6 percent of respondents.

**Comments:** The author answers the question in the title in the negative on the grounds that most respondents use supermarkets. No attempt is made to survey other shoppers or stores in other neighborhoods. The author's own price survey found that large independents have lower prices than supermarkets, but 93 percent of survey respondents thought that the supermarket prices were lower.

- (13) **M. Alexis and L. Simon. "The Food Marketing Commission and Food Prices by Income Groups," *Journal of Farm Economics*. 49 (May 1967): 436-46.**

**Findings:** Small foodstores had higher prices than supermarkets by 5-15 percent (aggregation to an overall mean was not done) for the market basket of low-priced items. The price difference was smaller (1-5 percent) on the market basket of high-priced items. Supermarket prices were not higher in low-income neighborhoods. A higher proportion of low-income households shop at small foodstores.

**Comments:** The curious thing about these studies is that they consistently find very few supermarkets but lots of small foodstores in low-income neighborhoods. But Food Stamp redemption data seem to show that redemptions are as concentrated in supermarkets as overall food sales are.

- (14) **National Commission on Food Marketing. "Retail Food Prices in Low and Higher Income Areas," *Special Studies in Food Marketing. Technical Study No. 10. June 1966.***

**Findings:** Small store prices exceeded chain supermarket prices by an average of 3.4 percent in high-income areas and 2 percent in low-income areas. For given store types, prices in low-income areas were no different than prices in other areas.

**Comments:** Price collection was limited to metropolitan areas. No rural prices were collected. Not all item prices in the sample were collected in every store, thus most items were represented by 6-10 stores.

**Appendix table 1—Selection procedures used by published price analyses**

Study	Item selection	Area selection and year	Store selection
1	Market basket, lowest cost available item	National sample drawn on 40 Primary Sampling Units (regions) in 1994	376 supers, 2,002 small
2	Market basket, limited brand and size range	3 NY counties in 1989: Kings, Onondaga, and Tioga	33 supers, 78 small
3	Market basket, lowest cost available item	33 “persistently poor” rural counties in 1989	51 supers, 81 small
4	Market basket, limited brand and size range	Central cities and suburbs, 10 major metro areas, 1982	322 supers
5	45 precisely defined items	6 NY counties in 1981: Bronx, Dutchess, Erie, Kings, Manhattan, and Queens	82 chain supers, 109 independents
6	Market basket, limited brand and size range	18 VT cities and towns, 1981	35 supers
7	54 items available in all stores	Urban, suburban, and rural areas around Omaha, NE	8 supers, 6 small
8	8 items, various sizes	6 neighborhoods in New Haven, CT, 1971	11 supers, 11 small
9	37 precisely defined items	46 neighborhoods in NYC, 1968	337 supers, 706 small
10	Market basket, lowest cost available item	1 low-income Los Angeles neighborhood, 1 nearby city	13 supers, 42 small
11	20 precisely defined items	Philadelphia neighborhoods, sorted by income, 1967	87 supers, 153 small
12	72 items, without further description	1 low-income Philadelphia neighborhood, 1965	8 supers, 4 small
13	Market basket, specific sizes, separate indexes for high- and low-price items	Rochester, NY, 1966	20 supers, 11 small
14	Market basket of 18 precisely defined items	6 large central cities, 1962	180 stores

Source: Authors’ summary, based on articles listed in Appendix A.



## Appendix B: Estimating Retail Structure

We needed an estimate of the share of total retail food sales held by supermarkets. Since that is not routinely reported, we developed an estimate using the 1992 Census of Retail Trade. The Census Bureau does not define supermarkets but, rather, a more inclusive category of “Grocery Stores,” which includes supermarkets and small groceries (see table 2). The Bureau also measures food sales by several other types of retail outlets, including specialty foodstores (such as meat or seafood markets), gasoline stations, drug stores, warehouse clubs, and mass merchandisers (such as Wal-Mart), and by nonstore retailers (such as vending machines and catalog companies).

In its report, *Merchandise Line Sales*, the Census Bureau estimates retail sales of food products to have been \$308.5 billion in 1992. We subtracted food sales by nonstore retailers to reach the table 2 estimate of total retail outlet food sales of \$303.1 billion. The Census Bureau also reports that grocery stores accounted for 83.4 percent of total retail outlet food sales, or \$252.7 billion. Some of that is in small stores, and we had to separate those sales in order to estimate supermarket sales. To make that adjustment, we had to define “small.” Table 3, analyzing food stamp redemption data, defines small stores as those with less than \$2 million in annual sales and supermarkets as those with over \$2 million. The NSD does the same. If we used that cutoff, we could apply other Census of Retailing data (“Sales Size of Establishment,” which is table 1 in the Subject series *Establishment and Firm Size*) to estimate that small grocery stores accounted for 14.4 percent of all sales (food and nonfood) of all grocery stores (again, defining small groceries as less than \$2 million in annual sales). If we assumed that food sales accounted for the same share of total sales in both supermarkets and small groceries, then we could estimate that small

grocery food sales were \$36.4 billion ( $0.144 \times 252.7$ ) and that supermarket food sales were \$216.3 billion; in turn, that would imply that supermarkets accounted for 71.4 percent of food sales (table 2).

However, Census Bureau supermarkets do not include all large sellers of food. The category of “General Merchandise Stores” includes some very large establishments (such as warehouse clubs and mass merchandisers), the food operations of which resemble supermarkets. If the \$19.3 billion of food sales of large establishments in those categories are included with supermarkets (as we think they should be), then the supermarket/large retailer share of food sales rises to 77.7 percent (table 2).

Some approaches define supermarkets with a cutoff (\$2 million in annual sales) that does not change over time. Other analysts use a cutoff that increases over time to account for inflation. For example, USDA’s Economic Research Service defines supermarkets as grocery stores with sales in excess of \$2 million in 1980 dollars. In 1992 dollars, that would imply a sales cutoff of \$3.4 million. If we had used the ERS definition, then the supermarket share would have been 64.9 percent instead of the 71.4 percent reported in table 2. We used the \$2 million definition here to be consistent with other studies. The A.C. Nielsen Co. uses the \$2 million supermarket definition for the data used in table 5. Mantovani and Daft use the same definition to sort stores into supermarkets and nonsupermarkets for the food stamp redemption data reviewed in table 3. Their data source, USDA’s Food and Consumer Service, allows outlets to select an outlet type (such as supermarket or small grocery). Mantovani and Daft did not use the self-selected type information in the FCS data files, but instead used reported annual sales data to assign stores to the supermarket category to be consistent with other studies.