

Relation of Overweight and Obesity with Demographic and Behavioral Factors

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Summary

Overweight and obesity are risk factors for chronic diseases, among them diabetes, cardiovascular diseases, cancer, etc. There are many factors that influence development of obesity and overweight, among them demographic and social data, genetics, lifestyle. The objective of our study is to determine the correlation of overweight and obesity with demographic data, social and behavioural factors, in Georgian population for males and females in the age group 18-64. The source of research was the database for non-communicable diseases risk factor prevalence in Georgia conducted in 2010-2011; Representative samples of adults aged 18-64 years had been analysed 6469 persons (4453 women and 1840 men) in a whole. BMI (kg/m²) was dependent variables in separate multiple linear regression models for which predictors were identified 1. Demographic and social factors - sex, age, education, marital status, working status 2. Behavioural factors: Daily physical activity, alcohol consumption rate during last month, number of meal servings during the day (1,2,3,4), smoking status. As the method of analyses also were used Chi-square test to compare the groups according to BMI and calculation of odds ratios. Lifestyle, dietary behaviour, social status, and other socio-demographic factors affect BMI differently. Age has the strong impact on the likelihood of overweight and obesity. Exercise reduces the probabilities of being overweight and obese and the level of BMI among overweight individuals. Depending on the results of the study health education programs can be targeted at individuals susceptible to overweight and obesity also useful recommendations maybe outlined according to sex, marital status, age, etc.

Abbreviation: BMI– Body Mass Index.

Key words: Lifestyle, demographic and behavioral factors, obesity, overweight, regression model, Georgia.

Problems statement

Obesity and overweight are among the major public health issue in developing and developed countries. Individuals who are affected by overweight and obesity are at increased risks for different diseases, including hypertension, hypercholesterolemia, diabetes, coronary heart disease, stroke, cancer, poor reproductive health, and psychological problems such as depression and eating disorders (James, W. P. T. 1995).

According to evolutionary history people always struggled to procure food, but situation significantly changed recently as they don't need much efforts to gain the food. Accordingly overweight, obesity and physical inactivity became the common problem of society (Kushner, R. F. & Foster, G. D. 2000).

Different studies had been conducted that showed the positive relationship of overweight and chronic diseases, also the inefficacy of diets. In USA this is the big problem as despite of high expenses that are aimed to lowering overweight and obesity, the prevalence of those conditions dramatically increased (Willett, W. c.2002).

Obesity maybe caused by genetic disorders, though mostly it's caused by unhealthy dietary habits and physical inac-

tivity.

The major determinant of obesity and overweight is BMI (weight/height²). Normal BMI is between 18.5 and 25, Overweight is from 25 to 29.9. Obesity exist when BMI is more than 30.

Obesity prevalence varies according to different factors, i.e.: Sex, Race, age, social and economic conditions, etc. Socioeconomic status influence the prevalence of obesity and overweight. Less educated population is more obese than educated ones, especially women. Such difference was not observed in men population (Hermann S, 2011).

Obesity prevalence is also influenced by the race, as black women are more obese compared with whites, that is also linked with greater prevalence of diabetes in this population (Seidell, J. c. & Flegal, K. M. 1997).

The scientists distinguish different type of fat distribution on the body, i.e. apple-shaped and pear-shaped people. Health risks are greater in apple shaped people. Such distribution is mostly present in men. The measure of fat distribution is waist/ hip ratio. The health risks increase when WHR is more than 1 in men and more than 0.8 in women (Ross, R., Shaw, K. D., 2001).

Obesity is present also among the children and is increasing in alarming rate. The NHANES survey determined that obesity prevalence has increased from 5 to 15 % since 2000 in children. The prevalence is different according to ethnicity, composing 27 % of Mexican boys and 25 % of black girls (Flegal KM, 2010).

The main cause of obesity is unhealthy diet and physical inactivity. More efforts are made to change the unhealthy eating patterns of population (Tohill BC, Seymour J, Serdula M, *et al.*: 2004) The food pyramid has been implemented to promote healthy eating habits in humans. The pyramid contains the twelve version for the people of different age, sex, race, ethnicity, activity level, so that people can choose their appropriate option.

According to dietary surveys, population begun to consume the recommended products but not in sufficient amount (appropriate number of servings during the day). They do not usually eat fresh fruit and vegetables, but instead canned and iced products. The paradox is that African Americans who used to eat healthy food, became adopted to fast food that has been associated with higher income (Tohill et. Al 2004).

Influencing the person's eating habits during childhood may prevent from developing obesity during adulthood (Edmunds L., Waters, E. & Elliott, E. J. 2001).

According to the report of Institute of Medicine, the federal, state and local government should participate in the programs for obesity prevalence reduction to make them successful. The recommendations include creating and implementing healthy eating standards at schools, also working out educational programs about the harm of junk foods.

Aim of Research

Existing study is aimed to analyze the effects of socio-demographic and lifestyle variables on body weight. The theoretical literature confirms that different factors such as sex, age, marital status, educational level, working status , alcohol and tobacco usage, also level of physical activity and amount of daily meal courses greatly affect BMI changes.

This study addresses the differentiated effects of socio-demographic and lifestyle variables on BMI. We examine the effects of socio-demographic and lifestyle variables on body weight by using quantitative methods of the analyses. These estimates allow testing of the hypothesis that the relationship between obesity and the underlying factors varies in different extent.

Target groups and methodology of research

Data had been drawn from STEPS 2010- 2011 database (stepwise approach to surveillance) , spread of non-communicable disease risk- factors in Georgia, which collected information about socio-demographic, behavioural, anthropometric, biochemical measurements for Georgian population. Our sample included 6469 adults aged ≥ 18 . Had been conducted secondary analyses of the provided data.

The WHO STEP wise approach to Surveillance (STEPS) is a simple, standardized method for collecting, analysing and disseminating data in WHO member countries. By using the same standardized questions and protocols, all countries can use STEPS information not only for monitoring within-country trends, but also for making comparisons across countries. The approach encourages the collection of small amounts of useful information on a regular and continuing basis. The STEPS Instrument covers three different levels of "steps" of risk factor assessment. These steps are:: Questionnaire, Physical measurements, Biochemical measurements.

In our study data analyses had been conducted with the method of quantitative research, i.e. Chi-square test and regression analyses. Regression analysis is a statistical tool for the investigation of relationships between variables. To seek the causal effect of one variable upon another. In such analyses also typically is assessed the "statistical significance" of the estimated relationships, that is, the degree of confidence that the true relationship is close to the estimated relationship. We used multiple regression tool as it is valuable for quantifying the impact of various simultaneous influences upon a single dependent variable. Further, because of omitted variables bias with simple regression, multiple regression is often essential even when one is only interested in the effects of one of the independent variables (Astrid Schneider, Gerhard Hommel, Maria Blettner 2010).

Multiple regression tool had been used in our study to investigate the relation between dependent variable BMI and independent variables . The dependent variable, BMI, is determined as self-reported weight (in kilograms) divided by the square of self-reported height (in meters). Independent variables had been divided into two groups, i.e. demographic and behavioral factors. In the analyses with demographic information had been included the following determinants: sex, education, age, marital status, working status for last 12 months.

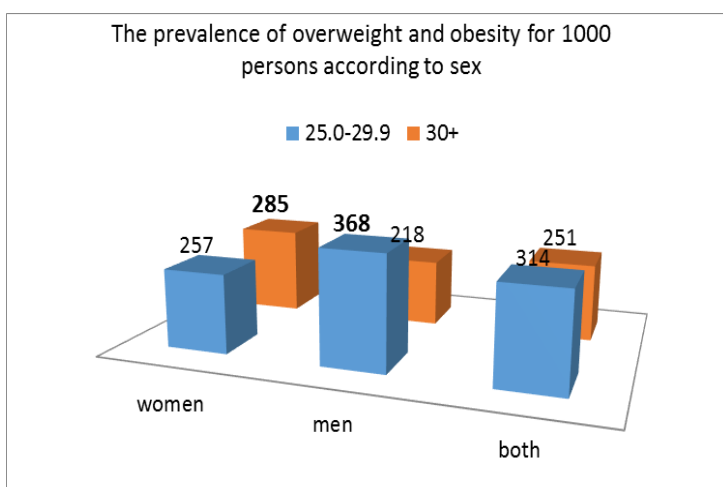
In the analyses with behavioural risk-factors had been analysed the following: daily physical activity (minimum 10 minutes), amount of daily meal course, tobacco usage, alcohol consumption for the last 12 months.

T-test method had been used to analyse the difference of BMI between groups.

Results of the research

Among 6293 persons (4453 women and 1840 men) for whom information about BMI was available had been determined that overweight (BMI 25 – 29.9) prevalence per 1,000 people in both sexes is 314. Overweight prevalence per 1,000 women is 257 and for men 368. The obesity prevalence (BMI 30+) per 1,000 people is 251, while for women is 285 and men 218. The prevalence of overweight is more in men, but obesity in women.

Illustration 1. The prevalence of overweight and obesity per 1,000 persons according to sex



In the regression analyses with demographic data, had been included several groups for each independent variables.

According to marital status: 1. Not married, 2. Married, 3. Living separately, 4. Divorced, 5, widow. According to education level : 1. No education, 2. Primary incomplete 3. Primary complete 4. Incomplete secondary, 5. Complete secondary 6. University degree.

According to working status: 1. Government worker, 2. Non- government employee 3. Self-employee 4. Uncompensated 5. Student 6. Housewife 7. Pensioner 8. Unemployed.

The analyses had been performed via SPSS using multiple regression method.

Strongest relation had been found between age and body mass index that means that among the demographic factors age is the strongest determinant of BMI change , i.e. with increase of age body mass index value

also increases. This correlation is statistically significant. According to analyses, sex is not determinant of BMI changes, the relation had not been found to be statistically significant. It's more realistic that sex only is not the determinant of development of obesity, but other factors in line with it should be foreseen during the analyses.

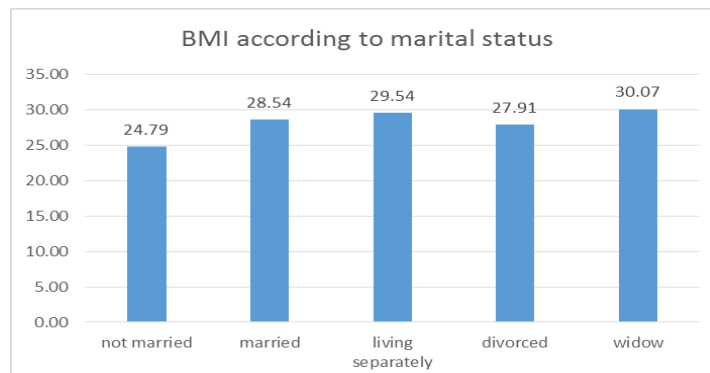
Table 1. Demographic factors (list of dependent variables)

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 (Constant)	30.300	.230		131.839	
age_18_24	-5.693	.559	-.146	-10.185	.000
age_25_34	-3.950	.428	-.119	-9.220	.000
age_35_44	-1.658	.386	-.055	-4.293	.000
Marital status	-1.419	.441	-.045	-3.220	.001
Educational level	-.677	.302	-.028	-2.238	.025
Sex	-.490	.331	-.019	-1.481	.139
Working status	-.666	.375	-.023	-1.777	.076

Independent variable BMI

The correlation between marital status and BMI is statistically significant. According to the results gained via T-Test analyses, the lowest BMI had been observed in unmarried individuals and increased in married persons. Though, recommendations maybe outlined for married couples to follow regular eating habits (i.e. 3 -4 meal courses per day approximately the same time of the day) and not to cease physical activity after marriage. BMI lowered again in divorced individuals.

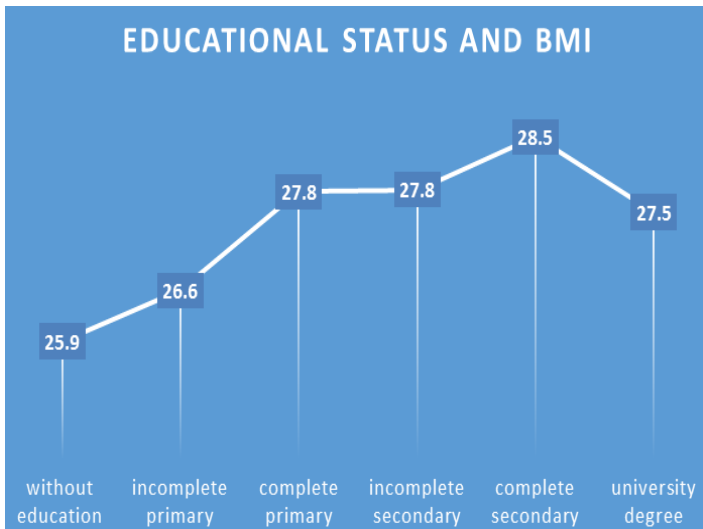
Illustration 2. BMI according to marital status



Statistically significant relation had not been found between working status and BMI. As for educational level the relation is statistically significant and education level maybe the determinant of obesity development.

Though in the analyses of educational groups with T-test , the highest value was found for individuals with complete secondary and the lowest for people with no education. Accordingly all individuals, despite of their educational level need information and training for maintaining healthy eating habits and physical activity skills.

Illustration 3. BMI according to educational status



On the basis of results described above, several recommendations were worked out:

- To avoid intake of high calorie food with increasing of age
- To control BMI value after marriage as it's obvious the tendency of weight gain after marriage
- To create guidelines for maintaining of healthy eating habits and promoting physical activity that will be comprehensible for individuals with any educational level.

Multiple regression method had been used to determine correlation between behavioral risk-factors and BMI. The following variables were included in the analyses: daily physical activity (minimum 10 minutes), amount of daily meal course, tobacco usage, alcohol consumption for the last 12 months.

Table 2. Multiple regression analyses (behavioural factors).

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 (Constant)	27.97	1.06		26.42	.000
Daily 10 minute physical activity	-.823	.401	-.035	-2.05	.041
Meal course_1_3	.26	.36	.013	.72	.472
Meal course_5_6	1.72	.71	.042	2.43	.015
Tobacco	-1.40	.41	-.063	-3.45	.001
Alcohol consumption	.16	.22	.013	.74	.461

Independent variable BMI

The strongest correlation had been revealed between tobacco usage and BMI and this correlation is statistically sig-

nificant. The more tobacco usage is associated with lower value of BMI, though tobacco usage should not be promoted due to its negative influences on various health parameters.

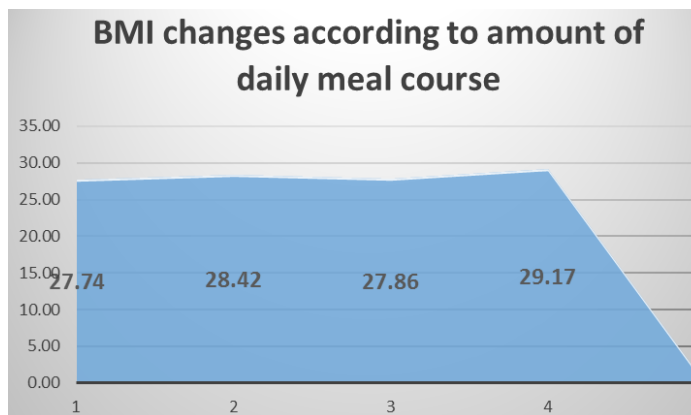
Table 3. BMI distribution according to tobacco usage The weak positive correlation had been found between daily meal courses and BMI changes, furthermore, according

Tobacco usage	Mean BMI	N	Standard deviation
yes	26.79	1181	8.09
no	28.41	5221	12.29
total	28.11	6402	11.64

to literature, the normal BMI value is maintained if meal courses are taken at the same time and approximately the same amount during the day. Accordingly, while providing the recommendations about healthy eating habits should be outlined the stable regimen of food intake.

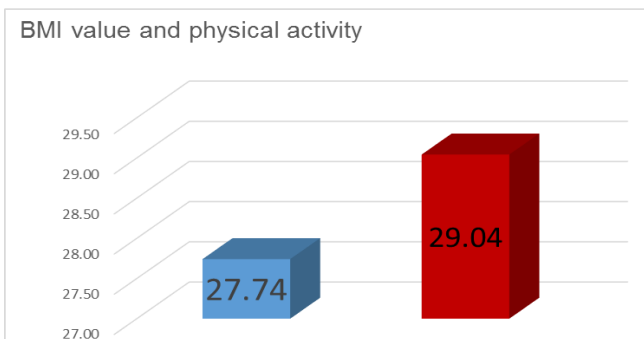
Illustration 4. Daily servings and BMI

Daily 10 minute physical activity also influences BMI, i.e. in persons who undertake daily 10 minute walk-



ing or any other type of physical activity BMI is less than in individuals who are not dealing with such activity at all. So, promotion of physical activity is also important part of maintaining normal BMI.

Illustration 5. BMI value according to daily physical activity



Conclusions:

1. Prevalence of overweight (BMI 25.0-29.9) for 1000 people in both sexes is 314. That for obesity (BMI 30+) is 251. The prevalence of overweight is more in men (368‰), but obesity in women (285‰);
2. The overweight and obesity prevalence increases with age and the peak is reached for age 45-54 and 55-64. In age group 45-54 obesity and overweight is more prevalent in men (860‰) and in age group 55-64 more prevalent in women (925‰), accordingly the tendency for weight gain in men begins earlier;
3. Higher BMI value is related to certain social and demographic factors. In persons with postgraduate education BMI value is 1 kg/m² less compared with people with secondary education. High values of BMI had been identified in married couples (28.5) , people who live separately (29.5) and widows (30.1);
4. Higher BMI value is related to certain behavioural factors. In the case of daily meal course amount 4 – BMI value was 29.2 and it was higher compared with meal ingestion 3 times daily (BMI value more for 1.3 kg/m²). BMI is related to frequency of meat ingestion (t=3.4), vegetable consumption (t=2.8) , fast food usage (t= 3.0), tobacco usage (t=-3.5) and physical activity (t=-2.0);
5. The negative correlation had been found between BMI value and physical activity, i.e. more time is spent on physical activity the lower is BMI value. In persons who underwent at least 10 minute daily activity the mean BMI value was 27.7 and it was 1.3 kg/m² less compared with persons without any physical activity.

Recommendations:

On the basis of research results had been worked out following recommendations:

1. From the purposes of disease prevention and increasing life expectancy Georgian population need to control their BMI value, refuse from high calorie food intake, increase physical activity and maintain energetic balance;
2. BMI value monitoring is necessary for the groups who have tendency of developing overweight and obesity, such as age 50 or more, married and separately living couples, housewives, persons who uses fast food frequently, also persons with different diseases in anamnesis and heredity (i.e. diabetes mellitus, high arterial pressure, stroke);
3. To control BMI value after marriage as it's obvious the tendency of weight gain after marriage.

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