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# The Role of Economics in Eating Choices and Weight Outcomes

Lisa Mancino, Biing-Hwan Lin, and Nicole Ballenger



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**Lisa Mancino, Biing-Hwan Lin, and  
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## Abstract

We use data from the USDA's 1994-96 Continuing Survey of Food Intakes by Individuals and the 1994-96 Diet and Health Knowledge Survey to ascertain whether economic factors help explain weight differences among adults. Weight differs among demographic subgroups, and differences in specific behaviors, health awareness, and eating patterns can be linked to weight outcomes. An economic framework helps explain how socioeconomic factors affect an individual's ability to achieve good health. Our results suggest that income, household composition, and formal education help explain variation in behaviors and attitudes that are significantly associated with weight outcomes.

**Keywords:** obesity, CSFII, DHKS, weight, age, income, education, race/ethnicity.

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## Summary

The incidence of obesity has risen all across America, among all population groups. Not everyone, however, is equally at risk of becoming overweight or obese, or at risk for the same reasons. Understanding weight differences is one approach to finding solutions to obesity and its associated health costs. Much of the variation in body weight is related to differences in what we eat and how active we are. To encourage specific behavioral changes, however, we need to understand the motivation behind these behaviors.

The purpose of this report is to:

- Identify if and how the risk of being either overweight or obese differs among various demographic subgroups.
- Determine if differences in specific eating and physical activity behaviors—as well as knowledge, attitudes, and perceptions that affect such behaviors—can be linked with weight outcomes.
- Examine whether economic factors—such as income and time constraints—appear to help explain differences in behaviors and attitudes that affect weight outcomes.

We use multivariate analysis to identify significant correlates of overweight and obesity. The data come from USDA's 1994-96 Continuing Survey of Food Intakes by Individuals and the 1994-96 Diet and Health Knowledge Survey.

Certain behaviors and attitudes are significantly associated with alternative weight outcomes. Individuals who exercise more frequently, watch less television, drink fewer sugary beverages, and eat a higher quality diet are more likely to have a healthy body weight. Differences in attitudes about diet and health also correlate with weight differences. Compared with women of healthy weight, overweight and obese women are less likely to believe they have control over their weight. Likewise, overweight and obese men are less likely to accurately assess their weight status; nearly 60 percent of overweight and obese men consider themselves to have a healthy weight.

Differences in obesity rates across population subgroups indicate that socioeconomic factors significantly and systematically affect an individual's ability to achieve good health. Variables of particular interest to economists seem to contribute to variation in these behaviors and attitudes. Individuals with higher incomes tend to make greater investments in their own health. They watch less TV and eat a higher quality diet. Men with higher incomes are more accurate about their weight status, while women with higher incomes drink fewer sugary beverages, exercise more frequently, and are more confident that they can control their weight.

Time constraints may limit personal investments in healthier behaviors. These time constraints seem to correlate with household composition. Compared with single parents, married parents have a higher quality diet, eat breakfast more often, and drink fewer sugary beverages.

Formal education also seems to motivate individuals to make greater investments in their own health. Individuals with a college education watch less TV, eat a higher quality diet, drink fewer soft drinks, and eat breakfast more often. Women with a college education have a greater feeling of control over their own weight and exercise more frequently.

## Introduction

Obesity rates among adult Americans have doubled within the past 25 years. In 1999-2000, nearly 65 percent of U.S. adults were either overweight or obese (Centers for Disease Control and Prevention, 2003). Obesity accounts for \$117 billion a year in direct and indirect economic costs, it is associated with 300,000 deaths each year, and it will soon overtake tobacco as the leading cause of preventable deaths (U.S. Department of Health and Human Services, 2000). Magnifying the public cost, Medicaid and Medicare were estimated to have paid for over half of all U.S. medical expenses related to overweight and obesity in 1998 (Finkelstein et al., 2003).

The risk of being overweight<sup>1</sup> has been increasing among children as well (CDC; Joliffe, 2004). Over 15 percent of children age 6 to 19 are either overweight or at risk of becoming overweight, according to recent estimates. For children age 6-12, this represents a 135-percent increase from 1976. For children age 12-19, the increase is 210 percent. For an adolescent, the probability of childhood obesity persisting into adulthood is as high as 80 percent (American Academy of Pediatrics, 2003). So the trends in overweight and obesity are likely to continue if left unchecked.

The incidence of obesity has risen across America and among all population groups. Not everyone, however, is equally at risk of becoming overweight or obese, or at risk for the same reasons (see appendix). Understanding weight differences and predispositions to obesity is one approach to finding solutions. Understanding differences in risk can be used to tailor education and intervention campaigns and more efficiently allocate funds.

One determinant of body weight is a person's genetic makeup. Medical studies have shown that genetic differences explain a significant amount of weight variation both among individuals and over time for a given individual (CDC; Schousboe et al., 2004; Allison et al., 1996). However, much of the variation in body weight is also related to behavior: what we eat and how active we are. This is cause for hope because behaviors are amenable to change. Our first objective is to see if we can link specific eating and physical activity behaviors—as well as knowledge, attitudes, and perceptions that affect such behaviors—with weight outcomes.

To promote specific behavioral changes, we need to understand the motivation behind these behaviors. Economic analysis is suited to this task because it helps explain how individuals choose to allocate their limited resources—including their time and money—to eating a healthful diet, engaging in physical activity, and being informed about diet, health, and weight relationships. More important, are economic factors (costs, income, etc.) behind differences in behaviors and attitudes that affect weight outcomes?

## Data

The data used in this study come from the USDA's 1994-1996 Continuing Survey of Food Intakes by Individuals (CSFII) and the companion Diet and Health Knowledge Survey (DHKS).<sup>2</sup> The CSFII collects information on food intake in the United States, and also records demographic information

<sup>1</sup>Children are considered to be at risk of being overweight if their BMIs are between the 85th and 95th sex- and age-specific percentiles from the 2000 CDC growth charts. Those with BMIs at or above the 95th percentile are considered to be overweight.

<sup>2</sup>Although there are more recent data on individual food consumption and body weight, these data lack health knowledge information and some sociodemographic variables that allow us to look more closely at how economic factors help explain the relationship among behaviors, attitudes, and weight outcomes.

on each respondent’s household. CSFII respondents are also asked to report their weight and height. The DHKS provides information on people’s attitudes and knowledge about dietary guidelines and their ability to practice this knowledge. In each CSFII household, the DHKS was administered to one adult over 19 years old who reported at least 1 day of food intake. To maintain a clear link between dietary knowledge/attitudes and an individual’s nutrient intake, our data set included only the adults who answered both the CSFII and DHKS, amounting to 5,364 individuals.

## Which Behaviors and Attitudes Affect Risk?

Are particular behavioral patterns of eating and physical activity associated with an individual’s weight category? To create weight categories, we grouped respondents based on their self-reported body mass index (BMI) (table 1). BMI is the ratio of weight (in kilograms) to height squared (in meters). Following weight classifications used by the CDC, National Institutes of Health, and World Health Organization, respondents who reported BMIs between 18.5 and 25 were classified as having a healthy weight, BMIs of 25-30 were overweight, and BMIs of 30 or above were classified as obese.

Using these weight categories, we questioned whether various measures of caloric consumption, caloric expenditures, and attitudes about diet and health correlate well with weight outcomes.

### *Eating and Physical Activity*

We analyzed how the differences among individuals in terms of calories expended and calories consumed correlate with weight differences among individuals.<sup>3</sup>

### *Calories Expended: Exercise and Television Watching*

As proxies for calories expended, we considered the number of hours a respondent spent watching television, averaged over 2 days, and whether he or she exercised more than once a week. (We cannot ascertain how well these days represent their usual patterns of calories consumed and calories expended.)

<sup>3</sup>This was done by comparing the mean values of food intake, physical activity, and dietary knowledge for individuals with a healthy body weight against the mean values for individuals classified as either overweight or obese.

**Table 1—BMI definition and classifications**

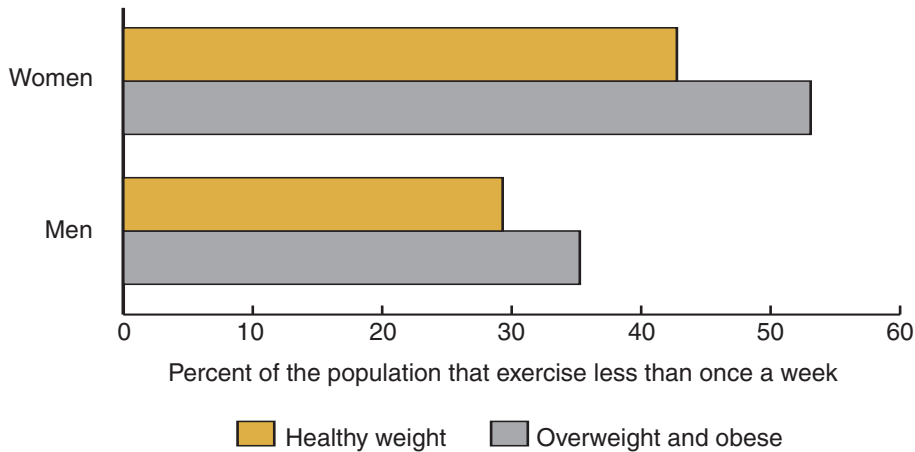
	Healthy weight	Overweight	Obese
BMI <sup>1</sup>	18.5-25	25-30	> 30
6'	137-185 lbs	185-220 lbs	> 220 lbs
5'6"	115-155 lbs	155-185 lbs	> 185 lbs

<sup>1</sup>Body Mass Index (BMI) =  $\frac{\text{Weight (Kilograms)}}{\text{Height}^2 \text{ (Meters)}}$



Figure 1

**Weight differences by exercise frequency**



For both men and women, a smaller proportion of overweight and obese individuals exercised more than once a week. Also, the number of hours spent watching TV is significantly<sup>4</sup> higher for overweight and obese individuals than for healthy-weight individuals.

**Calories Consumed: Quantity, Quality, and Eating Patterns**

To assess the relationship between calories consumed and body weight, we analyzed the total energy an individual consumed, averaged over 2 days. The quality of an individual’s diet can also influence overall caloric intake; for example, foods that are lower in energy density,<sup>5</sup> such as broccoli, can promote a feeling of fullness and reduce caloric demand compared to foods that are higher in energy density, such as French fries. As a measure of diet quality, we used the 2-day average of an individual’s healthy eating index (HEI) score (Basiotis et al.; table 2). We also included the number of Pyramid servings consumed from each food group, and the percentage of calories derived from sugary beverages.

Nutrition studies have pointed to a relationship between an individual’s body weight and various eating patterns, such as snacking between meals, eating breakfast, the amount of time between eating occasions, and eating foods prepared outside the home (Ma et al., 2003; Nicklas et al., 2001). As indicators of such dietary patterns, we included the percent of calories derived from foods consumed away from home, whether or not the individual consumed breakfast on the recall days, how long the individual went between eating occasions, and how often he or she ate a snack.

We found that:

- Individuals with a healthy body weight consume fewer calories than individuals who are overweight. However, obese individuals report consuming fewer calories than either healthy-weight or overweight individuals.<sup>6</sup>

<sup>4</sup>Statistical significance refers to the likelihood that the difference observed between two groups is due to chance alone and there is no true systematic difference between these groups. In this study, a finding is referred to as significant if there is a less than 5 percent probability that the difference observed would occur by chance alone if there were no differences between the groups being compared (i.e., a p-value of less than 0.05).

<sup>5</sup>Energy density is the total energy (calories) from a specific food divided by its weight.

<sup>6</sup>This counterintuitive finding could be because individuals who are obese may under-report more often and to a higher degree than individuals with a healthy weight. (McCrory et al., 2002; Variyam, 2003b).

**Table 2—Healthy Eating Index definition**

The HEI score is the sum of 10 components that represent different aspects of a healthful diet. The maximum score for each component of the Index is 10. The minimum score is 0. The maximum total HEI score is 100.

- **Components 1-5:** Reflect how well an individual's diet conforms to the Food Guide Pyramid in terms of daily consumption of grains (bread, cereal, rice, and pasta), vegetables, fruits, milk (milk, yogurt, and cheese), and meat (meat, poultry, fish, dry beans, eggs, and nuts).
- **Components 6-7:** Measure an individual's fat and saturated fat consumption as a percent of total calories. To obtain perfect scores for these components, individuals must consume no more than 30 percent of calories from fat and no more than 10 percent of daily calories from saturated fats.
- **Components 8-9:** Reflect the degree to which an individual limits her cholesterol and sodium intake.
- **Component 10:** Reflects the level of variety in an individual's diet.

Based on the total HEI score, an individual's diet will fall into one of three categories: Good (above 80), Needs Improvement (51-80), and Poor (50 and lower).

Source: The Healthy Eating Index : 1999-2000,  
[www.usda.gov/cnpp/Pubs/HEI/HEI99-00report.pdf](http://www.usda.gov/cnpp/Pubs/HEI/HEI99-00report.pdf)

- For both men and women, individuals with a healthier body weight also score higher on the HEI. This difference is statistically significant for women.
- Healthy-weight women tend to eat significantly more fruit and less meat, snack more often, and eat breakfast more regularly than women who are overweight or obese.
- Overweight and obese women go significantly longer intervals between meals than healthy-weight women, and receive more of their daily calories from fast-food restaurants.

### ***Knowledge, Perceptions, and Attitudes***

An individual's eating and exercise behaviors may be influenced by his or her awareness of relationships among diet, physical activity, health, and weight. We looked at three aspects of diet and health awareness: knowledge, perceptions, and attitudes.

As an indicator of **knowledge**, we used information on whether an individual was correctly able to identify how many servings of dairy, fruit, vegetables, grains, and meat are recommended in the Food Guide Pyramid. We found no significant correlation between knowledge about food servings and body weight category. For example, both healthy-weight and overweight men are about equally able to identify the correct number of food servings. Questions about serving recommendations may be poor measures of an individual's actual knowledge about health and nutrition.

People's **perceptions** about the healthfulness of their current body weight may affect their willingness to invest in more healthful behaviors. For example, someone who does not know he or she is overweight may make different food choices than someone who has been told by his or her doctor to lose weight and limit caloric intake. To verify this, we first created a variable that compared one's BMI to whether one considered oneself to be too heavy, too thin, or just right (Kuchler and Varyiam, 2003; Mancino and Kinsey, 2004). We next estimated the correlation between an individual's perceived body weight and BMI.

Nearly 60 percent of overweight and obese men believed they have a healthy body weight. This is significantly more than the share of men actually categorized as healthy according to their BMI. This "disconnect" likely influences the extent to which many men invest in healthful behaviors. In some ways, this inspires hope and might indicate an easy fix. If men are more aware of what their body weight or BMI should be, they might make different eating and exercise decisions.

**Attitudes** about diet and health may also have an impact on health behaviors (Kuchler and Lin, 2002; Lin et al., 2004). For example, people who do not believe their food choices can affect their overall health would be more likely to make less healthful food choices than those who strongly believe in such a link. To ascertain attitudes, we used answers to how important respondents felt it was to maintain a healthy weight, how much control they felt they had over their own body weight, and how nutrition (versus prices or convenience) influenced their food choices.

Women in the healthy-weight category were significantly more likely to disagree with the statement "some people are born fat, some are born thin." In other words, those women who believe their weight is under their own control are more likely to have a healthy weight than other women. This makes sense. If you have a low sense of self efficacy in terms of controlling your body weight, why would you invest in behaviors not always enjoyable to you?

Significantly more healthy-weight women than overweight women indicated the importance of nutrition when buying food. Significantly more overweight women indicated that taste and storability are the most important attributes when buying food. As to storability, we found that significantly more overweight women shop once a month or less. This may suggest that overweight women are buying fewer nonstorable fresh items in favor of goods that are processed, which may ultimately affect the healthfulness of their diets.

## **Economic Factors May Help Explain Behaviors and Attitudes: Our Framework**

We developed an economic framework to determine if and how economic factors might explain differences in the behaviors and attitudes that we found to be correlated with weight outcomes. This framework is based on the biological relationship between calories consumed and calories expended, where excess body weight results when someone routinely

consumes more calories than he or she expends. How many calories we choose to consume and how many calories we expend daily are influenced by a constellation of factors including the price of goods and services, a person's income, time constraints, cooking skills, level of education, gender, age, cultural background, and genetic endowment (Frazao, 1999). Each factor may play a multifaceted role, affecting an individual's knowledge about health and nutrition, his or her choice of what to eat, and how many calories he or she expends.

### **Prices**

Economic theory assumes that relative differences in prices can partially explain differences among individuals in terms of their food choices, leisure activities, and knowledge about diet and health. For example, avocados may cost less in California than in Minnesota. If buyers of avocados were alike in every other way, we would expect the Californian to purchase more avocados than the Minnesotan. We may also expect relative differences in the price or accessibility of information to shape an individual's knowledge and attitudes about diet and health. Public health campaigns, which reduce the price of information, tend to focus on areas or populations that are most at risk of coming in contact with a specific health threat. For example, Texans may have different attitudes and knowledge about how to avoid West Nile virus than people in Montana. Economic theory also assumes that the full price of a good or service includes its monetary price as well as other costs, such as travel costs and time. Thus, an individual living near a public park may choose to be more active than someone else living in an area with few walking trails, sidewalks, or bike trails.

### **Full Income**

An individual's full income is the fusion of the amount of money, time, and ability he or she has to either purchase or produce goods and services (Becker, 1965). For example, someone may allocate his or her time, money, and ability to painting the exterior of his or her house, or may hire a contractor to do the job. The choice depends on the price the contractor charges versus the price of materials, on the time needed to paint the exterior (which is related to painting skills), and on what else this person could be doing (opportunity costs).

Economic theory uses the concept of full income to explain differences in choices regarding food and physical activity. For example, as individuals' wages increase, their incomes increase and they have more money to spend on everything: food, other goods, and leisure activities. Wage increases also inflate the value of their time because time spent working has increased in value relative to time spent in leisure or working around the house. This change may compel individuals to purchase goods and services that are more convenient, more prepared, or higher quality. An increase in wage rates also raises the full cost of ill health, which includes the cost of medical treatment needed to regain health and time lost working. As such, individuals with higher incomes should have more incentives to invest in their own health (Grossman, 1972). They may choose to make these investments by eating more healthfully and engaging in more active pursuits.

However, there are opposing forces that may compel individuals to gain weight as income increases. As time spent working in the market becomes more valuable, an individual may devote more time to such work by spending less time at leisure. With sedentary work, this reallocation of time will lead to fewer calories expended. If this is not offset by a reduction in calories consumed, then an individual will likely gain weight. As time spent working in the market becomes more valuable, an individual may also choose to purchase foods that are more prepared. If these foods are higher in calories, or if that individual is less aware of the caloric and nutrient content of these purchased foods, weight gain is again likely.

Other factors related to time allocation may affect how individuals choose which foods to buy and how much to exercise. For one, the extra costs incurred from poor nutrition should be at least as high for individuals with children as for individuals with no children.<sup>7</sup> However, the extra costs of preparing food may actually be lower for individuals with children. The time costs to prepare a meal for two people are not much different than to prepare a meal for four. Also, many food manufacturers offer volume discounts. Thus, as individuals prepare food for more people, the relative time and monetary costs decline, while the extra benefits of preparing a healthful meal remain at least as high. Therefore, economic theory predicts that, all else equal, an individual with children is more likely to make healthful food choices than an individual without children.

Opposing forces are at work here too. Some factors may compel individuals to gain weight as family size increases. This is more likely for single parents who are responsible for both providing the family income and tending to housework. As these individuals devote more time to working and tending to household chores, they will have less time for active pursuits. They may also choose to purchase foods that are more prepared. If these time substitutions lead to fewer calories expended or less awareness of the caloric and nutrient content of foods eaten, weight gain is again likely.

### **Education**

Formal education may also promote greater self-investment in health. People with more education may be better able to obtain, process, interpret, and apply information that shapes their knowledge and attitudes about nutrition. Investing in education may reflect the degree to which people are forward looking and thus willing to make greater investments in their own health. Moreover, education is highly correlated with income; individuals with higher levels of education tend to earn higher incomes. Thus, they may choose to make greater investments in their own health by eating healthfully, being physically active, and enhancing their knowledge about health and nutrition.

### **Age**

Age may have opposite effects on an individual's willingness to invest in his or her own health. On one hand, as people grow old, their health declines. They may become more aware of the links between diet and health, possibly from visits to the doctor or illnesses among friends. Thus, the perceived benefit of investing in health may increase. Since metabolism slows with age, we would expect older individuals to expend less energy and eat

<sup>7</sup>Traditional economic models typically assume individuals consider only their own well-being. However, an individual's well-being is likely influenced by that of others, especially their children's or other family members.

smaller portions than younger individuals. This, along with reduced flexibility and bone density, may limit an older person's ability to be physically active.

### **Gender**

Assuming equal levels of physical activity, ages, and height, men typically have higher metabolisms than women. This, in turn, should induce women to consume fewer calories than men. Also, differences in marketing techniques and recommendations from physicians may also lead to variation, by gender, in diet and health awareness. Physicians may tell men less often to monitor their calcium intake because men are less likely to suffer from osteoporosis. Men, therefore, may be less aware of a link between loss of bone density and inadequate calcium consumption.

### **Culture and Genetics**

A person's cultural background and genetic endowment may also affect his or her body weight via health awareness, food choices, and level of physical activity. Cultural background may cause a person to make different food choices, have different notions about the links between diet and health, prefer different types of physical activities, and hold different views on what his or her ideal body weight should be. Also, an individual with Type I diabetes may be both more aware of the nutrient content of food and more mindful of food choices (to monitor glucose levels) than someone without diabetes.

In summary, our economic approach is based on the assumption that the foods we consume, the energy we expend, and what we know about diet and health affect our body weight. In turn, these behaviors and attitudes are influenced by prices, full income, education, age, gender, genetics, and culture.

This economic framework enables us to look at if, and how, economic factors correlate with—and therefore might explain—behaviors and attitudes that affect weight outcomes.

## **Economic Factors May Help Explain Behaviors and Attitudes: Our Findings**

To apply our economic framework, we used multivariate statistical analysis to assess the relationship between specific behavioral patterns and attitudes and an individual's income, level of education, household structure (which may be a proxy for time constraints), geographic location (which may be a proxy for variations in price and availability of food), age, and race/ethnicity. Multivariate analysis allows us to gauge the influence of one specific socioeconomic or demographic variable on behavior. For example, we can estimate how increasing an individual's age by 1 year will affect the amount of television that that individual watched each day, holding all other influences constant.

The correlation between socioeconomic factors and weight outcomes varied significantly by gender when estimating how the risk of being either over-

weight or obese differed among demographic subgroups (see appendix). For that reason, we ran separate estimations for men and women (table 3). To interpret, keep in mind that each of the variables listed in the row along the top of the table represents a specific behavior or attitude. Each behavior or attitude was hypothesized to be jointly determined by the socioeconomic and demographic variables listed in the first column. Thus, the “+ (Women)” in the second column, first row indicates that among women, income is positively correlated with exercise. In other words, a woman with a higher income is likely to exercise more often than a woman with a lower income. A negative sign in the next column of the first row shows that both men and women with higher incomes watch less television than those with lower incomes.

### **Region/Location**

One important limitation of the CSFII is that it contains no information on price of foods bought and eaten. However, when purchases are made within a short timeframe, it is reasonable to assume that slight variation in prices across households can be captured by information on the household’s regional location (Variyam, 2003b). Thus, geographic location and whether or not an individual lives in an urban, suburban, or rural area are often included in models as proxies of systematic differences in food prices and expenditures. Regional variables may also correlate with cultural differences (southern cuisine is famous for its fried food and barbeque), and neighborhood or lifestyle differences (some suburban areas have fewer sidewalks for exercise while some urban areas have fewer supermarkets). Our analysis suggests that these location variables do correlate with some weight-related behaviors:

- Men and women who live in the West have a higher quality diet and drink fewer sugary beverages.
- Men and women in rural areas have a lower quality diet.
- Men who live in urban areas are more likely to believe that their body weights are healthy when in fact they are either overweight or obese.
- Women in the South eat breakfast more often than women in other regions.

### **Full Income**

Economic theory suggests that demand for goods and services used to maintain or improve one’s health increases with income (Grossman, 1972). We used the household’s Poverty Income Ratio (PIR) to group individuals into three different income categories: low, middle, and high (Lin et al., 2004). The PIR is the ratio of a household’s income to the Federal poverty guideline for that household’s number of family members.<sup>8</sup> In this study, a household was considered to be low income if its PIR fell below 185 percent of the Federal poverty level. Households above 185 percent typically do not qualify for most social programs, such as Head Start, the Food Stamp Program, the National School Lunch Program, and the Children’s Health Insurance Program. An individual whose household income fell between 185 and 300 percent of the poverty level was classified as middle income.

<sup>8</sup>For example, the 2004 Poverty Guideline for a family of 2 individuals is \$12,490. If this household reported an income of \$24,980, its PIR would be 2 and its income would be 200 percent of the Federal poverty level.

Individuals with household incomes that exceeded 300 percent of the poverty level were classified as high income.

Our empirical results show that income and healthy weight behaviors are correlated in the following ways:

- Compared with all other explanatory variables, income had the strongest marginal impact on diet quality and the amount of time spent watching TV. Both men and women with higher incomes watch less TV and eat a higher quality diet.
- Women with higher incomes drink fewer sugary beverages, such as fruit drinks and soft drinks, and have a higher sense of self-efficacy regarding weight control. Also, a higher proportion of women with higher incomes indicate that they exercise at least once a week.
- Men with higher incomes are more accurate in reporting their weight status.

### Household Type

Time is a scarce resource for all households, both low and higher income. Waking hours can be spent working for pay, working in the home (cleaning, cooking, caring for children, upkeep), investing in our health (exercising, cooking a healthy meal, reading about health and nutrition), or simply enjoying our free time (reading a book, watching TV, or socializing). Our analysis suggests that for some households, time constraints—or preferred allocations of time—may limit personal investments in healthier behaviors. For example, married couples with children may be better able attend to their health than single parents.

- Compared with all other explanatory variables, household structure has the largest impact on an individual’s consumption of sugary beverages and whether he or she consumes breakfast. Men and women who are

**Table 3—How socioeconomic variables correlate with food choices, physical activity, and dietary awareness**

	Calories out		Calories in			Dietary awareness	
	Exercise	TV	Healthy Eating Index score	Sugary beverages	Breakfast	Women: a sense of control over own weight	Men: accurately assessing weight status
Income	+ (Women)	-	+	- (Women)		+	+
College education	+ (Women)	-	+	-	+	+	
Married with children	- (Men)	- (Men)	+	-	+		
Residence			- (West) + (Rural)	- (West)	+ (Southern women)		
Race and ethnicity	+ (Black men)	+ (Black women)	+ (White and Hispanic)		+ (White women)	+ (White)	- (Hispanic)
Age	-	+	+	-	+	-	



married with children drink fewer sugary beverages, and eat breakfast more often than single parents. They also have a higher quality diet.

- Household composition has the strongest impact on whether men exercise more than twice a week. Married men with children exercise less frequently than single men with no children. However, they also tend to watch less TV than men without children.

### **Education**

Formal education may motivate an individual to make greater investments in his or her own health. Indeed, we find that education is correlated with those behaviors that are associated with a healthy weight.

- Men and women with a college education watch less TV, eat a higher quality diet, drink fewer soft drinks, and eat breakfast more often.
- Compared with all other explanatory variables, whether or not a woman went to college has the strongest impact on whether or not she exercises more than twice a week.
- Women with a college education have a greater sense of control over their own weight.

### **Age**

On one hand, older people may find it more difficult to be physically active, due to loss of bone density and increased risk of disease. On the other hand, increasing risk of disease may also provide greater incentives to eat healthfully. Our analysis supports both conjectures about the relationship between age and weight-related behaviors.

- Older men and women indicated they exercise less frequently and watch more television.
- Older individuals appear to make investments in their health by trying to eat more healthfully. They have a higher quality diet, drink fewer sugary beverages, and eat breakfast more often.

### **Race and Ethnicity**

Ethnic differences may partly account for variations in what people choose to eat, their attitudes about physical activity or various forms of exercise, and their awareness of health and nutrition.

- Men and women who are either Hispanic or non-Hispanic White eat a higher quality diet than non-Hispanic Black men and women.
- Non-Hispanic White women were more likely to report that they ate breakfast on both survey days.
- Non-Hispanic Black women watch more hours of television than women of other races.
- Non-Hispanic Black men indicated they exercise more frequently than men of other races.

- Compared with all other explanatory variables, ethnicity is estimated to have the strongest impact on an individual’s dietary awareness. Hispanic men are most likely to believe that their body weights are fine, when in fact they are overweight or obese. White women disagree most with the idea that they have little control over their own body weight.

## Conclusion

Increasing rates of overweight and obesity present serious challenges to the future quality of public health, health care, aggregate productivity, and quality of life among Americans. Health education and outreach programs can be designed to influence the two levers that individuals use to manage their weight: the foods they eat and the energy they expend.

This report illuminates how certain socioeconomic and demographic factors may relate to an individual’s consumption of a healthful diet, engagement in physical activity, and understanding of the links among diet, exercise, and good health. Our analysis finds that certain behaviors and attitudes—such as diet quality, breakfast eating, exercise, TV watching, and perceptions of control over one’s own weight—are associated with weight outcomes. Also, variables of particular interest to economists—such as household structure, income, and formal education—may help explain variation in these behaviors and attitudes. These insights might be used to tailor nutrition outreach messages within specific demographic subgroups. For example, it seems that there may be constraints common among single parents that make it difficult for them to find time for physical activity, prepare nutritious foods, and eat meals at regular intervals. The next step would be to explore ways to relieve such constraints.

It would be misleading to suggest that weight differences are entirely the result of personal choices. It would also be naive to suggest that personal choices are entirely shaped by the economic variables we considered. However, economic factors do seem to influence behaviors that may lead to weight differences among individuals.

Clearly, an individual’s culture, environment, and genetic makeup also play a role in determining his or her weight. These influences likely affect anyone’s desire and ability to have the physique of either Arnold Schwarzenegger or Audrey Hepburn. However, such differences should not completely preclude maintaining a healthy body weight—at least not for the three out of five Americans who are currently overweight or obese.

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## Appendix

### Who Is More at Risk?

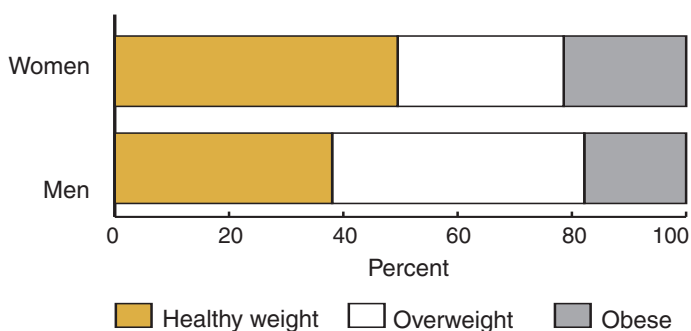
The variables we used to identify the risk confronted by specific socioeconomic/demographic subpopulations are the variables available in our data set: an individual's gender, race/ethnicity, age, household composition, income, and level of education.<sup>1</sup> We also included regional indicators, such as Midwest, South, Northeast, and West, as well as whether the individual lived in an urban, rural, or suburban area.

### Gender

We found that men are more likely than women to be overweight, and that women are more likely than men to be either a healthy weight or obese. The BMI classification system is designed to be gender neutral, so why men are more likely to be overweight and women are more likely to be obese is not easily explained.

<sup>1</sup> We would have also liked to include information on the amount of time spent preparing food per day; more detailed information about the household's time constraints; the availability of grocery stores, restaurants, and fast-food places in the household's vicinity; and an individual's measured—as opposed to reported—BMI.

Figure 1a  
**Weight differences by gender**

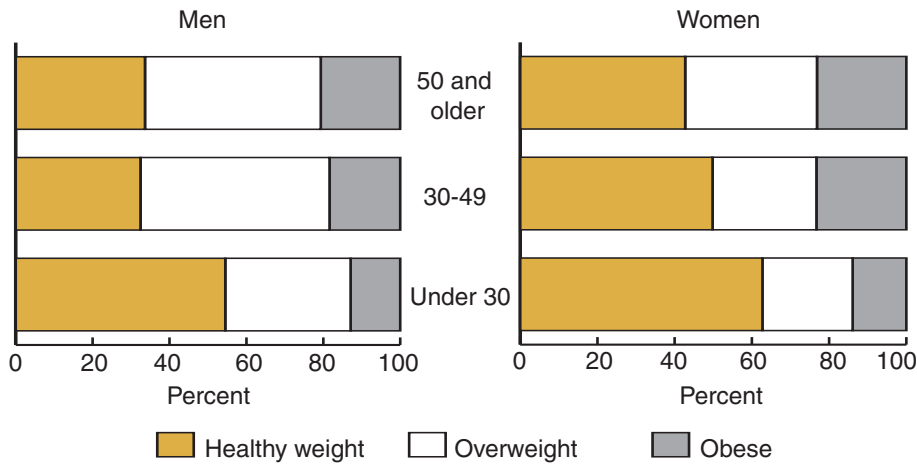


## Age

Weight distributions change significantly with age. This in itself is not too surprising. For most people, metabolism slows with age. However, our data suggest that an energy imbalance tends to occur earlier for men than for women. For example, there are significantly more women age 30-49 with a healthy weight than men of the same age.

Figure 2a

### Weight differences by gender and age

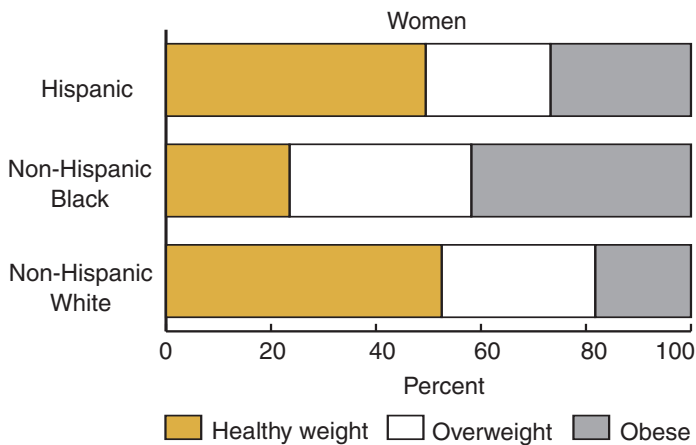


## Race/ethnicity

Women who are non-Hispanic White or Hispanic are significantly more likely to have a healthy weight than non-Hispanic Black women. One's racial/ethnic background may influence food choices, as well as one's attitudes about diet, exercise, weight, and health.

Figure 3a

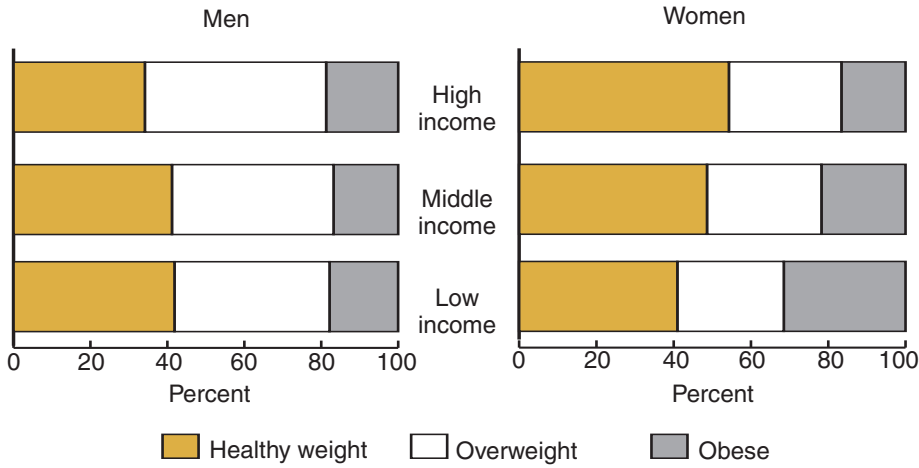
### Weight differences by race/ethnicity



## Income

Women with higher incomes are significantly more likely to have a healthy body weight than those with low incomes. Likewise, low-income women are significantly more likely to be obese. Among men, we found that weight outcomes did not differ significantly across income categories.

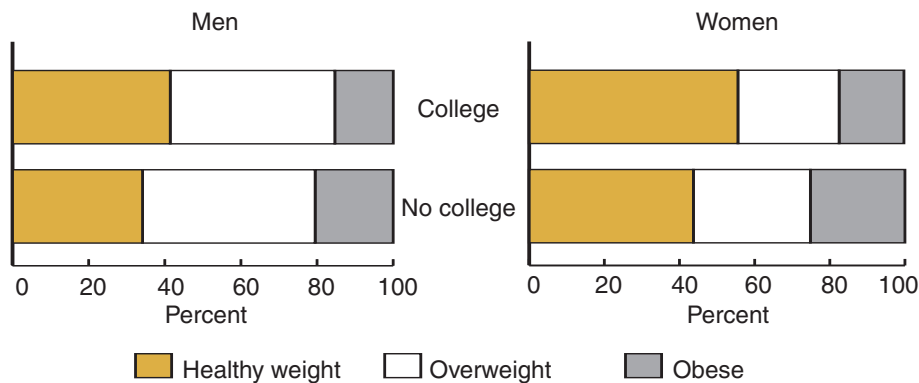
Figure 4a  
**Weight differences by gender and income**



## Education

Both men and women who had not gone to college are significantly more likely to be overweight or obese. Men and women who had attended at least some college are more likely to have a healthy body weight. Education level may be a predictor of diet and health knowledge, or a good proxy for an individual's investment in his or her own health.

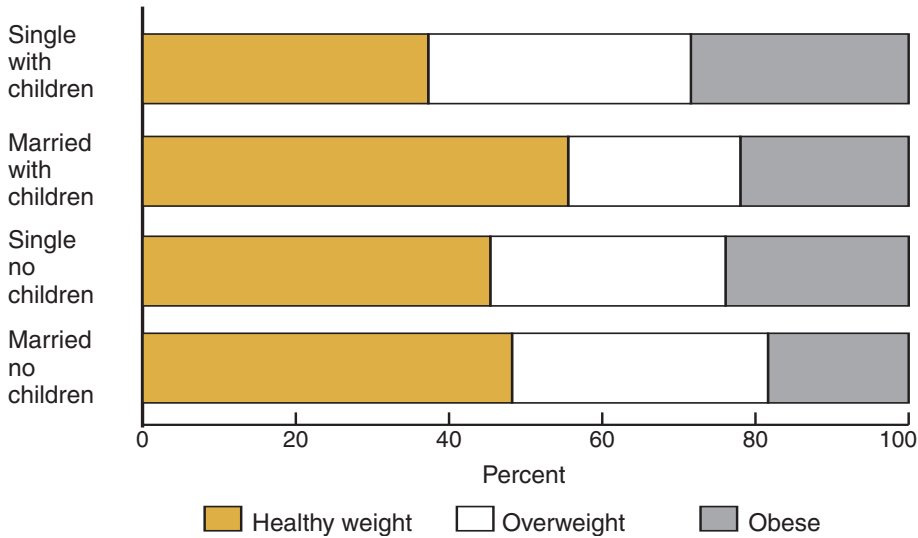
Figure 5a  
**Weight differences by gender and education level**



## Household type

Women who are married with children are more likely to have a healthy body weight than single women with children. In a household with two adults, both may contribute to the household’s income and share in child-rearing and other household duties, freeing up time and money to pursue healthier behaviors.

Figure 6a  
**Women's weight differences by household composition**



## Region/Location

For both men and women, individuals who live in the West are significantly more likely to have a healthy weight. Men who live in rural areas are significantly more likely to be obese than men in urban or suburban areas. Whether a woman lived in an urban, rural, or suburban area was not significantly related to her weight category.

Figure 7a  
**Weight differences by sex and region/location**

