Obesity and Labor Market Outcomes in Post-Soviet Russia

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Introduction

Globally, there are more than 1 billion overweight adults, with at least 300 million of them being obese. The increased consumption of more energy-dense foods and foods with high levels of sugar and saturated fats, combined with reduced physical activity, have led to obesity rates that have been rising significantly since 1980 not only in North America, the United Kingdom, and Australia but also in Eastern Europe, the Middle East, China, etc. (WHO, 2010). Thus, the prevalence of obesity has risen dramatically not only in high income countries but in middle and low- income regions. A lot of research papers have been published on the determinants and consequences of obesity in developed countries (Chou et al., 2004; Lakdawalla et al., 2005; Rashad et al., 2006). The trend of increasing obesity in transition countries have been analyzed for Russia (Zohoori et al., 1998, Jahns et al., 2003, Huffman and Rizov, 2007, 2010) and other Central and East European countries such as Lithuania and Poland (Kalediene and Petrauskiene, 2004, Koziel et al., 2004).

Obesity is a complex condition that has serious health, social and psychological dimensions, affecting all ages and socioeconomic groups (WHO, 2010). The negative consequences of obesity on health are well known. Obesity is a major contributor to the global burden of chronic disease and disability, including diabetes, cardiovascular diseases and cancer (WHO, 2010). Obesity creates economic burdens for countries with rising obesity in the form of increased medical expenditures, and also leads to economic insecurity of individuals. Obesity is also linked to lower wages and employment, induce wage penalty, and job discrimination (Puhl and Brownell, 2001, Cawley, 2004). Given the health effects of obesity, obese individuals are more likely to have work limiting disabilities or to miss work due to illness if they are employed (Cawley et al., 2007). Obese workers may earn lower wages or be less likely to find employment due to employer discrimination (Puhl and Brownell, 2001). More studies have examined the relationship between obesity and wages (Averett and Korenman, 1996, Baum and Ford, 2004, Cawley, 2004, Morris, 2006, Gregory and Ruhm, 2009, Wada and Tekin, 2010), than the number of studies that have examined the relationship between obesity and employment (Morris, 2007, Norton and Han, 2008).

The goal of this paper is to estimate the impacts of obesity on employment, wages and missed work due to illness for Russian adults by gender in order to better understand the mechanisms through which obesity affects employment, wages and sick-leave days. This study extends the literature on the relationship between obesity and labor market outcomes, measured as employment, wages, and sick-leave days in 'transition' economies by using recent panel data 1994-2005 from the Russian Longitudinal Monitoring Survey (RLMS) and provides the first empirical evidence from Russia. We also consider the reverse causality from wages to obesity (where higher wage may lead to lower BMI) and the possibility that obesity may be an endogenous variable. We employ econometric techniques to control for potential biases due to endogeneity and reverse causality. To determine whether obesity reduces the employment and wages we estimate various labor and wage model specifications, including fixed-effect models to control for unobservable heterogeneity.

The rest of the paper is organized as follows. The next section discusses current evidence on the relationships between obesity and employment, wage and missed work due to illness. Following is a section on methodology and data for the analysis. And finally, results are discussed and conclusions drown.

Literature review

The relationships between obesity and labor market outcomes have been researched primarily using data on developed high income countries including the US and West European countries (England, Denmark, Finland, etc). The main labor market outcomes are wage/earnings; employment and occupational selection. The earlier studies, which have focused on the US, have used the NLSY data and the results from these studies are mixed (Loh, 1993, Pagan and Davila, 1997). One limitation of these studies is that they ignore the potential endogeneity of obesity, making causal inference impossible.

Later studies have tried to control for the endogeneity of obesity using the Instrumental Variable (IV) approach. Cawley (2000b) uses the weight of a child as an instrument for the weight of the child's mother, and finds no evidence that body weight causes employment disability. In another study Cawley (2004) employs the fixed effect and IV models with instrument, the BMI of a sibling, and finds obesity wage penalty only for white females. Norton and Han (2008) identify the effect of obesity on labor market outcomes by using genetic information, and find no statistically significant effect of lagged BMI on either the probability of employment or wages conditional on employment, for either males of females. However, the instruments are sometimes weak and do not always pass the overidentification tests (Lundborg et al., 2009).

Conley and Glauber (2007) using data from the Panel Study of Income Dynamics (PSID) estimate sibling fixed effects models where a body mass index measure is lagged by 15 years to correct for endogeneity bias. They found that obesity is associated with 18% reduction in women's wages and 16% reduction in women's probability of marriage. Gregory and Ruhm (2009) find little evidence of an "obesity penalty" but instead show that the wage is often maximized at low levels of BMI. Wada and Tekin (2010) develop measures of body composition, body fat and fat-free mass, and analyze the relationship with wages. Their results indicate that body fat is associated with decreasing wages for both women and men, and fat free mass is associated with increased wages. In general, the literature on relationship between BMI and wages finds that the BMI has significant negative consequences on earnings for females and small or sometimes insignificant effects for males.

The effects of obesity on labor market outcomes have been also examined by European studies. Using data from the Health Survey for England, Morris (2006, 2007) assesses how BMI and obesity affect employment and earnings. He addresses the issue of endogeneity by employing the recursive bivariate probit model and the propensity score matching method. Morris uses area level variables, the mean BMI in the respondent's health authority, and the prevalence of obesity in the area in which the respondent lives, as instruments. Results show that obesity has a negative effect on employment for both genders, and that BMI has a positive and significant effect on earnings for men, but significantly negative effect on female's earnings. Another study by Lundborg et al. (2009) employs British data from the National Child Development Study (NCDS), and uses obesity status of parents as instrument. Lundborg et al. (2009) find a significant negative association between obesity and labor market outcomes, but after instrumenting with parental obesity the results are no longer statistically significant. However, the authors are doubtful about the instruments, which did not pass the tests for overidentifying restrictions in several specifications.

Using data from a Danish panel survey from 1995 and 2000, Greeve (2008) analyzes the relationship between body weight and employment status and wages using the IV models and whether the respondent's father or mother had been prescribed medication for obesity related health problems. Results show negative effect of BMI on employment. Sousa (2005) and Atella et al. (2008) investigate the relationship between obesity and wages for European countries using data from the European Community Household Panel. Sousa (2005) finds a negative BMI effect on labor market outcomes for females and positive BMI effect on labor market outcomes for males.

In addition to studies focused on the developed countries in North America and Europe, Cawley et al. (2009) analyze the association between weight and labor market outcomes among legal immigrants to the US from developing countries. They did not find a significant association between weight and either employment, wages or work limitations for men or women; being overweight or obese is associated with lower employment for among women who have been in the US for less than 5 years. But the authors discuss several limitations of their study, including not accounting for possible endogeneity in obesity, the lack of instruments, the self-reporting height and weight that may lead to measurement error, etc.

Schultz (2008) uses round 13 of the RLMS data, conducted in 2004, to investigate the health and disability impacts on labor productivity measured by variations in labor force participation, hours worked and wage rates. The focus of his study is the impact of health related inputs, which include having a medical checkup in the last three months, consumption of grams of ethanol alcohol per day, and the number of cigarettes smoked per day on labor productivity. To correct for potential endogeneity of these health inputs the author estimates the relationships with labor productivity employing the two-stage least squares, which is identified on the basis of exclusion restrictions using the community prices of alcohol, cigarettes and the price of the doctor's consultation visit. Schultz also fits a quadratic function to BMI that reveals an inverted U-shaped pattern on labor participation and wages, but he does not account for potential endogeneity in BMI.

The contribution of this study is to extend the literature on the relationship between obesity and labor market outcomes, measured as employment, wages, and sick-leave days in transition economies by using entire panel data from the Russian Longitudinal Monitoring Survey (RLMS). To the best of our knowledge this study provides the first empirical evidence from Russia using a panel data from the RLMS.

Conceptual Issues and Methodology

Obesity affects employment and wages in two key ways. First, since obesity is the cause for both chronic and acute diseases, the obese individuals are more likely to have health problems. Therefore, obesity may reduce individual's productivity, which leads to lower wages and lower likelihood of employment. Individuals who are overweight or obese may earn lower wages compared to their normal weight counterparts because health status may decrease their productivity (Baum and Ford, 2004). Second, there may be employer discrimination against obese people, which means that obese may be less likely to be hired or promoted (Puhl and Brownell 2001), and therefore, they work less and may earn lower wages. The goal of this paper is to investigate these relationships during the transition in Russia and compare to the results from the previous studies on developed economies.

Following the labor economics literature, in order to determine the effects of obesity on labor force participation (LFP), wage (ln*w*) and sick-leave-days indicator (S) and to formalize the causal relationships discussed above, we develop the following three equation econometric model:

$$LFP_{it} = \beta_0 + \beta_1 X_{it} + \beta_2 Obese_{it} + \eta_{it}, \quad (1)$$

$$\ln w_{it} = \alpha_0 + \alpha_1 X_{it} + \alpha_2 Obese_{it} + \varepsilon_{it}, \quad (2)$$

$$S_{it} = \chi_0 + \chi_1 X_{it} + \chi_2 Obese_{it} + \mu_{it}. \quad (3)$$

LFP and S are binary variables, while ln*w* is continuous variable. LFP is an indicator equal to 1 if the individual is in the labor force and 0 otherwise. S is an indicator equal to 1 if the individual reports missed work due to illness in the last 30 days. **X** is a vector of exogenous explanatory variables that are shown to be correlated with labor market outcomes in the labor economics literature, including age, age squared, household size, education, marital status, number of children in the household, non-labor income control for constraints and incentives an individual to undertake market employment, regional dummies. Obese is the key regressor we are interested, and it is a binary variable equal to one if the individual has a BMI > 30 and 0 otherwise. Body mass index (BMI) is defined as individual weight in kilograms divided by height in meters squared (kg/m^2). The probability of being employed (eq.1) and the probability of missing work due to sick-leave days (eq. 3) can be estimated by the standard Probit model:

$$LFP^*_{it} = \beta_0 + \beta_1 X_{it} + \beta_2 Obese_{it} + \eta_{it},$$

where LFP^*_{it} is unobservable but $LFP_{it} = 1$ if $LFP^*_{it} > 0$,

$$S^*_{it} = \chi_0 + \chi_1 X_{it} + \chi_2 Obese_{it} + \mu_{it},$$

where S_{it}^* is unobservable but $S_{it} = 1$ if $S_{it}^* > 0$.

η_{it} and μ_{it} are assumed to be a zero-mean, constant variance random error terms that are not correlated with the explanatory variables. The wage equation (2) can be estimated by the Ordinary Least Squares (OLS) regression. We estimate the econometric models by gender because there are significant differences between men and women (Cawley, 2000a, 2004).

Our goal is to estimate consistent estimates of the econometric models discussed above. But the standard probit and OLS estimates will be bias if obesity (BMI) and the error terms η_{it}, μ_{it} and ε_{it} are correlated as reviewed in detail in Cawley (2004). Some of the reasons why obesity and employment, wages and sick-leave days are correlated, include: a) that unobservable individual effects, such as genetic and non genetic factors, included in the disturbance term, are correlated both with labor force participation (and wage and sick-leave days) and with the individual BMI; and b) potential reverse causality that obesity (BMI) affects labor force participation (and wages and sick-leave days) and that labor force participation (and wages and sick-leave days) affect obesity. For example, obesity may cause unemployment based on discrimination against the obese (Pagan and Davila, 1997), or based on believes of employer that the obese are less productive (Everett, 1990). On the other hand unemployment may cause obesity, because the unemployed individuals who have lower incomes are more likely to consume cheaper, fat-containing food (Cawley, 2004) and exercise less. Therefore, the standard Probit and OLS estimates will be biased by the endogeneity of obesity (BMI).

The previous studies (Cawley, 2004, Brunello and D'Hombres, 2007, Morris, 2007, Greve, 2009) have dealt with the endogeneity of obesity using the Instrumental Variable

(IV) models. In this approach we need to use instruments that are correlated with obesity but uncorrelated with labor market outcomes. However, the achievement of unbiased estimates with the IV method depends essentially on the predictive power and validity of instruments. If there is a weak correlation between instruments and obesity, or the instruments are correlated with labor market outcomes, then the IV estimates could still be biased. Therefore, some studies (Baum and Ford, 2004, Conley and Glauber, 2007) based on longitudinal data employ the fixed effects model, the most commonly used model that deals with unobservable individual heterogeneity. We will also estimate fixed effects models to control for potential unobservable heterogeneity bias.

Data and Sample

Data from the RLMS for 1994- 2005 period is used to investigate the impacts of obesity on employment and wages. The RLMS is a nationally representative household survey that annually (excluding 1997 and 1999) samples the population of dwelling units. The RLMS is based on multi-stage probability samples of the Russian population. The annual samples collect data for more than 4000 households and their members, who total more than 10,000 individuals each year. The collected data include a wide range of information concerning household characteristics such as demographic composition, income, and expenditures. Data on individuals includes employment details, anthropometric measures, health status, nutrition, alcohol consumption, and medical problems. The BMI index for each respondent is constructed from data on weight and height collected by trained personnel. Therefore, the BMI values are not based on self-reported weight and height, which may be reported with error. The wealth of relevant variables makes the RLMS appropriate for the purposes of this study. Our sample consists of all adult individuals of working age 18-65; any pregnant women at the time their weight is measured are deleted from the sample since their weight is affected by the current pregnancy. The sample includes 40082 (23358 females and 16724 males) individuals over 1994-2005 period, including 2559 in 1994, 2683 in 1995, 2918 in 1996, 3310 in 1998, 3766 in 2000, 4222 in 2001, 4593 in 2002, 4877 in 2003, 5254 in 2004, and 5900 in 2005. Table 1 presents the definitions and summary statistics for all variables used in the analysis.

Figure 1 shows the average BMI for the full sample and by gender. In the beginning of the period in 1994 the average BMI for the full sample was 26.22, with females having higher average BMI equal to 26.95. By the end of the period in 2005 the average BMI has slightly changed to 26.05, with a higher change for the males BMI which increased from 25.07 to 25.23 but the males' BMI is still smaller than the females' BMI of 26.05. This figure shows that both females and males had an average BMI that would be classified as overweight.

Figure 2 presents the pattern of obesity in Russia. The percent of obese people has slightly increased from 25 to 25.4 during the period of 1994 to 2005, while there is more significant increase in the percent of obese men from 13.2 percent in 1994 to 17 percent in 2005.

Figure 3 presents the average wage for the full sample, and obese and non-obese subsamples. The numbers indicate that real wage generally increases overtime and the wage for non-obese people was slightly higher in four out of ten years of data. An interesting pattern for the wage differentials for obese and non-obese individuals, by gender is presented in Figure 4. Males earn more than females. Obese males in Russia earn more than non-obese males with the exception of 1994 and 1998 when their wages were slightly lower; while for obese and non-obese females the wages are almost identical, only in 1994 and 1995 the obese females earned slightly higher wages.

Figures 5 and 6 present the employment and monthly hours work in Russia for the analyzed period from 1994 to 2005 by gender and by obesity status. More of the non-obese females are employed compared to the obese females, while more of the non-obese males were employed in 1995 to 2003. Obese females and males have higher monthly hours worked than their non-obese counterparts. And lastly, Figure 7 shows the number of monthly work days missed due to illness. There is no clear trend. Half of the period obese male had missed work due to illness with 16 days reported for 2005, while obese females had the most sick leave days in 1994 and 2002.

These simple descriptive statistics suggest that there is no noticeable wage penalty for obese people, even obese males earn more. However, to determine the causal effect of obesity on employment and wages, we estimate econometric models to control for various factors that might be correlated with obesity, employment, wages and sick leave days.

Results

Obesity and employment

The relationship between obesity and employment is estimated with a probability model (Probit) and Logit fixed effects model to correct for bias due to unobserved heterogeneity. Table 2 present the estimates from the Probit model of the impact of obesity on employment for men and women. The results from the standard Probit model for the whole sample indicate that obesity significantly reduces the probability of being employed by 2.1

percent. But when the model is estimated by gender the impact of obesity on employment is not significant anymore. The effects of the other variables included in the analysis are consistent with the literature, such as having a higher education, older children, being married male increase the probability of working, while having young children and being married female decreases the probability of working.

Next, we estimate the fixed effect logit model. The results presented in Table 3 indicate that being obese decreases significantly the probability of being employed for females but not for males. Therefore, the results suggest that there is no evidence that obese males are less likely to be employed. This result is consistent with Morris (2007) and Sousa (2005), who also find that obesity has a significant and negative effect on employment of females, and with Norton and Han (2008), who do not find statistically significant effect of obesity on employment of males.

Obesity and wages

The relationship between obesity (BMI) and wages is estimated with the OLS model and the fixed effects models, by gender. The results from the OLS estimation reported in Table 4 show that obesity has a positive and significant impact on wages for males and females in Russia. The wages for obese females are 5.3 percent higher, while the wages for obese males are 9.4 percent higher. This result is contrary to the findings in the studies for developed economies that find wage penalty for obese workers, but consistent with Morris (2007) and Sousa (2005) who find that BMI has a significantly positive effect on earnings for males. Because the log wage model potentially suffers from bias due to unobserved heterogeneity, we next re estimate it with the fixed effects estimator. The results are presented in Table 5. The coefficient on obesity is only significant for males and shows that the wages of obese males are higher by 10.3 percent.

Obesity and sick-leave

The relationship between obesity and sick-leave is estimated with both a Probit model and a Logit fixed effects model, by gender. The results from the Probit model reported in Table 6 show that being obese female will increase the probability of missing work due to health problems by 0.8 percent, while being an obese male would decrease the probability of missing work days by 0.9 percent. One reason could be that skinnier men in Russia could have other health (and drinking) problems. From the fixed effects model (results reported in Table 7) we do not find a significant impact of obesity on the probability of missing work due to illness.

Conclusion

This paper is focused on the impacts of obesity on employment, wages and sick-leave-days probability, by gender in Russia. Analyzing the relations between obesity and labor market outcomes is important for understanding the role that obesity may play in changing these outcomes.

The results from the estimated models provide no compelling evidence that obese males are less likely to be employed in Russia, while obese females are less likely to be employed. We did not find evidence of wage penalty for obesity, a result different from findings of some studies on developed market economies. In fact the wages for obese females and males are higher. However, being obese female increases the probability of missing work due to health problems, which is consistent with previous studies. We find also that being obese male will decrease the probability of missing work days.

The policy implications suggested by the findings of this study are to help formulate effective policies to improve incomes and the overall wellbeing of the citizens in Russia. The effects of obesity on labor market outcomes should also raise further attention to the increasing obesity.

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Table 1. Variable Definitions and Summary Statistics

Variable	Mean (SD)	Definition
Dependent Variables		
Employment LFP	0.772 (0.419)	Dummy variable equal to 1 if the individual is employed and 0 otherwise
Wage	2398 (2618)	Individual real monthly wage in Rubles (base 2000)
ln(wage)		Individual real monthly wage in logarithm
Sickdays	0.06 (0.237)	Dummy variable equal to 1 if the individual reports missed work for illness in the last 30 days
Explanatory Variables		
BMI	26.07 (4.978)	Individual weight divided by height squared (kg/m2)
Obese	0.2531 (0.434)	Dummy variable equal to 1 if the individuals BMI>30 and 0 otherwise
Age	39.95 (13.01)	Age in years
Age squared		Age in years squared
Male	0.417 (0.493)	Dummy variable equal to 1 if the individual is a male and 0 otherwise
Prime_Edu	0.015 (0.121)	Dummy variable equal to 1 if the individual has only completed primary school (up to 4 years) and 0 otherwise
Base_Edu	0.253 (0.435)	Dummy variable equal to 1 if the individual has base education or up to 8 years
High_Edu	0.574 (0.495)	Dummy variable equal to 1 if the individual has completed high school and 0 otherwise
Univ_Edu	0.172 (0.378)	Dummy variable equal to 1 if the individual has completed university education and 0 otherwise
Married	0.717 (0.450)	Dummy variable equal to 1 if the individual is married and 0 otherwise
HH_Size	3.52 (1.533)	Number of household members
Children6	0.310 (0.583)	Dummy variable equal to 1 if there are children 6 years or below in the household
Children18	0.592 (0.803)	Dummy variable equal to 1 if there are children above 6 years in the household
Assets		Sum of dummy variables for household assets such as tv, washing machine, car, dacha, etc.
Moscow-St Petersburg	0.025 (0.155)	Dummy variable equal to 1 if the individual resides in Moscow-St. Petersburg region and 0 otherwise
North and Northwest	0.056 (0.230)	Dummy variable equal to 1 if the individual resides in North and Northwest region and 0 otherwise
Central	0.185 (0.388)	Dummy variable equal to 1 if the individual resides in Central region and 0 otherwise
Volga region	0.211 (0.408)	Dummy variable equal to 1 if the individual resides in Volga region and 0 otherwise
North Caucasus	0.161 (0.368)	Dummy variable equal to 1 if the individual resides in North Caucasus region and 0 otherwise
Ural region	0.158 (0.364)	Dummy variable equal to 1 if the individual resides in Ural region and 0 otherwise
West Siberia	0.076 (0.264)	Dummy variable equal to 1 if the individual resides in West Siberia region and 0 otherwise
East Siberia	0.091 (0.288)	Dummy variable equal to 1 if the individual resides in East Siberia region and 0 otherwise

Table 2. Estimates of the probability of being employed

Variable	Dependent variable LFP; Marginal effect (SE)		
	All	**Female**	**Male**
Obese	-0.021 (0.005)***	0.007 (0.007)	0.002 (0.007)
Age	0.064 (0.001)***	0.082 (0.002)***	0.037 (0.001)***
Agesq	-0.001 (0.000)***	-0.001 (0.000)***	-0.001 (0.000)***
Univedu	0.116 (0.005)***	0.164 (0.007)***	0.065 (0.006)***
Highedu	0.016 (0.005)***	0.028 (0.008)***	0.012 (0.006)**
married	0.042 (0.005)***	-0.031 (0.007)***	0.146 (0.011)***
Hhsize	-0.099 (0.007)***	-0.133 (0.011)***	-0.066 (0.009)***
Children6	0.050 (0.018)**	-0.034 (0.027)***	0.152 (0.028)***
Children18	0.061 (0.014)***	0.032 (0.021)***	0.055 (0.019)***
assets	0.025 (0.001)***	0.022 (0.002)***	0.022 (0.002)***
North and Northwest	0.008(0.013)	-0.003(0.019)	0.011(0.015)
Central	-0.021(0.011)**	-0.041(0.015)**	0.0004(0.013)
Volga region	-0.053(0.011)***	-0.059(0.015)***	-0.049(0.014)***
North Caucasus	-0.133(0.012)***	-0.152(0.017)***	-0.111(0.017)***
Ural region	-0.020(0.011)*	-0.039(0.016)**	-0.002(0.013)
West Siberia	-0.079(0.013)***	-0.108(0.019)***	-0.050 (0.018)***
East Siberia	-0.015(0.012)	-0.048(0.018)**	0.014(0.013)
Pseudo R-squared	0.232	0.252	0.231
Number of observations	40082	23358	16724

* Significant at 10%, ** Significant at 5%;*** Significant at 1%

Table 3. Fixed effect logit estimates of the probability of being employed

Variable	Dependent variable LFP; Coefficient (SE)		
	All	**Females**	**Males**
Obese	-0.244 (0.092)**	-0.243 (0.109)**	-0.226(0.177)
Age	0.613 (0.023)***	0.615 (0.030)***	0.591(0.039)***
Agesq	-0.009 (0.000)***	-0.009(0.000)***	-0.009(0.0004)***
Univedu	1.105 (0.165)***	1.444 (0.222)***	0.647(0.255)**
Highedu	0.002 (0.091)	0.050(0.121)	-0.079(0.142)
married	-0.075 (0.094)	-0.349(0.114)***	0.597(0.182)***
Hhsize	-0.228 (0.129)*	-0.095(0.157)	-0.437(0.229)*
Children6	-0.674 (0.264)**	-0.963(0.313)***	-0.464(0.529)
Children18	-0.619 (0.206)***	-0.623(0.260)**	-0.934(0.356)**
assets	0.029 (0.026)	0.013(0.033)	0.059(0.043)
Pseudo R-squared	0.143	0.137	0.162
Number of observations	16035	10037	5997

* Significant at 10%, ** Significant at 5%;*** Significant at 1%

Table 4. OLS estimates for the wage equation.

Variable	Dependent variable Ln wage; Coefficient (SE)		
	All	**Female**	**Male**
Obese	-0.022 (0.014)	0.053 (0.017)***	0.094 (0.024)***
Age	0.049 (0.004)***	0.066 (0.005)***	0.033 (0.006)***
Agesq	-0.001 (0.000)***	-0.001 (0.000)***	-0.001 (0.000)***
Univedu	0.278 (0.018)***	0.365 (0.023)***	0.337 (0.027)***
Highedu	-0.002 (0.015)	0.042 (0.019)**	0.034 (0.021)
married	0.029 (0.015)*	-0.168 (0.017)***	0.138 (0.029)***
Hhsize	-0.222 (0.024)***	-0.239 (0.029)***	-0.242 (0.037)***
Children6	-0.096 (0.053)*	-0.583 (0.068)***	0.251 (0.081)***
Children18	-0.129 (0.038)**	-0.138 (0.046)***	0.009 (0.063)
assets	0.178 (0.005)***	0.159 (0.006)***	0.182 (0.008)***
North and Northwest	-0.215 (0.032)***	-0.254 (0.039)***	-0.178 (0.049)***
Central	-0.642 (0.025)***	-0.646 (0.030)***	-0.652 (0.038)***
Volga region	-0.779 (0.025)***	-0.754 (0.030)***	-0.826 (0.039)***
North Caucasus	-0.723 (0.028)***	-0.710 (0.034)***	-0.776 (0.042)***
Ural region	-0.632 (0.026)***	-0.617 (0.031)***	-0.648 (0.039)***
West Siberia	-0.852 (0.032)***	-0.771 (0.039)***	-0.951 (0.049)***
East Siberia	-0.561 (0.029)***	-0.497 (0.036)***	-0.677 (0.043)***
Constant	6.712 (0.086)***	6.331 (0.106)***	7.219 (0.130)***
Adj R-squared	0.151	0.185	0.171
Number of observations	21226	11932	9294

* Significant at 10%, ** Significant at 5%;*** Significant at 1%

Table 5. Fixed effect estimates of the wage

Variable	Dependent variable ln wage; Coefficient (SE)		
	All	**Females**	**Males**
Obese	0.53 (0.022)**	0.022(0.027)	0.103(0.36)**
Age	0.158 (0.007)***	0.156(0.009)***	0.154(0.011)***
Agesq	-0.001 (0.000)***	-0.001(0.0001)***	-0.001(0.0001)***
Univedu	0.113 (0.43)**	0.121(0.056)**	0.108(0.066)*
Highedu	0.016 (0.023)	0.011(0.034)	0.017(0.032)
married	-0.020 (0.024)	-0.067(0.028)**	0.071(0.048)
Hhsize	-0.109 (0.033)***	-0.089(0.043)**	-0.122(0.51)**
Children6	-0.123 (0.063)**	-0.511(0.084)***	0.239(0.097)**
Children18	0.075 (0.048)*	-0.012(0.057)	0.143(0.076)*
assets	0.019 (0.007)**	0.008(0.009)	0.032(0.011)***
Constant	3.334(0.148)***	3.231(0.199)***	3.623(0.223)***
R-squared	0.107	0.120	0.100
Number of observations	21226	11932	9294

* Significant at 10%, ** Significant at 5%;*** Significant at 1%

Table 6. Estimates of probability of missing work due to health reasons

Variable	Dependent variable: Sick leave days; Marginal effect (SE)		
	All	**Females**	**Males**
Obese	0.001 (0.003)	0.008 (0.004)***	-0.009 (0.005)*
Age	0.002 (0.001)***	0.004 (0.001)***	-0.001 (0.001)
Agesq	-0.000 (0.000)***	-0.000 (0.000)***	-0.000 (0.000)
Univedu	0.009 (0.004)**	0.015 (0.005)***	-0.0001 (0.006)
Highedu	0.004 (0.003)	0.006 (0.004)*	0.0004 (0.004)
married	0.003 (0.003)	-0.007 (0.004)*	0.021 (0.005)***
Hhsize	-0.031 (0.004)***	-0.031 (0.004)***	-0.028 (0.008)***
Children6	-0.019 (0.010)*	-0.030 (0.013)**	-0.022 (0.017)
Children18	0.011 (0.008)	0.002 (0.009)	0.011 (0.013)
assets	0.003 (0.001)***	0.003 (0.001)**	0.004 (0.001)**
North and Northwest	0.004 (0.007)	-0.001 (0.008)	0.008 (0.011)
Central	-0.001 (0.005)	-0.001 (0.006)	-0.001 (0.008)
Volga region	-0.011 (0.005)**	-0.012 (0.006)**	-0.009 (0.008)
North Caucasus	-0.021 (0.004)***	-0.022 (0.005)***	-0.019 (0.007)**
Ural region	-0.006 (0.005)	-0.005 (0.006)	-0.007 (0.008)
West Siberia	-0.009 (0.005)*	-0.007 (0.007)	-0.014 (0.008)
East Siberia	-0.005 (0.005)	-0.004 (0.007)	-0.007 (0.008)
Pseudo R-squared	0.018	0.028	0.013
Number of observations	40082	23358	16724

* Significant at 10%, ** Significant at 5%;*** Significant at 1%

Table 7. Fixed effect logit estimates of the probability of missing work days due to health reasons

Variable	Dependent variable Sick leave days; Coefficient (SE)		
	All	**Females**	**Males**
Obese	-0.059(0.108)	-0.039(0.133)	-0.093(0.184)
Age	0.013(0.029)	0.048(0.041)	-0.028(0.045)
Agesq	-0.001(0.000)***	-0.001(0.0005)***	-0.0005(0.0005)
Univedu	-0.229(0.188)	-0.324(0.248)	-0.036(0.295)
Highedu	-0.013(0.112)	0.081(0.161)	-0.084(0.156)
Married	-0.024(106)	-0.008(0.128)	-0.062(0.199)
Hhsize	-0.576(0.156)***	-0.571(0.204)**	-0.588(0.247)**
Children6	-0.651(0.293)**	-0.729(0.379)*	-0.534(0.475)
Children18	-0.370(0.221)*	-0.202(0.283)	-0.626(0.361)*
Assets	0.028(0.034)	0.016(0.045)	0.039(0.052)
Pseudo R-squared	0.015	0.017	0.013
Number of observations	12752	7425	5326

* Significant at 10%, ** Significant at 5%;*** Significant at 1%

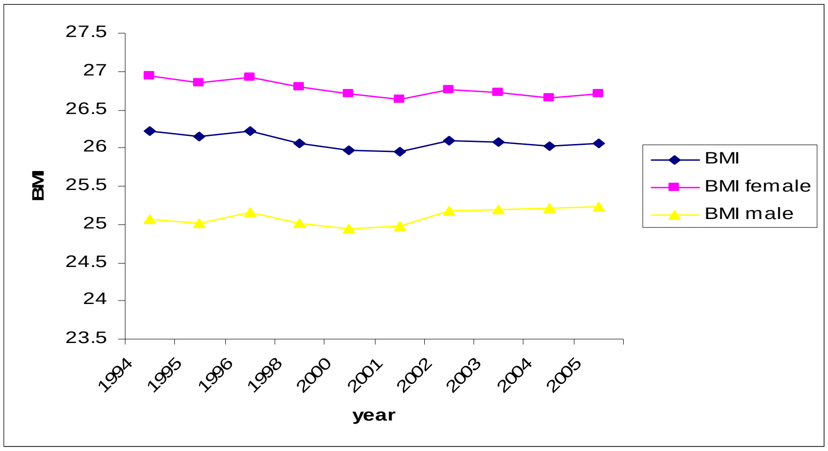

Figure 1. BMI by gender in Russia, 1994-2005

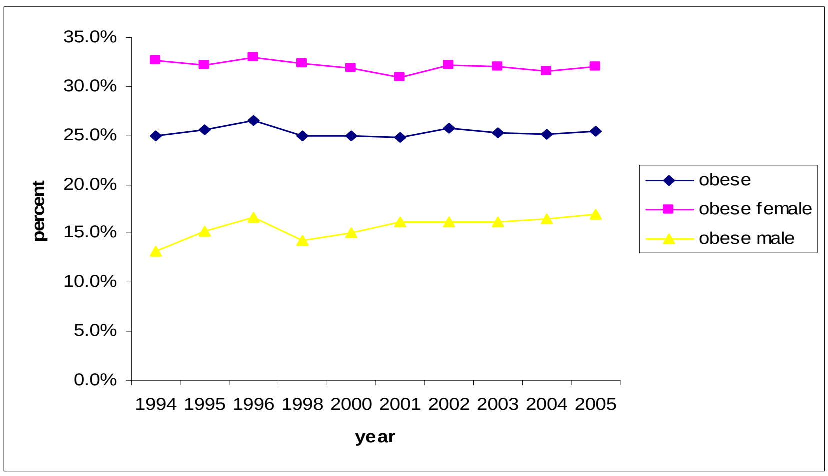

Figure 2. Obesity by gender in Russia, 1994-2005

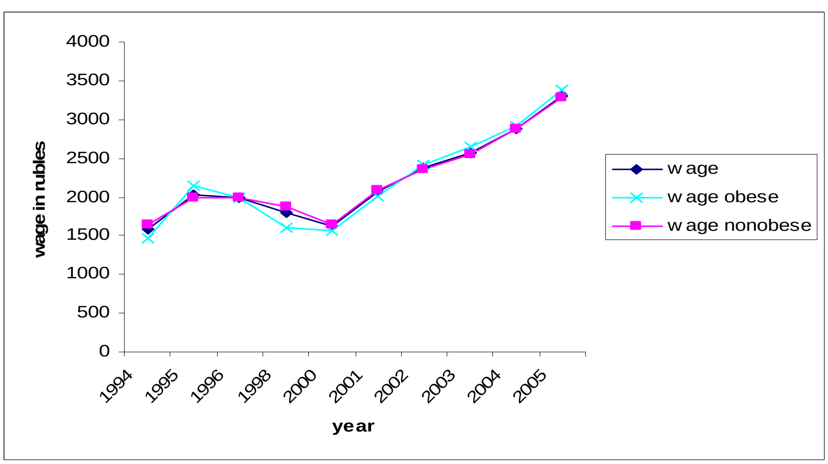

Figure 3. Wage by obesity status in Russia 1994-2005

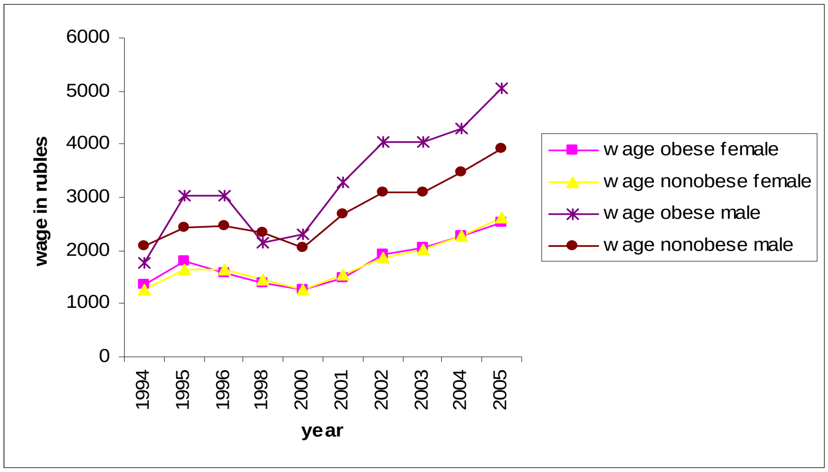

Figure 4. Real monthly wages in Russia by gender and obesity, 1994-2005

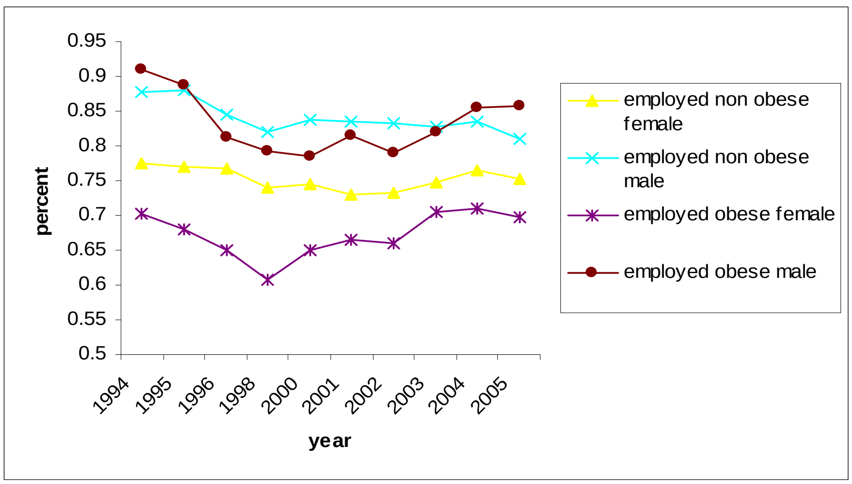

Figure 5. Employment by gender and obesity in Russia, 1994-2005

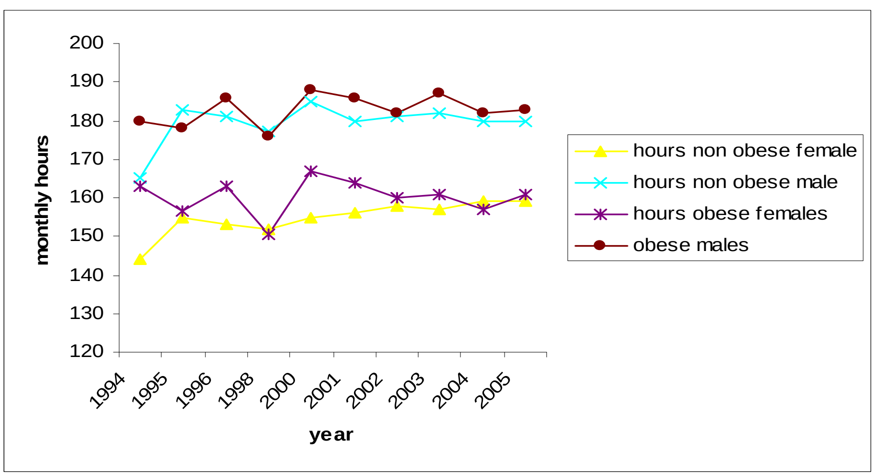

Figure 6. Monthly work hours by gender and obesity in Russia, 1994-2005

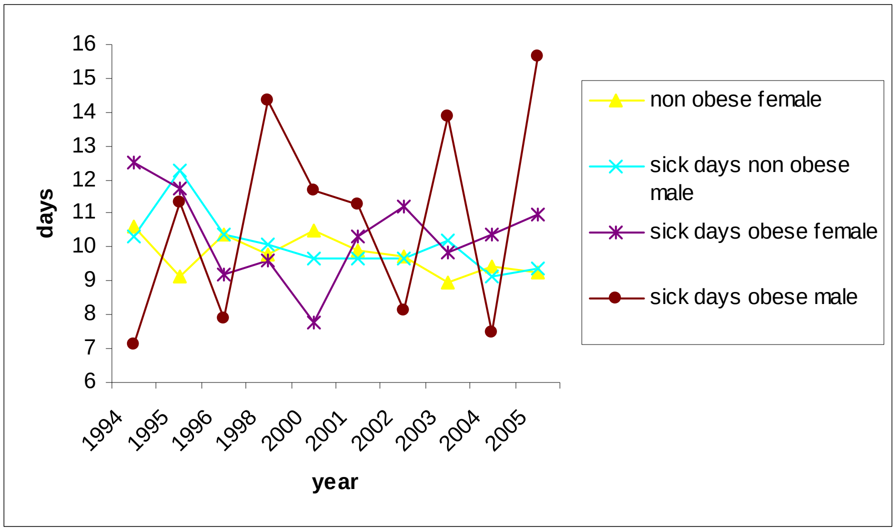

Figure 7. Number of monthly sick days by gender and obesity in Russia, 1994-2005.