Cost of Eating: Whole Foods Versus Convenience Foods in a Low-income Model

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Background and Objectives: *Financial limitations in low-income populations, those at highest risk for poor health outcomes, may preclude adherence to recommended dietary guidelines. We examine the financial burden of shopping for foods to meet national dietary recommendations in a supermarket compared to eating primarily in a fast-food restaurant.* Methods: *Using a single-parent, low-income model, we obtained whole food costs (healthy) from local supermarkets and from fast-food outlets (convenient). Using cost per calorie as a metric for comparison, we used estimated single-parent, low-income living expenses to determine the relative costs of meeting national dietary guidelines.* Results: *Average food costs for healthy and convenience diets accounted for 18% and 37% of income, respectively. Dairy products and vegetables accounted for the largest cost percentages of diet costs (36% and 28%, respectively). The cost per calorie of a convenience diet was 24% higher than the healthy diet. Both models resulted in net financial loss over the course of a year for a single-parent, low-income family.* Conclusions: *Food costs represent a significant proportion of annual income. Diets based heavily on foods from convenient sources are less healthy and more expensive than a well-planned menu from budget foods available from large supermarket chains.*

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One in three American children are obese or at risk for becoming obese.[1] Low socioeconomic status has been associated with increased rates of childhood obesity.[2] It is estimated that 75% of children from at-risk populations fail to meet recommended daily intake for grains, vegetables, fruits, and dairy products.[3]

National advertising campaigns strive to increase public awareness of healthy food choices and provide recommendations for daily intake from major food groups. "More Matters/5 A Day®" (fruits and vegetables) and "3-A-Day®" (dairy) are examples of current public campaigns encouraging healthy eating habits for both children and adults.[4,5] While these recommendations appear scientifically sound, the financial cost of healthy food choices is often overlooked. Especially in difficult economic times, it is unclear how many Americans can actually afford to "eat right."

Previous published analyses have explored the availability of healthy foods, the energy density of common food choices, and general cost disparities for healthy food choices in at-risk populations.[6-8] None, however, have created a specific model using itemized personal budget considerations for a low-income, single-parent household.

Low-income families are at high risk for poor eating habits and the associated chronic diseases of obesity, hypertension, hyperlipidemia, and diabetes.[9] Low-income families enrolled in the federally sponsored Thrifty Food Plan (TFP) spend on average 125% of what food is estimated to cost.[10] Using age- and gender-appropriate dietary intakes as a baseline, an itemized food schedule is one way to analyze the cost of a standardized menu drawn from each of the recommended food groups.[11] We report the economic feasibility of a whole food (healthy) diet compared to a fast-food (convenience) diet in the absence of federal or state assistance.

Methods

Our model is based on a single parent raising one child in an urban environment. Baltimore City was chosen as an area representative of at-risk urban populations.[8,12] Mean living expenses included transportation costs, clothing expenses, school supplies, and anticipated food consumption. Costs for additional

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food items, entertainment costs, credit card debt, and health care costs not covered by employers were not included.

Food Costs

Daily food intake was derived from recommendations from the American Heart Association (AHA) and the American Academy of Pediatrics (AAP).[11] Costs were retail averages from three large supermarket chains (Giant, Safeway, and Super Fresh) in Baltimore. The least expensive options were used in each food subgroup (generic, frozen, bulk, and canned products). Frozen vegetables, in particular, are cheaper and more available at urban grocery stores compared with fresh vegetables.[7,8] All products were compared from each supermarket chain, and an average cost per ounce was calculated (Table 1). Costs were then applied to recommended dietary guidelines to calculate age- and gender-specific monthly and annual food costs (Tables 2, 3).[11,13] In Table 3, only adult values were used to calculate the relative percentage of food costs per subgroup due to the consistency of the adult diet compared to inherent age and gender variations in the child diet.

Table 1

Food Subgroups, Products, and Average Cost

Food Subgroup	*Products*	*Average Cost Per Ounce*
Milk/dairy	Skim milk, cottage cheese, yogurt, string cheese	$0.11
Lean meats	Chicken breast, chicken thigh, 90% lean ground beef, pork chops	$0.20
Fruits	Bulk apples, bulk oranges, bulk pears, bulk bananas, canned fruit cocktail, canned pears	$0.08
Vegetables	Frozen green beans, frozen broccoli, frozen mixed vegetables, frozen spinach, frozen peas, frozen corn	$0.11
Grains	Spaghetti, macaroni, whole wheat bread, white bread, shredded wheat cereal, frosted flakes cereal, corn flakes cereal	$0.12

Table 2

Cost Analysis of a Healthy Diet in Children Ages 1–18 Years

	1 Year		***2–3 Years***		***4–6 Years***		***9–13 Years***		***14–18 Years***	
	Daily Recommendation	*Monthly Cost*	*Daily Recommendation*	*Monthly Cost*	*Daily Recommendation*	*Monthly Cost*	*Daily Recommendation*	*Monthly Cost*	*Daily Recommendation*	*Monthly Cost*
Milk/dairy (in cups)	2	$55.08	2	$55.08	2	$55.08	3	$82.67	3	$82.67
Lean meats/ beans (in ounces)	1.5	$9.17	2	$12.25			5	$30.58		
Female					3	$18.33			5	$30.58
Male					4	$24.42			6	$36.67
Fruits (in cups)	1	$18.75	1	$18.75	1.5	$28.17	1.5	$28.17		
Female									1.5	$28.17
Male									2	$37.50
Vegetables (in cups)	.75	$19.33	3	$25.83						
Female					1	$25.83	2	$51.67	2.5	$64.58
Male					1.5	$38.75	2.5	$64.58	3	$77.50
Grains (in ounces)	2	$7.17		$10.75						
Female					4	$14.33	5	$17.92	6	$21.50
Male					5	$17.92	6	$21.50	7	$25.08
Total monthly cost		$109.58		$122.67						
Female						$141.75		$211.00		$227.50
Male						$164.42		$227.50		$259.50

Table 3

Cost Analysis for 1800-calorie Healthy Adult Diet

	Daily Recommendation 25–30-Year-Old Female	*Monthly Cost*	*Percentage of Food Costs*
Milk/dairy (in cups)	3	$82.67	36%
Lean meat (in ounces)	5	$30.57	13%
Fruits (in cups)	1.5	$28.15	12%
Vegetables (in cups)	2.5	$64.56	28%
Grains (in ounces)	6	$21.54	9%
Total monthly cost		$227.49	

Convenience diet prices were obtained from a large, multinational fast-food chain. Breakfast, lunch, dinner, and children's value meals were used for all calculations. The breakfast meal included a sandwich, hash-brown potatoes, and coffee or juice. The lunch and dinner meals included a sandwich, medium-sized french fries, and a 21-ounce carbonated beverage. The children's meal included a sandwich or chicken-based bite-sized nuggets, small French fries, and a small carbonated beverage.[14]

Estimates for child food costs were obtained from the US Department of Agriculture Cost Calculator for comparison to our model.[15] Costs were calculated from age 1 through 17 for a single parent household with income under $58,670, the lowest available income option.

Cost-per-Calorie Comparison

A cost-per-calorie value was computed from the average healthy diet cost divided by the calculated number of total calories associated with recommended daily intake. The number of calories per ounce was calculated for each food item from nutrition labels on packaging and in-store nutrition data (for bulk food items). The average number of calories per ounce was calculated for each food subgroup as well. From this, cost per ounce (Table 4) was divided by the number of calories per ounce to arrive at the average cost per calorie.

For convenience diet items, caloric values were obtained from online nutritional information.[16] The average number of calories for each meal (breakfast, lunch, and dinner) was calculated and divided into total meal costs to obtain an average cost per calorie. Only adult diets were considered in this analysis.

Table 4

Adult Diet Comparison of Healthy Versus Unhealthy Diet Costs

	Healthy	*Unhealthy*
Average daily cost	$7.48	$15.30
Average daily calories	1,786	2,709
Cost-per-calorie	$0.004188	$0.005484

Household Costs

The median annual income in Baltimore ($29,792) was derived from the 2004 census.[17] State, local, and federal taxes accounted for a burden of $1,725 with a net annual income of $28,067.[18] Rental costs for a two-bedroom apartment including utilities averaged $1,247 per month.[19] Private vehicle costs were calculated to be $6,320.[20] Our model also included parental and child clothing costs ($613.14), personal costs ($977.14), and school supply costs ($563.49).[21,22] The resulting net income was used for analysis. The same cost of living expenses were applied to the convenience food model.

Results

Food Costs

Stratified food costs are presented in Table 2. The annual food costs associated with the healthy diet model were $5,019. Child food costs ranged from $109.58 to $259.50 monthly, with average monthly and annual food costs of $191 and $2,289, respectively. Monthly and annual estimated food costs for an 18–35-year-old adult with an average daily intake of the USDA recommended 1,800 calories were $227.49 and $2,730, respectively (Table 3). Dairy products were responsible for the largest percentage (more than 35%) of adult food costs. Vegetables accounted for slightly more than one fourth of food costs. Fruits and lean meats collectively accounted for one ourth of food costs.

The convenience dietary model estimated an average annual food cost of $10,298, nearly twice that of the healthy food model. The average monthly child diet cost was estimated at $393, with a range from $321–$465. The estimated adult monthly diet cost ranged from $465 to $858 (Table 5). Calculated cost-per-calorie values for the healthy and convenience diets were $0.0042 and $0.0055, respectively. The average cost per calorie of the healthy diet was estimated to be 25% less than that of a convenience diet. Related, the convenience diet comprises 52% more calories than the healthy diet.

Table 5

Cost Analysis of an Unhealthy Diet

	Average Cost
Breakfast menu, daily	$3.90
Lunch/dinner menu, daily	$5.75
Child menu, daily	$3.37
Child monthly cost, age 1–8	$320.59
Child monthly cost, age >8	$465.38
Adult monthly cost	$465.38
Monthly household cost	$858.36

Table 6

Annual Income Balance Sheets

	Healthy Diet (% of Income)	*Unhealthy Diet (% of Income)*
Net income (after taxes)	$28,067	$28,067
Housing	$19,017 (68)	$19,017 (68)
Transportation	$6,320 (23)	$6,320 (23)
Clothing	$613 (2)	$613 (2)
Personal care	$977 (3)	$977 (3)
Child care/education	$563 (2)	$563 (2)
Family food costs, average	$5,019 (18)	$10,298 (37)
Balance	-$4,442	-$9,721

Household Income

Using the proposed model, housing and transportation costs potentially accounted for 68% and 23% of available income, respectively (Table 6). Clothing, personal care items, and education costs each accounted for 2%–3% of income. Using the same model, food products from the healthy diet would represent 18% of available income ($5,019). Proportional food cost from a convenience diet would represent 37% of available income ($10,298). If housing and transportation costs are assumed to be fixed, both the healthy and convenience diet costs contribute to a negative annual household budget. Both our healthy food model and USDA estimates suggest that food costs represent 18% of household income.[15]

Discussion

Several factors contribute to disparities in healthy eating habits in at-risk populations. One significant barrier is the relative lack of availability of healthy food choices in low-income and urban neighborhoods.[7,8,23] Fast-food is often more convenient and readily available than home-prepared meals or fresh foods, particularly in low-income neighborhoods.[23,24] Our results emphasize the financial difficulties faced by low-income families trying to meet recommended dietary guidelines.

Our findings also confirm results from prior studies suggesting that dairy and vegetables are associated with higher cost compared with other food subgroups.[25] Vegetables are the least consumed food group in low-income households.[26] Cost and limited availability of fresh foods in low-income and urban neighborhoods present significant challenges to eating a healthy diet. In our model, frozen vegetables were, on average, 70% cheaper than fresh vegetables. Compared with fresh and brand-name foods, this may save an average family up to 53% on their annual food bill.[27]

Our model further reinforces the premise that it is difficult to meet current dietary recommendations without income assistance. Current government programs that help low-income families offset costs to meet nutritional needs include the Women, Infant, and Children (WIC) Program, the Free and Reduced Meal (FARM) program, and the Commodity Supplemental Food Program (CSFP). These programs are available to households with incomes less than 185% of the poverty line. The single-parent families on which our model was based would not qualify for federal assistance.[28-30]

Our model also suggests that on a per-calorie basis, a convenience (fast-food) diet is more expensive than a diet derived from generic brand or frozen foods. While sole consumption of either diet is unrealistic, the model provides an analytic value for cost comparison, showing that a healthy diet, while still financially difficult, is potentially more cost-effective than a fast-food diet.

Substituting public transportation for private vehicle ownership could potentially permit an annual transportation savings of $5,552.[27,31] Our calculated food costs accounted for 18% of available income, nearly double the nationwide estimate of 9.6%.[32] This value was even greater in the convenience food model (37%). We believe that this is due to the low income considered in our model compared with the US median income.[33] If we substitute US median income, our estimated food costs would account for 10% of gross income, consistent with nationwide estimates of food costs as a percentage of income.

There are several limitations to our model. Assuming that all food is prepared at home for each meal is unrealistic. Actual estimates for low-income families reveal that 86% of meals are prepared at home.[10] Similarly, assuming that all food is consumed from a fast-food chain is also unrealistic. Additionally, our healthy diet model does not include food preparation costs for home

meals. Inherently, our model lacks variation in menu selection for both the healthy and convenience diet options. There are certainly numerous alternatives to the items considered, but effort was taken at pricing menus that would represent typical family meals.

Regardless of the health value of either model, food cost presents a significant financial challenge for low-income families. Meeting recommended dietary guidelines through local grocery or fast-food chains is not financially feasible in our model. Compared to fast-food prices, however, our model suggests that a low-cost healthy diet is more cost-effective. The use of public transportation, combined with a more frugal approach to household budgeting, also makes meeting dietary recommendations more feasible. While our model evaluated cost of living expenses in a very specific population, we believe that the data obtained can be utilized to help counsel patients across different geographic and cultural areas.

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