Obesity and occupation selection

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Abstract

Aims: Evidence suggests that obese workers, and in particular obese females, on average earn lower wages than non-obese workers. This may be because obese workers are employed in occupations with lower mean wages, or because within occupations they earn lower wages, or both. In this paper we investigate the first case. The aim is to examine the relationship between obesity, earnings and occupation selection in England.
Methods: The main data for the analyses were taken from the 2003 Health Survey for England (HSE). The sample consisted of non-pregnant economically active men and women age 16 years or older (n = 8958). These were supplemented with data on mean earnings by occupation from the Annual Survey of Hours and Earnings. We investigated directly the relationship between mean occupational earnings and obesity measures by regressing the former against the latter plus a range of individual and area covariates. We also used multinomial logistic regression and ordered probit regression to model the impact of obesity on occupation selection employing various occupation classifications. We also investigate the endogeneity of BMI.
Results: For the mean occupation wage regression, we find that obesity has a negative and significant on occupational wages in females, and a positive but not significant effect in males. For the occupation selection model, we find that relative to non-obese men, obese men have an increased likelihood of working in higher paid occupations and lower paid occupations compared to the reference category "Professionals", while obese women have an increased likelihood of working in lower paid occupations only. In addition, obese women are significantly more likely to work in occupations which require a low skill level while obese men are more likely to exhibit a high skill level at their workplace. Obese women work in occupations related to lower social status while there is no evidence of impact of BMI on the social status for male. Using a Hausman test, we did not find evidence for endogeneity.
Conclusion: Our paper suggests that obese female workers on average earn lower wages than their non-obese counterparts and this is because they tend to be employed in occupations with lower mean wages.

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1. Introduction

The prevalence of overweight and obesity has nearly trebled over the past two decades in the UK. In 2005, the rates of overweight and obesity in England were 42.6% and 22.1%, respectively, for men and 32.1% and 24.2%, respectively, for women and they continue to increase (OECD Health Data 2007). This is worrying because obesity is a condition in which the natural body fat reserves are increased to a point where they are associated with health morbidities including coronary heart disease, non-insulin dependent diabetus mellitus, osteoarthritis, hypertension, stroke (NHLBI, 1998) and certain types of cancer (Wellman, 2002). In 2001, it has been estimated that over 34,000 deaths in England, or about seven percent of all deaths, could be attributed to obesity (House of Commons Health Committee, 2004).

Besides the physical effects, obesity incurs economic costs, burdens the health care system and has considerable psychological and social effects. In 2001, obesity accounted for over 15 million days of sickness, costing the English economy £1,322 million in lost earnings (House of Commons Health Committee, *op cit*). In 2002, the direct cost of obesity to the NHS was £0.5 billion, while the indirect costs due to sickness and premature death of workers to the UK economy was estimated to be at least £2 billion. In addition, evidence for discrimination and stigmatisation has been found in multiple settings and has potentially negative implications for the mental health of obese people. It has been found for example that overweight employees are ascribed multiple negative stereo types (lazy, sloppy, less competent, lacking self discipline) (Roehling, 1999).

The aim of this paper is to examine the impact of obesity on occupational selection in England. The analysis is conducted using individual level data from the 2003 Health Survey for England. Obesity is measured using a number of measures. The primary dependent variable, occupational choice, has nine categories which represent the major groups of the Standard Occupational Classification 2000 (SOC2000) published by the Office for National Statistics (ONS, 2000). In addition, we consider the impact of obesity on ordered socioeconomic positions related to occupations and the level of skill required by occupations; both variables can be linked to unit groups of the SOC2000.

The next section reviews the literature on the impact of obesity in the labour market, focusing on studies that investigate the relationship between occupation and obesity. We then discuss the main statistical issues and the data and variables used. The results and conclusion follow.

2. Review of the literature

Several papers have studied the relationship between BMI and wages or income (Loh, 1993; Hamermesh and Biddle, 1994; Sargent and Blanchflower, 1994; Pagan Davila, 1997; Sarlio-Latheenkorva and Lahelma, 1999; Harper, 2000; Cawley, 2004; Morris, 2005). The majority found significant wage or income penalties for obese females and no evidence of a difference in income or wages for obese males. This section reviews the two studies that explored the relationship between overweight or obesity and occupation (Hamermesh and Biddle, 1994; Harper, 2000).

Hamermesh and Biddle (1994) use US data to first, investigate the relationship between BMI and earnings and second, explore how obese individuals choose their occupations. Utility-maximising individuals are expected to sort themselves into relatively rewarding occupations and away from occupations that impose wage penalties. Pay penalties for obese individuals might arise from two sources: employers' distaste for obese individuals unrelated to their productivity (general employer discrimination); and/or occupation-specific productivity effects. There are three ways in which obesity might affect productivity in specific occupations: (1) non-obese workers have more human capital than obese worker and so are more productive in a specific occupation compared to their obese peers. (2) Customers prefer to deal with non obese employees (customer discrimination) (3) Co-workers feel more motivated to work with slim employees in a specific occupation. In the case of employer discrimination, wages for obese individuals should, ceteris paribus, be lower in all occupations while occupation specific effects would cause pay differentials between obese and non obese people in specific occupations. Thus, it is empirically possible to distinguish between a model that implies employer discrimination and occupation-specific effects. Hamermesh and Biddle find weak evidence for both.

Harper (2000) used the National Child Development Study (NCDS) to examine the impact of obesity at age 23 on log hourly earnings at age 33 years. Obesity is defined as being in the 80-89th percentiles and the 90-100th percentiles of the BMI sample distribution. The use of longitudinal panel data reduces the likelihood of reversed causality bias given the time periods in which BMI and earnings are measured. Consistent with most other studies, Harper finds statistically significant and negative effects of obesity on earnings for females and no significant effects for males. Having established the relationship between earnings and BMI, he tests for general employer discrimination versus occupation-specific effects by adding interaction terms for obesity and occupation sector, Harper finds his occupation-specific interaction terms overall not to be significant. Consequently, he argues that the pay differential is not occupation specific but indicates employer discrimination. However, he finds evidence that obese individuals earn less in craft occupations; this might be attributable to either occupation specific effects or productivity effects.

In light of the above, we investigate the impact of obesity on occupation selection using data from the 2003 Health Survey for England. Based on the above, obesity could be related to occupation selection in three ways: (1) obesity influences occupation selection through employer discrimination or occupation specific discrimination. (2) Occupation influences obesity; this is because, for example, BMI is positively correlated with stress or a lack of exercise inherent in specific occupations. (3) Omitted variables (e.g., the discount rate) influence both obesity and occupation selection. In this paper, we aim to model the first relationship. We investigate whether or not there is endogeneity in our estimates. In addition, we explore if the occupation selection of obese employers is systematically linked to the level of skills required in the occupation or its socioeconomic status. We believe this analysis is the first to attempt to model the relationship between occupation choice and obesity using British data.

3. Data and variables

Data sources

The empirical analysis is based on data from the Health survey for England (HSE) and the Annual Survey of Hours and Earnings (ASHE). The HSE is a representative survey of individuals aged 2 years and older living in households in England. A new sample is drawn each year and approximately 13,000 private households are asked to provide data on demographics, education, individual health, housing, and employment. The interview is followed by a nurse visit at which physiological measurements including height and weight are taken.

The ASHE provides data on levels on earnings by occupation as classified by the National Office for Statistics for men and women. It is based on one percent of the employees in employment in Great Britain[1]. The information on earnings and hours is obtained from the employer and collected as gross pay before tax and national insurance contribution and other deductions.

Since individual wages are not included in the HSE we follow Morris (2005) and use data from the ASHE to compute occupation mean wages. We allocate to each individual in the HSE sample the sex-specific monthly wage for the occupation they work in. We linked the data on monthly occupational earnings reported by the ASHE to each individual in the HSE via the 371 unit groups of the occupational classification variable (SOC2000).

Occupation categories

[1] It does not cover information on the self employed.

We use the standard occupational classification, first introduced in 1990 by the Office for National Statistics, to define our primary dependent variable. The ONS determines occupation as a person's type and duration of qualification and work experience needed to perform the required tasks in his or her job at the time of the interview. The last review of the occupation classification in 2000 resulted in the SOC2000 with nine major occupation groups, 22 sub major groups and 371 unit groups. We use the nine major groups as the dependent variable in our analysis. Table 1 describes the groups in terms of the qualifications associated with the performance of the job and provides some examples.

Table 1 Description of the SOC2000 nine major occupation categories

Occupation Group	Required Qualification	Examples
Manager and Senior Officials	A significant amount of knowledge and experience to perform the required task	Senior Official in Local Government, Engineering Manager, Financial director
Professional Occupations	Degree or equivalent occupations	Chemists, Engineers, Architects, Health Professionals
Associate Professional and Technical Occupations	Associated high level vocational training	Engineering Technicians, Architectural assistant, Inspector
Administrative and Secretarial Occupations	Good standard of general education	Civil service executive officer, Credit controller, Post office clerk
Skilled Trade Occupations	A substantial period of training	Farmers, Tool Makers, Vehicle mechanic, Roofers
Personal Services Occupations	Good standard of general education	Hairdresser, Dental Nurses, Travel Agents, Croupier
Sales and Customer Service Occupations	General education or work based training related to sales procedures	Sales Assistant, Telephone salesperson, Insurance agent, Customer care adviser
Process, Plant and Machine Operatives	Minimum standard of competence (for example operating a vehicle) that must be attained to perform the task	Bakery assistant, Spinner, Wire worker, Fruit sorter, Lorry driver
Elementary occupations	Minimum standard of general education	Farm worker, Dock labourer, Postal workers, Hospital porter

Each of the SOC2000 unit groups is associated with one of four skill levels. The first skill level equates with competence associated with general education (usually acquired in the first compulsory education). Examples of occupations defined at this skill level include postal workers, hotel porters, cleaners and catering assistants. The second skill level covers all of which require the knowledge provided via a good general education as for occupations at the first skill level, but which typically have a longer period of work-related training or work experience. Occupations classified at this level

include machine operation, driving, caring occupations, retailing, and clerical and secretarial occupations. The third skill level applies to occupations that normally require a body of knowledge associated with a period of post-compulsory education but not to degree level. Examples are trade occupations and proprietors of small businesses. The fourth skill level relates to professional occupations and managerial positions in corporate enterprises or governments. Occupations at this level usually require a degree. In addition to our occupation variable we construct a variable using the four ordered skill levels to explore the hypothesis that obesity is systematically related to the skill level required to perform in a specific occupation.

Another variable related to SOC2000 is the National Statistics socioeconomic classification (NS-SEC). Constructed to measure employment relations and conditions of occupations, this variable indicates the socioeconomic position of each occupation. The three class version of the variable can be used in a hierarchical order that reflects the ranked labour market status associated with different occupations. The three categories are managerial and professional occupations, intermediate occupations and routine and manual occupations. Managerial occupations involve general planning and supervisory powers. Intermediate occupations describe positions in clerical, sales, service and intermediate technical occupations that do not involve general planning or supervisory powers. Routine and manual occupations describe positions with basic labour market contract in which employees work in routine occupations (agricultures, sales and services etc.) or lower technical supervisory positions.

Obesity measures

BMI is a widely used for measuring obesity. It is calculated by dividing an individuals' weight in kilograms by their height in metres squared. According to the WHO (WHO, 1998), an individual is within the healthy body mass range if their BMI is between 18.5 and 24.99. An individual with a BMI above 24.99 is classified as overweight and a BMI above or equal to 30 indicates obesity. We compute BMI for each respondent from height and weight values obtained during the nurse visit and reported in the HSE. One useful feature of the HSE is that height and weight are collected by a nurse and are therefore not prone to reporting bias.

We use three based BMI measures: (1) An indicator variable that takes value one if the individual has a BMI over 30 and zero otherwise. (2) Continuous BMI in order to explore the relationship between increasing body mass and occupation choice. (3) The natural logarithm of BMI, to capture non-linearity between the relationship of occupational choice and varying BMI.

Covariates

We include a comprehensive set of covariates: continuous age and age squared; marital status, ethnicity; education; work experience and work experience squared; the number of children living in the household; and, housing tenure. The reference individuals lives in London, white, married, owner of a house, holds a degree, and has one child.

Previous research suggests that the impact of obesity on labour market outcomes is different for males and females (Sargent and Blanchflower, 1994; Pagan Davila, 1997; Sarlio-Latheenkorva and Lahelma, 1999; Harper, 2000; Cawley, 2004; Morris, 2005); we therefore considered males and females separately in the analysis.

4. Econometric specification

The statistical analysis has three steps. First, we explore the relationship between obesity and mean occupational earnings using a linear regression model:

$$w_i = \phi B_i + X_i^{'} \mu + \mu_i \qquad (1)$$

where w_i is the mean occupational wage of individual *i*, *X* is a vector of covariates, B_i is the obesity measure, and μ_i represents is an error term. ϕ and μ are coefficients to be estimated.

In the second step, we use a multinomial logit regression model to estimate the probability that a rational and utility maximizing individual *i* chooses occupation *j* dependent on the covariates and body fat status. More formally, each occupation *j* has a level of utility attached to it given by

$$\begin{aligned} &U(occupation_1) = \alpha_1 B_i + X_i^{'} \beta_1 + e_i^1 \\ &\ldots \qquad (2) \\ &U(occupation_J) = \alpha_J B_i + X_i^{'} \beta_J + e_i^J \end{aligned}$$

where α and β are coefficients and the error term *e* is assumed to be independently and identically logit distributed. This condition is called the independence of irrelevant alternatives (IIA) assumption[2]. As we observe the outcome *y* for choice *j* if U(occupation$_j$)>U(occupation$_k$) where $j \neq k$,

[2] It has been argued that if the decision maker can weigh the outcome categories independently, a multinomial logit model can be used (Mc Fadden, 1973).

it follows from the distributional assumptions that the choice probability depending on the covariates and body fat is given by:

$$P(y_i = j) = \frac{\exp(\alpha_j B_i + X_i' \beta_j)}{1 + \sum_j^J \exp(\alpha_j B_i + X_i' \beta_j)} \quad (3)$$

where j indexes occupation choices and i indexes individuals. To identify the model, we set $\alpha_0, \beta_0 = 1$ to obtain a benchmark category:

$$P(y_i = 0) = \frac{1}{1 + \sum_j^J \exp(\alpha_j B_i + X_i' \beta_j)} \quad (4)$$

Estimating the model requires independent and identically distributed error terms. Thus, the errors have to be uncorrelated with the BMI measures and the independent X vector. However, as discussed above obesity may be endogenous. To avoid this problem, we can instrument the obesity measure using suitable instruments Z and running the following model:

$$B_i = X_i' \theta_1 + \theta_2 Z_i + \nu_i \quad (5)$$

where θ is a set of coefficients and ν_i is not correlated with μ_i. The aim of this first stage IV regression is to isolate exogenous variation in the obesity measure so that we can use predicted $\hat{B}_i$ from (5) in place of B_i to obtain consistent estimates of α and β in (3) and (4).

Estimating (5) allows as well to test for endogeneity using a Hausman test. We store the residuals from the first stage equation and add these as an explanatory variable to the original multinomial logit model (3) and (4). Under the hypothesis that BMI is exogenous, the coefficient on the residuals will be zero across the categories j. In this case we would prefer to use the uninstrumented results which have smaller standard errors in the multinomial model estimation (Wooldridge, 2002)

In the third step, we use an ordered probit specification to investigate the impact of obesity occupation skill levels and occupation socioeconomic status based on the NS-SEC.

Instruments

The main challenge of the IV approach is to find suitable instruments for the obesity measure to be able to test for endogeneity and, if appropriate, control for endogeneity bias in the regressions. We require *Z* variables that are partially correlated with BMI once the other exogenous variable have been netted out and are orthogonal to the error term in the second stage occupation equation. An empirical test for weak instruments is to test the overall significance of Z in the first stage regression using an F test. Following Morris (2005), we use area based obesity indicators to instrument the BMI measures in the IV models. The instrument is the mean BMI across individuals in the post code area where the individual lives, excluding the individual itself. The first requirement of an instrument is that it is correlated with BMI conditional on other variables that affect occupation choice. Morris (2005) argues that the main risk factors for obesity are excessive intake of high calorie foods and physical inactivity; area based instruments capture the peer influence which affect behaviour to food intake and exercise and are therefore likely to be non-weak predictors of individual level BMI conditional on other covariates. The second requirement of an instrument is that it is not correlated with the error term in the occupational choice equation. If mean area BMI is correlated with unobserved area effects that influence occupational choice, then IV estimates are not consistent. We therefore include measures of area deprivation based on the index of deprivation 2000, the proportion who are unemployed and the proportion with no qualifications in the area and the area mean total household income so that area BMI is not component of the occupational choice equation.

Modelling strategy

For men and women, we report 24 regressions, related to four different dependent variables. The first is mean occupational wage. It is regressed on the indicator variable for obesity, continuous BMI and the natural logarithm of BMI separately. The second and main dependent variable is SOC2000 major groups. Using a multinomial logit model, this is regressed on each of the three BMI based measures. The final two dependent variables are occupation skill levels and socioeconomic status related to occupations. IN each case we run separate models for each gender.

Sampling issues

The analysis is based on the 2003 Health Survey for England. The total sample size is 20,993. We only include individuals over 15 years of age and in full-time employment in our analysis. Pregnant women were excluded from the sample because their BMI does not relate to the standard BMI categories. These exclusions together reduce the sample to 10,019. Of these individuals, 8958 have a

valid BMI measure from the nurse visit; 3699 are female and 5259 are male. There are a negligible number of observations missing for each of the occupation variables.

It is possible that observations within areas are not independent; we therefore control for clustering in the area sampling units so that the standard errors in the regression models account for within-area correlation.

To allow for the possibility that items are not missing at random we include dummy variables for all missing values of the covariates. If the dummy variable is not significant then non responders are affected in the same way as responders.

6. Results

Descriptive statistics

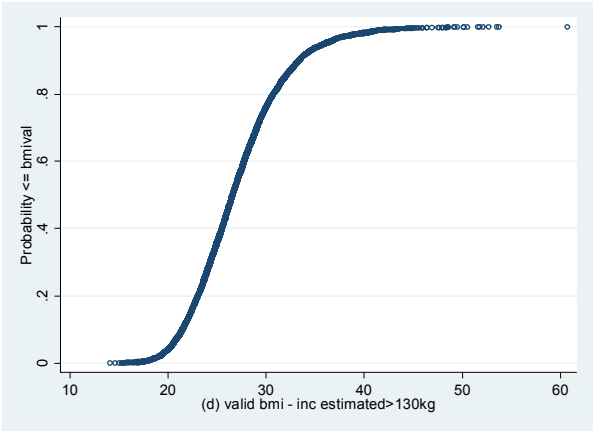
Summary statistics for the key variables are shown in Table 2. This shows cross tabulations of mean BMI, obesity prevalence and mean monthly wage by occupation categories and gender. For females, obesity prevalence is highest in the occupations skilled trade (36%), process and plant (30%) and personal services (31%) while it is lowest in professional (15%) and managerial (20%) occupations. In contrast, the highest proportion of obese male can be found in managerial (25%) and processing occupations. The female descriptive data suggest that high paid occupations can be linked to low obesity prevalence; the pattern for males is ambiguous. In terms of the mean occupational wage variable, in all occupation groups the values are higher for males than for females, and the values generally decline with occupation group.

The cumulative distribution of the BMI for men and women is shown in Graph 1. It is clearly right skewed with a sample mean BMI of 27 and a median of approximately 26. Based on the WHO definition, 24% of the sample population are classified as obese while only 38% of women and 28% have a BMI within the healthy range.

Table 2. Descriptive statistics for male and female

	Male			Female		
	Mean BMI	Proportion obese %	Monthly mean wage	Mean BMI	Proportion obese %	Monthly mean wage
Managers and Senior Officials	27.59	25.29	41,841	26.43	19.88	27,412
Professional Occupations	27.12	18.57	36,858	25.68	14.86	30,090
Associate Professional and Technical Occupations	26.95	21.39	30,179	25.97	19.57	23,679
Administrative and Secretarial Occupations	27.16	24.21	16,567	26.98	24.45	19,623
Skilled Trade Occupations	27.56	24.81	21,382	28.43	36.21	12,871
Personal Service Occupations	27.28	24.74	16,843	27.52	30.28	13,064
Sales and Customers Service Occupations	26.22	18.31	16,481	27.03	23.1	12,530
Process, Plant and Machine Occupations	27.99	28.91	19,627	27.56	29.41	13,,225
Elementary Occupations	26.6	22.06	16,451	27.54	30.59	12,061
Total	27.33	23.77	27,307	26.83	23.97	18,961

Graph 1. Cumulative distribution of valid BMI



Regression results

Table 3 reports the results of the relationship between mean occupational wage and obesity using OLS. We find that obesity has a negative impact on mean occupational earnings for women; this

implies that obese women work, on average, in lower paid occupations compared to their non-obese peers. The continuous BMI measure and the natural logarithm of BMI also have a negative and significant impact on mean occupational earnings. The picture is different for men: all coefficients have a positive sign. While there is no evidence that being obese influences the mean occupational wage, there is moderate evidence that log BMI has a positive impact on occupational wage. Thus, mean occupational wage is increasing in BMI but less than proportionally.

Table 3. Occupation mean wage regressions

	Males	Females
	Coef	Coef
Obese 0/1	549.42 (516.92)	-744.86 (244.98)**
log BMI	3067.52 (1376.96)**	-2281.24 (599.29)*
BMI	97.76 (50.58)***	-77.09 (19.96)*

***significant at .1, ** significant at .05, * significant at .001

In terms of occupation choice, obese males are significantly more likely to work in managerial, administrative and secretarial occupations and skilled trade occupations compared with professional occupations (see Table 4). The result is consistent with the findings from the descriptive statistics. Log BMI has a significant and positive effect on being employed in Sales and Customer and elementary occupations compared to working in a professional occupation.

Table 4. Impact of obesity on occupation: results for males

	Obesity indicator	Log BMI	BMI
	Coef (std. error)	Coef (std. Error)	coef (std. error)
Managers and Senior Officials	.33 (.13)**	.23 (.36)	.009 (.012)
Associate Professional and Technical Occupations	.18 (.15)	-.40 (.40)	-.003 (.015)
Administrative and Secretarial Occupations	.36 (.18)***	.18 (.53)	.025 (.015)
Skilled Trade Occupations	.25 (.13)***	.17 (.38)	.057 (.024)**
Personal Service Occupations	.36 (.28)	.31 (.73)	.042 (.016)**
Sales and Customers Service Occupations	-.01 (.25)	-1.26 (.63)**	.025 (.017)
Process, Plant and Machine Occupations	.39 (.15)**	.28 (.43)	.026 (.019)
Elementary Occupations	.16 (.16)	-1.08 (.46)**	.037 (.017)**

Professional occupation is the benchmark category

***significant at .1, ** significant at .05, * significant at .001

Consistent with previous research, the effects of obesity on labour market outcomes are different for females. Being obese increases the likelihood of being employed in administrative and secretarial

occupations, skilled trades, personal service occupations and processing and elementary occupations compared to working as a Professional.

Table 5. Impact of obesity on occupation: results for females

	Obesity indicator	Log BMI	BMI
	Coef (std. error)	Coef (std. error)	coef (std. error)
Managers and Senior Officials	.18 (.2)	.37 (.43)	.011 (.015)
Associate Professional and Technical Occupations	.22 (.21)	.06 (.43)	.003 (.015)
Administrative and Secretarial Occupations	.38 (.2)***	.73 (.44)***	.025 (.015)
Skilled Trade Occupations	.84 (.3)**	1.54 (.73)**	.057 (.024)**
Personal Service Occupations	.61 (.22)**	1.2 (.47)**	.042 (.016)**
Sales and Customers Service Occupations	.22 (.23)	.72 (.49)	.025 (.017)
Process, Plant and Machine Occupations	.46 (.25)***	.78 (.56)	.026 (.019)
Elementary Occupations	.6 (.22)**	1.03 (.48)**	.037 (.017)

Professional occupation is the benchmark category

***significant at .1, ** significant at .05, * significant at .001

In terms of the ordered SOC2000 skill variable as shown in Table 6, obese women are significantly more likely to be in employed in occupations with lower skill levels. For males, log BMI and BMI have the opposite effect, indicating that obese are more likely to be employed in occupations with higher skill levels than non-obese males.

Table 6. Impact of obesity on occupation skill level.

	Obesity indicator	Log BMI	BMI
	coef (std. error)	coef (std. error)	coef (std. error)
Men	.033 (.0403)	-.241 (.114)**	-.007 (.004)***
Women	.109 (.049)**	.216 (.104)**	.007 (.003)**

***significant at .1, ** significant at .05, * significant at .001

The dependent variable NS-SEC is increasing in occupations with lower social status. For females, there is strong evidence that obesity, on average, increases the likelihood of working in occupations associated with lower socioeconomic status (see Table 7). The coefficients on log BMI and BMI are also positive and significant at the 0.01% level. There are no significant effects for males.

IV results

The instruments are significant predictors of individual obesity. In all models the F statistic under the null hypothesis that the coefficients on the area BMI measures are zero exceeds of the value of 10, which is the threshold recommended by Staiger and Stock (1997).

Table 7. Impact of obesity on employment ranked by social status

	Obesity indicator	Log BMI	BMI
	coef (std. error)	coef (std. error)	coef (std. error)
Men	-.007 (.042)	-.09 (.11)	-.002 (.004)
Women	.17 (.051)*	.42 (.11)*	.01 (.003)*

***significant at .1, ** significant at .05, * significant at .001

Assuming the instruments are valid we are unable to reject the null hypothesis of the Hausman test that the obesity measures are exogenous. We have no evidence that BMI based measures suffer from endogeneity problems, and hence we prefer uninstrumented regression results. The results of the Hausman test for the occupational selection model are in the Appendix.

7. Conclusion

In this paper, we used the Health Survey for England to examine the impact of obesity on occupational choice in England. We investigated the relationship between mean occupational earnings and BMI and found that obesity has a negative and significant effect on occupational wages for females, and a positive but not significant effect for males.

We then explored the impact of obesity on occupation selection using a multinomial logit model and a range of obesity measures. We find that obese men have an increased likelihood to work in higher paid occupations and lower paid occupations, while obese women have an increased likelihood to work in lower paid occupations only (e.g., Administrative and Secretarial Occupations, Skilled Trade and Process and Plant Occupations, Personal Service Occupations and Elementary Occupations). In addition, obese women are significantly more likely to work in occupations which require a low skill level while obese men are more likely to exhibit a high skill level at their work place. Not surprisingly given the above, obese women work in occupations related to lower social status while there is no evidence of impact of BMI on the social status for male.

The IV coefficients on the BMI measures are not significant in the occupation selection models. Using a Hausman test it is not possible to identify endogeneity problems with respect to BMI based measures. We therefore preferred to use the non-instrumented regression results. However, failing to reject the exogeneity of obesity may be due to a lack of instrument power.

In summary, our paper suggests that obese female workers on average earn lower wages than their non-obese counterparts and this is because they tend to be employed in occupations with lower mean

wages. It may also be the case that within each occupation group, obese females earn lower wages than non-obese females and we suggest that further research is undertaken to investigate this topic.

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Appendix

Results of the Hausman test for the multinomial model logit with SOC2000 as dependent variable (H_0: all coefficients associated with the residuals are zero across the categories)

Females

Non-instrumented variable in equation	Obesity indicator	Log BMI	BMI
	χ^2	χ^2	χ^2
Residuals	12.51	11.719	12.049

***significant at .1, ** significant at .05, * significant at .001

Males

Non-instrumented variable in equation	Obesity indicator	Log BMI	BMI
	χ^2	χ^2	χ^2
Residuals	3.811	2.703	2.777

***significant at .1, ** significant at .05, * significant at .001