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**Article**

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# Obesity and labor market outcomes

## The hidden private cost of obesity: Lower earnings and a lower probability of employment

Keywords: obesity, BMI, wages, employment, occupation, absenteeism

### ELEVATOR PITCH

Rising obesity is not only a pressing global public health problem. There is also substantial evidence that obese people, particularly women, are less likely to be employed and, when employed, are likely to earn lower wages. There is some evidence that the lower earnings are a result of discriminatory hiring and sorting into jobs with less customer contact. Understanding whether obesity is associated with adverse labor market outcomes and ascertaining the source of these outcomes are essential for designing effective public policy.



### KEY FINDINGS

#### Pros

- ⊕ Studies for the US and multiple European countries find a negative and statistically significant effect of obesity on earnings and employment.
- ⊕ There is some evidence that obesity reduces prospects for employment.
- ⊕ Studies have found that obese people face discrimination in the labor market, either taste-based or statistical discrimination.
- ⊕ One of the most robust findings is that obese white women generally earn less than their non-obese counterparts, even after controlling for other factors.
- ⊕ There is evidence that obese workers suffer from customer discrimination, which might keep obese people from being hired to fill certain types of jobs.

#### Cons

- ⊖ Data sets drawn from survey data with information on labor market outcomes often have weak coverage of health issues, so obesity measurements may not be accurate enough for rigorous statistical studies.
- ⊖ Despite strong correlations between obesity and adverse labor market outcomes, causality has not been definitively demonstrated—and the direction of causality could run from lower wages to obesity.
- ⊖ It is possible that there is no causal relationship in either direction, and that a third factor is linked to both obesity and labor market outcomes.
- ⊖ Information is lacking to determine whether lower wages, particularly for obese women, are due to employers' dislike of obese people, statistical discrimination, or real differences in productivity.

### AUTHOR'S MAIN MESSAGE

There is growing evidence that obese people receive lower wages and are less likely to be employed than non-obese people, and that these adverse outcomes are caused by obesity. Obesity threatens to become an increasing burden on all taxpayers as a result of the associated higher medical costs, lower productivity and wages, and reduced probability of finding employment. Governments and employers have a compelling interest in finding ways to reduce obesity levels and discrimination against obese workers.

## MOTIVATION

Worldwide, obesity has nearly doubled since 1980, reaching epidemic proportions in many high-income countries and rising rapidly in developing countries as well. The World Health Organization (WHO) estimates that there were 1.5 billion overweight adults and at least 500 million obese adults worldwide in 2008 (based on the body mass index, or BMI; see **Measures of fat and obesity**). Childhood overweight and obesity have also increased dramatically since 1990 (see Figure 1). There is a strong intergenerational correlation between parental obesity and childhood obesity.

### Measures of fat and obesity

**The body mass index (BMI)** provides a common measure to clinically classify weight status for adults. Alone however, it is not an accurate measure of obesity, particularly for males, because it does not distinguish muscle from fat. In addition, in most data sets the BMI is calculated from self-reported height and weight, which may be systematically misreported. The BMI is calculated thus:

$$\text{BMI} = \text{weight (kg)} / \text{height}^2 \text{ (meters)}.$$

An adult with a BMI between 25 and 29.9 is considered overweight. An adult with a BMI of 30 or higher is considered obese.

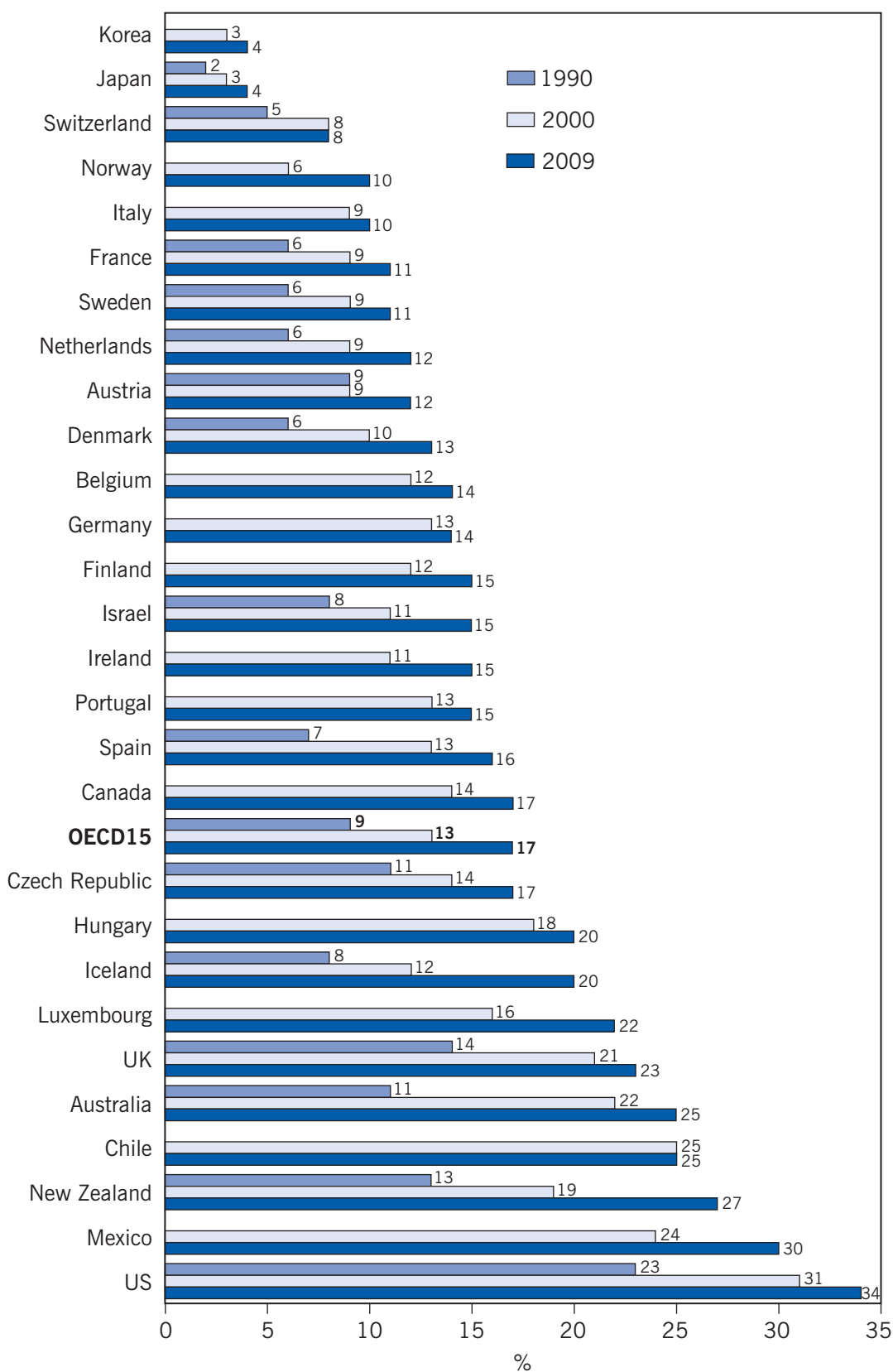
**Waist circumference** is a measure of central obesity, or the deposition of excess adiposity around the center of the body. It has at least two advantages over the BMI. It is a stronger predictor of morbidity and mortality, and it is a measure of fatness that is visible to others and that might be interpreted by employers, customers, or co-workers as an unattractive physical attribute that could lead to discrimination against people who are obese.

**Fat-free mass and body fat** are two other measures for assessing obesity. Fat-free mass includes everything in the body—skin, bones, organs, muscles—except the fat. Body fat excludes everything in the body except the fat.

Obesity is a risk factor for many diseases, including diabetes, heart ailments, stroke, hypertension, arthritis, sleep apnea, and asthma. In most high-income countries the medical costs of obesity-related illness in adults are estimated at 1–5% of annual health care expenditures—and could be as high as 20% in the US. Obesity rivals smoking as the leading preventable cause of death worldwide [2].

The literature on the possible links between obesity and adverse labor market outcomes has been growing since the mid-1990s [3]. It finds that obese people earn less, have lower productivity, and have higher rates of absenteeism on average than other workers. From a public policy standpoint, understanding whether obesity is associated with adverse labor market outcomes and establishing the source of these outcomes are essential for designing effective public policy.

Figure 1. Increasing obesity rates among the adult population in OECD countries, 1990, 2000, and 2009 (or nearest years)



Source: OECD. *Health at a Glance*, 2011. Online at: <http://www.oecd.org/els/health-systems/49105858.pdf>

## DISCUSSION OF PROS AND CONS

### Is obesity the cause of adverse labor market outcomes?

Despite the strong correlations found between obesity and adverse labor market outcomes, causality has not been definitively demonstrated. There is some evidence, however, that obesity itself is a cause of the adverse labor market outcomes experienced by obese people. The health conditions associated with obesity can contribute to these outcomes, even limiting the type of work that obese people can do.

Obesity may also impair the acquisition of human capital. This could be through a poor diet or because of teacher discrimination. Research also indicates that obesity may cause physiological brain changes that could impair cognitive function or performance.

Another possibility is that obese people are just as productive as other workers but face discrimination in the labor market, either taste-based or statistical discrimination. That employers or customers might have a subjective distaste for obese people is consistent with the considerable evidence that the obese are stigmatized. Statistical discrimination stems not from subjective dislike but from imperfect information about potential employees. This imperfection leads employers to make individual hiring decisions based on the assumed characteristics of the group to which a person belongs.

Finally, obese people might earn lower wages because of their higher health care costs. Employers who hire obese people might have to pay higher premiums for health insurance. They might therefore compensate obese employees with lower wages to maintain the same overall cost for combined wages and benefits needed to stay profitable.

Causality may also run from lower wages to obesity. People who are paid less might become obese in part because they cannot afford healthful food and must rely instead on low-cost, low-nutrition, calorie-dense foods. In most countries, there is an income-education-obesity gradient: Poor and less-educated people are more likely to be obese [4]. Poor labor market outcomes may lead to depression and low self-esteem, which in turn lead to weight gain.

It is also possible that there is no causal relationship, in either direction, between obesity and labor market outcomes, and that a third factor is linked to both obesity and labor market outcomes. A high rate of time preference is one possibility. Individuals who are more present-oriented and who more heavily discount the future may overeat in the present, discounting the future consequences of their actions. There is some evidence that a rise in the marginal rate of time preference has led to increasing obesity.

### Sorting out causation from correlation

Because randomized controlled trials of obesity and subsequent labor market outcomes would be unethical, most research relies on survey data. Social science data sets drawn from survey data with good labor force information have very weak coverage of health issues such as obesity.

Early research linking obesity to labor market outcomes used ordinary least squares (OLS) regression analysis (see **Analytic methods applied to obesity and labor market outcomes**). Most of these studies find a negative relationship between obesity and the

labor market outcome of interest. But even though these models typically control for a host of observable socio-economic and demographic factors, OLS cannot address the potential for reversed causality, or for a third factor that is the cause of both obesity and labor market outcomes.

### Analytic methods applied to obesity and labor market outcomes

**Ordinary least squares (OLS)** is a statistical method that allows researchers to relate labor market outcomes (earnings, employment, or occupation) to obesity, while controlling for the influence of other factors that predict these outcomes, including education and work experience, in order to isolate the effect of obesity on the outcome of interest.

**Instrumental variables** is a preferred analytic method when there are concerns about reverse causality, or when important unobservable factors are time-varying. This technique involves finding a variable (the instrument) that is highly predictive of an individual's obesity but completely unrelated to that individual's labor market outcomes except through its effect on obesity.

Later researchers have used a variety of more sophisticated econometric techniques to determine whether there is a causal link between obesity and labor market outcomes. These are described below; a more technical discussion of these methods can be found in [5].

Many researchers relate an early BMI measure of obesity to a later labor market outcome, arguing that this temporal ordering precludes reverse causality. These studies report a negative association between obesity and earnings, particularly for women. Results from these studies are most convincing if this early measure of the BMI is taken before the person enters the labor market, so that the BMI cannot be affected by the labor market outcome.

Sibling studies—in which one sibling is obese and one is not—have also been used to examine the relationship between obesity and wages on the assumption that the difference between siblings removes the variation in weight attributable to a shared family environment. However, variations in weight remain that are attributable to genetic makeup unshared by siblings and to non-genetic factors. This method will yield biased estimates of the effect of obesity on earnings to the extent that these factors are not captured by observable factors such as education, or that parents treat children differently in response to early signs of academic potential in ways that are related to future earnings.

Longitudinal data, which follow the same individuals over time, enable researchers to control for unobservable or hard-to-measure factors that might affect both obesity and labor market outcomes as long as these unobservable factors are constant over time. Essentially, with this type of data, individuals serve as their own control in fixed-effects models. Unobservable characteristics that might influence obesity and labor market outcomes include an individual's rate of time preference and personality traits such as laziness. However, if these unobservable factors vary over time, individual fixed-effects models cannot account for them.

When important unobservable factors are time-varying or reverse causality is suspected, studies can use instrumental variables (see **Analytic methods applied to obesity and labor market outcomes**) to study obesity and labor market outcomes. But finding a variable that is highly predictive of an individual's obesity but is unrelated to labor market outcomes except through its effect on obesity is very difficult. Some economists are critical of these studies because they do not believe that the chosen instrument is a good predictor of obesity or that it also predicts the labor market outcome.

Most of these studies use the weight of a biological relative as the instrument. This appears to be a valid instrument, since it is a source of variation in weight due to genetics (roughly half the variation in weight across people is genetic in origin) and ought to be unrelated to an individual's labor market outcomes. While its validity would be compromised if many of the genes responsible for obesity were also responsible for other factors that affect labor market outcomes, such as willingness to delay gratification (time discount rate), most studies have been unable to detect any effect of a common household environment on body weight [6]. A few studies have begun to use an individual's own genetic information as instrumental variables, since information on specific genes linked to obesity should be a strong instrument for obesity.

Other instruments have also been used, but they are generally less valid than a relative's body weight. For example, studies have used the average BMI and the proportion of obese people who live in the same area as the study subjects as an instrument. But because people choose where to live, this instrument could be related to occupational choices and earnings, rendering it invalid. Instruments used in other studies have included the presence of other obese people in the household, being an oldest child, having only sisters, or having a parent who has been treated for obesity. Their validity is questionable, however, as they are probably correlated with an individual's labor market outcome independent of their association with obesity.

## Results of empirical studies

Using the methods described above, many studies based on US data have assessed the relationship between obesity and wages or wages and employment. One of the most robust findings is that obese white women generally earn less than their non-obese counterparts, even after controlling for other factors and using a wide array of statistical techniques. That obesity has little effect on the earnings of men may be indicative of the premium that society places on thinness for women. The size of the effect is economically meaningful. For example, a difference in weight of two standard deviations among white women is associated with a 9% difference in wages. This difference is equivalent to one and a half years of education or three years of work experience [6].

Studies relating obesity to labor market outcomes have also been conducted using data for Australia, China, Denmark, Finland, France, Germany, Iceland, Sweden, Taiwan, and the UK, and reached similar results. Most of these studies find a negative and statistically significant effect of obesity on earnings and employment, and the effect is most often found for women.



Ascertaining whether there are wage penalties to obesity in European countries is difficult, because European labor markets generally have more compact wage structures, large shares of the labor force in the public sector, and more rigid wage structures, which leave little room for employer discretion. Yet studies using data on Europe as a whole find evidence of wage or employment penalties for women who are obese and sometimes for men.

Cultural norms may influence whether labor market penalties are associated with obesity. Studies have used deviations from the social norm (a relative rather than absolute measure of obesity) to study whether people whose weight exceeds the social norm are sanctioned through lower wages. While these studies have not been as rigorous as desirable in dealing with potential reversed causality, they generally find a negative relationship. A related study hypothesizes that if cultural norms for thin body types are inversely related to the prevalence of obesity, the labor market penalty for obesity should be lower in societies with a greater prevalence of obesity. The same study notes that if social interaction is valued in the labor market, and if obese people are less likely to interact socially, labor market penalties would be expected to be higher for obesity in settings with more social interactions [7]. The study reports some suggestive evidence in support of these hypotheses.

Some studies have found evidence of taste-based discrimination. The hypothesis is that employers with a personal dislike of obesity will hire fewer obese workers and thus incur higher production costs than their non-discriminating peers, who are more likely to obtain the most-qualified workers for the job because they draw their employees from a larger pool of candidates. In a competitive market, with freedom of market entry, employers who discriminate and face higher production costs will be driven out of business in the long run. A study using data for nine European countries that found a negative correlation in each country between wages and obesity rates also found a higher negative penalty for obesity in countries with less competition, as theory predicts [8].

Other studies find statistical discrimination. A study using a large sample of Swedish men concluded that the 18% lower earnings of obese men was more probably due to statistical discrimination than to taste discrimination, as the obesity penalty could be explained almost entirely by differences in cognitive skills, non-cognitive skills, and physical fitness, indicating that employers were using obesity as an indicator of skill limitations.

Finally, there is also evidence that obese workers suffer from customer discrimination. In a recent audit study, two equally qualified applications were submitted for the same advertised jobs, the only difference being the photos submitted with the applications [9]. One photo was of a normal-weight individual, and the other was of the same person digitally modified to appear obese. The applications with the modified photos were less likely to receive callbacks for an interview. There were also differences in callback rates across occupations. If customer discrimination is the cause of the lower earnings among obese workers, then the effect would be expected to be stronger in occupations that involve significant customer contact. This hypothesis is bolstered by the findings of other studies that report a stronger negative relationship between BMI and wages in occupations requiring interpersonal skills, particularly for overweight women in sales and service occupations.



## LIMITATIONS AND GAPS

More accurate measures of obesity are needed. Data related to obesity and related health and education issues need to be included in social science data sets. Nearly all studies linking obesity to labor market outcomes use the BMI as the measure of obesity. This is not surprising, since social science data sets that contain detailed information on labor market outcomes were not designed to collect health information. At most, they generally contain information on self-reported height and weight, which can be used to calculate the BMI. But the BMI is not an accurate measure of obesity (see **Measures of fat and obesity**) [10].

To circumvent the limitations of the BMI, some studies have used waist circumference, a measure of excess weight that is centrally distributed. Waist circumference is a stronger predictor of morbidity and mortality than the BMI, and it is a visible measure of fatness that employers, customers, or coworkers might see as an unattractive physical attribute.

Other studies have used fat-free mass and body fat to examine the link between obesity and earnings, finding lower earnings for people who have lower fat-free mass and higher body fat. One study using Finnish data found no association between the BMI and earnings or employment for men but did find that fat-free mass and waist circumference were predictive of men's earnings and employment. For women, all three measures were predictive of lower earnings and a lower probability of employment. This evidence is consistent with the concern that the BMI is not an accurate measure of fat for men.

Despite numerous studies finding that obese people receive lower wages and have a lower probability of employment, and some evidence that obese people are sorted into occupations requiring less customer contact, we still do not know for sure whether the lower wages, particularly for obese women, are due to employers' subjective antipathy towards obese women, due to statistical discrimination, or due to real differences in productivity.

The link between education and obesity also needs further study. There is mixed evidence on whether obese children and adolescents have lower academic outcomes, thus limiting their future productivity.

## SUMMARY AND POLICY ADVICE

There is considerable evidence that obese workers, particularly women, have lower earnings and a lower probability of employment. While there is some debate about whether the relationship is causal, the persistence of this finding across many data sets in many countries using sophisticated econometric methods indicates that obesity, particularly for women, is a likely cause of lower earnings and a lower probability of employment.

Two policy questions emerge from these findings. First, should governments intervene to reduce obesity? And, second, should obese workers be protected under antidiscrimination laws?

From an economic perspective, policies to reduce obesity may be warranted on efficiency grounds if obesity results in inefficiencies in resource allocation (market failure) [8], or on equity grounds if obesity is correlated with socio-economic status in ways that are not under an individual's control.

Indeed, many governments have already determined that the health care costs of obesity alone provide a rationale for intervention, such as taxing foods that are major contributors to higher calorie intake, including fats and oils, refined grains, and sugar and other sweeteners. There is concern, however, that such taxes are regressive and ineffective, because individuals will simply replace the higher-price (taxed) foods with non-taxed foods. In addition, since demand for many of the foods selected for taxation is relatively inelastic, it takes a large increase in prices to reduce consumption to healthy levels. Such large increases are likely to be politically unfeasible. Other policies aimed at reducing obesity rates include requiring restaurants to post calorie counts on their menus, revising school lunches to make them more nutritious, and mandating physical education classes in schools.

In response to the high health care costs associated with obesity, businesses and insurance companies have also begun to experiment with incentivizing employees to lose weight, with varying degrees of success. An experiment at a large US company provided randomly selected employees with a financial incentive to use the company gym coupled with self-funded commitment contracts aimed at addressing self-control problems. An analysis of the results of this experiment shows this to be an effective way to motivate employees to exercise.

Another policy debate concerns whether there should be antidiscrimination legislation aimed at protecting obese workers. Many economists argue that taste-based employer discrimination requires no government intervention because, as described earlier, market forces will eradicate such pay differentials, which are incompatible with profit maximization in a competitive market in the long run. From this perspective, the best policy prescription for reducing the wage differentials associated with obesity is to encourage competition in product markets. If the discrimination is customer-based or statistical in nature, however, legal protection may be warranted. Nonetheless, the issue of whether people who are obese should be a protected class under the law is far from resolved, in part because weight, unlike skin color or gender, is considered at least partly under an individual's control.

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## Competing interests

The IZA World of Labor project is committed to the *IZA Guiding Principles of Research Integrity*. The author declares to have observed these principles.

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