

# The Impact of Obesity Rates on Health Expenditure in China

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## Abstract

Obesity is a severe health status that might cause serious adverse effects on human health. Cardiovascular disease, hypertension, stroke, and diabetes are a small number of diseases that obese people might have to deal with due to excessive body fat levels. People, therefore, might face the unpreventable burden of possible health expenditures. China is one of the countries facing increasing both obesity rates and health expenditure over the years. This paper aims to analyse the relationship between obesity rates and health expenditure in China for the years between 1978 and 2015. We estimated a simple linear regression model by using ordinary least squares to find out if obesity rates have any impact on health expenditure in China for the given period. We used total health expenditure as a percentage of the gross domestic product as the dependent variable, while the obesity rate is the independent variable. The results show that health expenditure rises with increasing obesity rates in China from 1978 to 2015.

## 1 Introduction

Obesity is mainly considered to be a public health concern that may cause morbid or mortal outcomes for individuals. World Health Organization defines obesity as a state of having a body mass index (BMI) of 30 and over (WHO, 2022). BMI is calculated by dividing an individual's weight in kilograms into the square of his height in meters (WHO, 2022).

BMI is categorised into four groups. From 18.5 to 24.9, people are defined as healthy; from 25 to 29.9 is overweight, from 30 to 39.9 is obese and 40 or above is severely obese. A high BMI level generally results from excess energy not being burnt off through physical activity.

Obesity is generally associated to eating habits and daily life routines of individuals. The main reason of being obese is defined as an imbalance between energy intake and energy expenditure resulting an excess energy in human body (Minos, et al., 2016). Taking into account the importance of income on eating behaviour, eating habits are commonly defined as the result of rational behaviours of individuals that may be led by any changes in costs (McCarthy, 2004). Changing eating habits into unhealthy diets such as fast food, having sedentary lifestyle, living a stressed life etc. might trigger people to gain weight. Therefore, obesity might be an inevitable outcome of people's new lifestyle compared to previous generations that had relatively healthy and low level of obesity rates. According to WHO, obesity rates around the world has almost tripled since 1975. The upward trend in obesity rates unfortunately bring about severe health problems. National Health Services (NHS) in England (2019) reported that obesity causes type 2 diabetes, cardiovascular diseases, breast cancer, bowel cancer and stroke along with mental disorders such as depression and low self- esteem (NHS, 2022).

The severe damage of obesity on human body has noticeable consequences in both social and economic life. Obese people are likely to remain unemployed, have significant health issues, live a less active social life etc. Besides its negative social outcomes of being obese, the adverse economic impacts of obesity have also significant effects on people's lives. The costs of health problems caused by obesity might rise the health expenditures of obese people. There might be a significant difference between the health expenditures of an obese person and a healthy individual. Because the obesity might lead various morbid risks for human health, the following diseases along with obesity might cause people to spend more money to become well again and get back to their health.

China is one of the countries with high level of obesity rates and having an increasing trend in the number of obese people. Due to its medical consequences, obesity might trigger health expenditures to rise over the years in China. This study aims to examine the relationship between the obesity rates and the health expenditures in China from 1978 to 2015.

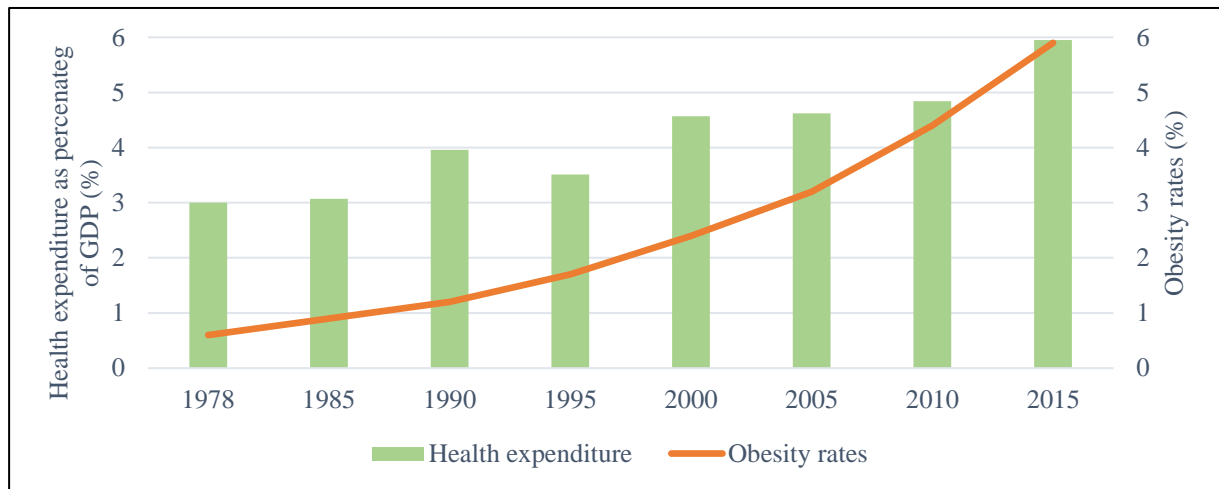
## 2 An Overview of Health Expenditures and Obesity Rates in China

Obesity has been one of the important morbid risks for human health worldwide, China in particular. China has been facing a remarkable upward trajectory in obesity rates over the years. With population almost 1.5 billion, low level of obesity rates in number compared to other countries do not show that Chinese people do not suffer from being obese. Regarding its large amount of population, by 2015, approximately 240 million people was obese in China.

Obesity is considered for people as a severe health status needed to be avoided due to its high risks in causing various morbid and mortal consequences.

Obesity might cause several physical and mental diseases. The alarming increase in the prevalence of obesity in China might point to possible health issues relating to high amount of body fat. NHS in England declare that obesity might cause potentially life- threatening conditions such as type 2 diabetes, coronary heart diseases, cancer

and stroke as physical damages besides its mental consequences might also be affected by having high level of body resulting depression and low self-esteem.



**Figure 1.** Health expenditure and Obesity rates in China, 1975- 2015 **Source:** China Statistical Yearbook, 2019; World Bank, 2022

### 3 Data, Model, and Methodology

This study investigates the relationship between health expenditures and obesity rates assuming that obesity rates might positively affect health expenditures in China. Because the health expenditure data is only available from 1978 to 2015, the research covers the data from 1978 to 2015. Obesity (OB) data is obtained from the World Health Organization Global Health Observatory database; health expenditure data is obtained from China Statistical Yearbook, and GDP annual growth rate data is obtained from the World Bank database. We used the prevalence of obesity among adults with BMI equal to and higher than 30, the age-standardized estimate. The relationship between obesity rates and health expenditure is analysed using the linear regression model. The function of the model is defined as follows: health expenditure as a percentage of gross domestic product (GDP) is the dependent variable and obesity rates is the explanatory variable of the model to be estimated.

$$HE = f(Obesity) \quad (1)$$

The model to be estimated for the function is as follows:

$$HE_t = \beta_0 + \beta_1 OB_t + \varepsilon_t \quad (2)$$

In equation (2),  $\beta_1$  stands for the coefficient of the obesity rate for adults 18 and above in China.

### 4 Empirical Results

First, we tested the dependence between the cross sections. As the cross-section dependence test hypothesises no dependence, the null hypothesis is rejected because the results show that there is a cross section dependence between the cross sections in the sample. Secondly, we test if the variables are unit root using second generation unit root tests. According to the results, health expenditure as a percentage of GDP is stationary at level but obesity is stationary at first difference. Therefore, we used the first- difference of the obesity rates as dependent variable in the estimation. We estimated Ordinary Least Square (OLS) to find out if there is a relationship between the health expenditure and obesity in China. The model to be estimated is as follows:

$$OB_t = \beta_0 + \beta_1 H_t + \varepsilon_t$$

We expect that the estimated coefficient  $b_1 > 0$  since health expenditures would rise as obesity increases regarding the health problems that obesity might cause. According to the OLS results, obesity rates have positive impacts on health expenditure. Therefore, the results show that health expenditure would rise if obesity rates rose in China between 1978 and 2015.

Variable	Result
Obesity rates	6.3840* (0.7313)
Constant term (c)	3.2266* (0.1278)
Sample	37
R square	0.6763
Statistical significance *p value < 0.01	

**Table 1.** OLS test results

## 5 Conclusion

This study analysed the relationship between obesity rates and health expenditure in China from 1978 to 2015. We estimated OLS method using a simple linear regression model. We firstly applied second generation unit root test to check the stationarity of the series. Later, we used OLS method to detect if the obesity rates have impacts on health expenditure using a simple linear regression model with one explanatory variable, health expenditure. According to the findings, we found out that obesity rates positively affect the health expenditure in China from 1978 to 2015.

We obtained a remarkable outcome suggesting an increase in obesity rates would cause a significant rise in health expenditure in China. The literature on the adverse effects of obesity on public health also state that health expenditures of the countries inevitably rise due to obesity related health problems. Buchmueller and Johar (2015) found out that obesity have negative impacts on health expenditure in Australia through causing chronic diseases and the costs of recovery from health problems to rise (Buchmueller and Johar, 2015). Ward et al (2021) also obtained a result that health care costs are relatively higher for severely obese people (Ward et al., 2021). Karamelikli and Gül (2022) found an inverse relationship between obesity and health expenditure in the short-term suggesting that the negative effects of obesity in the health expenditure would be only significant in the long term (Karamelikli and Gül, 2022).

Obesity is a severe health status that might negatively affects public health. Even though we obtained a positive relationship between obesity and health expenditure in China referring the health risks that obesity might cause, it yet does not fulfil the need of investigating the share of direct costs of health risks caused by obesity in the health expenditures in China. However, obesity might cause health expenditure to rise, there might be other medical or economic determinants for people to have health issues. Therefore, further studies should examine the obesity related diseases in micro basis analyses in order analyse whether a health problem is led by obesity or not.

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