E-ISSN: 2792-0739

JOURNAL OF SOCIAL AND ANALYTICAL HEALTH

www.jsoah.com

J Soc Anal Health, 2022, 2(1): 48-55

Research Article / Araştırma

Potential demand for obesity surgery: Findings from Turkish health survey

Obezite cerrahisine yönelik potansiyel talep: Türkiye sağlık araştırmasından bulgular

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ABSTRACT

Objective: The main objective of this study is to identify potential demand for obesity surgery funded by public and private health insurance in Turkey. **Method**: Negative Binomial Regression (NBR) analysis was used to answer the question of "Do age, gender, being under the umbrella of social security, having an illness in the last 6 months and being included in one of the obesity groups affect the number of health services received?". The NBR model, used when the dependent variable has a counting number, is a technique that works better than Poisson regression if the data has excessive distribution. In addition, the number of services received was subjected to analysis of differences according to subcategories of independent variables. The variables used in the analysis were obtained from the "Turkey Statistical Institute (TURKSTAT) - TÜİK Health Survey" micro dataset for 2016 and 2019. **Results**: Variables that positively affect the number of health services received are included in Class 1, Class 2, Class 3 obesity group and are gender, having social security, having illness in the last 6 months and diabetes ($p<0,05$). The presence of diabetes in a person increases the number of services receiving 1.42 times, being a woman 1.49 times, having any illness in the last six months 2.04 times and having a social security umbrella 1.14 times. Also, being in the Class I group affects the number of services receiving 1.28 times, Class II affects 1.57 times and Class III affects 1.93 times. **Conclusion**: When only 5% of Turkish adults, who are estimated to be suitable for bariatric surgery, want to be treated, the health system will be unable to respond to demand. There needs to be better guidance on patient prioritization and more resources for public surgical planning.

ÖZ

Amaç. Bu çalışmanın temel amacı, Türkiye'de kamu ve özel sağlık sigortası tarafından finanse edilen obezite cerrahisine yönelik potansiyel talebi belirlemektir. **Yöntem**: Yaş, cinsiyet, sosyal güvenlik şemsiyesi altında bulunmak, son 6 ayda hastalık geçirmek ve obezite gruplarından birine dahil olmak alınan sağlık hizmet sayısını etkilemekte midir? sorusuna cevap verebilmek için Negatif Binomial Regresyon (NBR) analizi kullanılmıştır. Bağımlı değişkenin sayma sayısı olduğunda kullanılan NBR modeli, verilerin aşırı dağılıma sahip olması durumunda Poisson regreyona göre daha iyi sonuç veren bir tekniktir. Ayrıca hizmet alma sayısı bağımsız değişkenlerin alt kategorilerine göre farklılık analizine tabi tutulmuştur. Analizde kullanılan değişkenler 2016 ve 2019 yılına ait "TÜİK Sağlık Araştırması" mikro veri setinden elde edilmiştir. **Bulgular**: Alınan sağlık hizmet sayısını pozitif yönde etkileyen değişkenler class 1, class 2, class 3 obezite grubuna dahil olmak, cinsiyet, sosyal güvenceye sahip olmak, son 6 ayda hastalık geçirmek ve şeker hastalığıdır ($p<0,05$). Kişide şeker hastalığının varlığı, hizmet alma sayısını 1.42 kat, kadın olmak 1.49 kat, herhangi bir hastalığı son altı ayda geçirmiş olmak, 2.04 kat, sosyal güvenlik şemsiyesine sahip olmak, 1.14 kat arttırmaktadır. Class 1, 1.28 kat, class 2, 1.57 kat ve class 3 grubunda olmak, 1.93 kat hizmet alma sayısını etiketlemektedir. **Sonuç**: Bariatrik cerrahiye uygun olduğu tahmin edilen Türkiyeli yetişkinlerin yalnızca % 5'i tedavi olmak istediğinde, sağlığı sisteminin talebe cevap verememe durumu oluşacaktır. Hasta önceliklendirme konusunda daha iyi rehberlik ve kamusal cerrahi planlama için daha fazla kaynak sağlanması gerekmektedir.

ARTICLE INFO/MAKALE BİLGİSİ

Key Words: Health Service Demand, Body Mass Index, Bariatric Surgery

Anahtar Kelimeler: Sağlık Hizmet Talebi, Beden Kitle Endeksi, Bariatrik Cerrahi

DOI: 10.5281/zenodo.6356846

Received Date/Gönderme Tarihi: 12.02.2022

Accepted Date/Kabul Tarihi: 14.03.2022

Published Online/Yayımlanma Tarihi: 15.03.2022

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INTRODUCTION

In the US, the adult obesity rate rose from 13.4% in 1962 to 39.8% in 2016, which amounts to an increase of about 200%. This increase amounts to 93.3 million adults aged 20 and older in the United States. The percentage of patients with a body mass index (BMI) above 40 kg/m2 is about 7.7%, which is equivalent to about 18 million adults aged 20 and older (Hales et al.2018; Fryar et al.2012). As a result, the economic impact of treating obesity-related comorbidities has increased significantly. It was found that obese patients experienced a 36% increase in annual health care costs and a 77% increase in drug costs compared to non-obese patients (English et al. 2020). Obesity is one of the diseases that contributes the most to the financial burden of chronic diseases in the USA. 47.1 percent of the total cost of chronic diseases in the U.S. is due to obesity. The Milken Institute has calculated the overall

economic burden of obesity at $ 1.72 trillion (9.3% of U.S. gross domestic product) (Waters and Graf, 2018). The total economic burden due to obesity for Turkey was determined as 1.73% of GDP in 2012 (Karahan et al., 2020).

The data of the Ministry of Health Nutrition Research and TURDEP-II study revealed that two out of every three adults in our country are overweight or obese. The prevalence of metabolic syndrome accompanied by central obesity, in which the risk is particularly high, was also detected in 36.6% of our adult population. In our country, 3% of adults (approximately 2.5 million adults) are morbidly obese (Bariatrik Cerrahi Kılavuzu, 2018).

With the increase in obesity in the USA, the prevalence of obesity surgeries has increased. 252,000 procedures were carried out in 2018. Bariatric surgery remains a safe treatment for the morbidly obese. 30-day mortality rates for patients have been reduced to 0.08%. Serious complications are also rare (<% 5); however, overall complication rates range from 13% to 25% (Ahmed and Lyo, 2021).

Bariatric surgery is more effective than conservative interventions for treating resistant obesity and is one of the treatment types that are considered cost-effective (Sharman et al. 2018). In Sjöström et al. (2007) "Swedish Obese Subjects" study, obese patients who underwent bariatric surgery had a lower mortality rate than those receiving traditional medical treatment in an average of 10 years of follow-up. Observational studies evaluating the effect of bariatric surgery on survival (such as the Israeli, Swedish, and US cohorts) have concluded that surgery is associated with lower mortality compared to medical care (Sjöström et al. 2007; Doumouras et al. 2020; Arterburn et al. 2015). In a population-based matched cohort study involving more than 26,000 patients, bariatric surgery was associated with a 32% reduction in all-cause deaths after an average follow-up period of 4.9 years (Doumouras et al. 2020).

Bariatric surgery is currently the most effective obesity treatment. In the early 1990s, researchers began to realize that bariatric surgery is also an effective diabetes treatment. The increase in the global incidence and prevalence of type II diabetes (T2DM) parallels the increase in obesity. Estimates suggest that T2DM prevalence will reach 552 million by 2030, 150% higher than 2011 (Whiting et al. 2011). T2DM has significant effects on morbidity, mortality, quality of life and health care costs. It is the second leading cause of obesity-related deaths and the leading cause of obesity-related disability (GBD, 2015).

About 90% of T2DM can be attributed to overweight. Comparing bariatric surgery with medical and lifestyle management therapies for T2DM treatment, bariatric surgery is superior. Numerous observational studies have shown a 92% reduction in all-cause mortality and diabetes-related mortality following bariatric surgery. In addition, treating T2DM with bariatric surgery is cost-effective based on clinical data and economic modeling (Stroud and Stucke, 2021).

This study aims to estimate the number of people potentially eligible for obesity surgery; to determine demographics, health conditions and health service usage levels; and to estimate the potential demand for surgery that is likely to occur in public and private health facilities throughout Turkey thanks to survey data from the 2016-19 Turkey Health Survey.

DATA SET AND METHOD

In this study, data from the 2016 and 2019 "Turkey Health Survey" were used. The survey is carried out every 2 years by TUIK and the date of the two most recent surveys is 2016 and 2019. Its scope is households located in all settlements within the borders of Turkey. People between the ages of 18-64 were included in this study. The 2016 data included 14730 people in the 18-64 age group. In 2019 data, it consists of 13795 people.[1] With this data set consisting of 28525 persons in total, the data of the two periods were combined. Since the dependent variable is the number of services received from healthcare facilities, the data were analyzed using a negative binomial regression analysis, which is based on the counting number technique and can be applied to data with the excessive distribution.

A basic regression model was created with obesity groups (Class 1, 2 and 3) affecting the number of service recipients. Other advanced models include age, gender, the disease in the last six months, and diabetes, including obesity groups as independent variables. The dependent variable is the number of services received from health facilities.

Since the number of services has the feature of counting, the analysis that needs to be done is Poisson regression. The most important assumption of Poisson regression is that the arithmetic mean and variance are equal or close to each other. If the variance and arithmetic mean are not close to each other (which is not in our data/study), the data is evaluated in such a way that it is over-distributed (Yüzbaşı and Asar, 2018). As a result of an alternative quasi regression or negative binomial regression analysis, the regression model with the lowest value of Akaike's Information Criterion (AIC) and Bayesian Information Criterion (BIC) is considered the best model (Dinarcan, 2018). As a result of the analysis, the values of negative binomial regression were evaluated in terms

[1] All variables, variable definitions and data sources used in the analysis are shown in ANNEX1.

of those with the lowest AIC and BIC values, and the analysis results were tabulated. The software used in the analysis are SPSS 23 and Jamovi software.

Since statistics on bariatric surgery in Turkey cannot be obtained from a public source, information has been requested from associations and Social Security institutions organized on bariatric surgery. Besides, a study was conducted and information was obtained from a university hospital for the type of bariatric surgery operations performed in the last year, the distribution of patients in terms of gender and costs.

STATISTICAL ANALYSIS

In summary data, mean, standard deviation for continuous variables and percentages for categorical variables were used. Negative binomial regression analysis was used to determine how many times the variables such as age, gender, being under the umbrella of social security, having an illness in the last six months and being included in one of the obesity groups affect the number of health services received. Results are reported with confidence intervals and coefficients.

FINDINGS

Research results will be given in the form of negative binomial regression results, a type of regression for counting numbers that are over-distributed. Among these findings are the general characteristics of variables, whether the variables differ depending on the number of services received, the distribution characteristics contained in the sample, and the projection of Turkey data.

The average age of the people in the study was 39.54 (SD ± 13,414) and the average body mass index was 26.37 (SD ± 5.69). Almost half of the participants (45.3%) are in the 25-44 age group. The rate of women is 55%. There is a statistical difference in the age of the person, age groups, body mass index categories, gender, general health status and having diabetes according to the status of receiving services from health facilities ($p<0,05$). The difference analyses were carried out with non-parametric tests since the variables did not show a normal distribution ($p> 0.05$). Variables were subjected to difference analysis with the Mean Whitney U test in paired groups, and the Kruskal Wallis H test for variables with three or more groups (Table 1).

Table 1. General Properties of Variables and Analysis of Differences

VARIABLE	VARIABLE EXPLANATION	N	%	Mean (95% CI)	Std. Deviation	p
Age	18-65 age	-	-	39,54	13,414	**0,000**
Age Groups	15-24	4804	16,8	3,61 (3,42-3,8)	6,72	**0,000**
	25-34	6076	21,3	4,37 (4,2-4,55)	6,915	
	35-44	6839	24	4,34 (4,19-4,49)	6,517	
	45-54	5925	20,8	5,42 (5,19-5,65)	9,01	
	55-64	4881	17,1	5,99 (5,72-6,26)	9,605	
Body Mass Index	Underweight	971	3,4	4,58 (3,91-5,25)	10,69	**0,000**
	Normal weight	11247	39,4	4,05(4,92-4,18	7,32	
	Pre-obesity	10160	35,6	4,07 (4,56-4,85)	7,586	
	Obesity class I	4522	15,9	5,61 (5,38-5,85)	8,025	
	Obesity class II	1259	4,4	6,88 (6,3-7,46)	10,514	
	Obesity class III	366	1,3	8,45 (7,26-9,65)	11,611	
Gender	Male	12828	45	3,54 (3,42-366)	6,859	**0,000**
	Female	15697	55	5,7 (5,57-5,83)	8,424	
General health status.	Excellent	2611	9,2	2,18 (2,03-2,32)	3,572	**0,000**
	Very good	15776	55,3	3,42 (3,34-3,5)	5,37	
	Good	7877	27,6	6,52 (6,33-6,71)	8,626	
	Fair	2061	7,2	10,57 (9,91-11,24)	15,402	
	Poor	200	0,7	10,63 (8,73-12,53)	13,568	
Diabetes	No	26081	91,4	4,35(4,26-4,44)	7,142	**0,000**
	Yes	2444	8,6	8,78 (8,29-9,28)	12,403	

Table 2: %, mean and confidence intervals of variables used in projection and analysis

Variables	Class 2 (example n = 1259; population estimate n = 2 310 230)		Class 3 (example n = 366; population estimate n = 682 568)		Class 2 + Class 3 Total (example n = 1625; population estimate n = 992 798)		All obese example N = 6147 population estimate n = 11 288 623	
BMI (kg m–2) (Mean)	36,9	(36.8, 36.9)	43,54	(43.17, 43.92)	38.37	(38.20, 38.54)	33.68	(33.6, 33.7)
Age (years) (mean)	47.2	(46.9, 48.1)	49,52	(48.4, 50,65)	47,47	(46.87, 48.13)	46.49	(46.2, 46.7)
Female sex (%)	70,9	(68.6, 73.4)	82	(78.0, 86.9)	70,9	(68.5, 73.2)	62.8	(61.6, 64.0)
A person who has had the disease in the last 6 months	72.8	(70.4, 74.6)	85.2	(81.2, 88.3)	72.8	(70, 75.3)	65.3	(63.7, 66.6)
Subjective diabetes statement (%)	25	(22.3, 27.7)	33.9	(29.5, 39.9)	25	(22.6, 27.6)	16.2	(15, 17.5)
Self-rated health %								
• Excellent	1,9	(1.2, 2.7)	1,4	(0.27, 2.70)	1,9	(1.1, 2.6)	3,9043	(3.4, 4.4)
• Very good	37,3	(34.2, 40.2)	26,8	(22.49, 31.43)	37,3	(35.1, 40.0)	43,485	(42.0, 44.5)
• Good	43,0	(39.9, 45.5)	45,4	(39,27, 50.40)	43	(40.3, 46.0)	38,425	(37.2, 39.6)
• Fair	15,9	(13.6, 18.1)	23,0	(18.67, 27.20)	15,9	(13.4, 17.8)	12,884	(11.9, 13.9)
• Poor	2,0	(1.3, 2.7)	3,6	(2.00, 5.44)	2	(1.3, 2.7)	1,3014	(1.0, 1.5)

When considered in terms of confidence intervals and proportional distribution, it was observed that the people in the Class 2 group had an average BMI of 36.9 (36.8, 36.9), the average age of 47.2 (46.9, 48.1) and predominantly female (70.9%). Besides, it is seen that 72.8% had any disease in the last six months, one out of every four people in this group was exposed to diabetes and 17.9% of them had a bad general health condition. In Class 3, the average BMI is 43.54 (43.17-43.92), the average age is 49.52 (48.4, 50.65) and it is predominantly female (82%). It was also determined that 85.2% of them had any disease in the last six months, 34 of every 100 people in this group were exposed to diabetes and 26.6% of them had a bad general health condition. When all obese groups are evaluated, the average BMI is 33.68 (33.6, 33.7), the average age is 46.49 (46.2- 46.7), it is predominantly female (62.8%). It was determined that 65.3% of them had any disease in the last six months, 17 of every 100 people in this group were exposed to diabetes and 19.1% of them had a bad general health condition (Table 2).

The number of people in the age range of 15-24, 25-34, 35-44, 45-54 and 55-64 was determined as both a number and a ratio using the data of the Turkish Health Survey. Turkish Health Survey data is sample data. As Turkey's population statistics represent the universe, the number of people in the same age groups was determined using the 2019 turkey population statistics. According to Turkish Health Survey data, the proportion of people in the obese group is 21.5%. The obese group includes Class1 (15.9%), Class2 (4.4%) and Class3 (1.3%). The rates of the three classes were proportional to the numbers in the universe and the number of people in each obesity group was determined. Thanks to this projection study, 6,147 people represented by 21.5% in the sample corresponded to 11,288,623 people who were obese in the universe. Individuals in the Class 3 group were evaluated as the group more suitable for bariatric surgery. The number of people in Turkey was determined by the ratio of sample rates to the population in the universe. 1259 people (% 4.4) in Class 2 are equivalent to 2.310.230 people when compared to the population of Turkey and 366 people (% 1.3) in Class 3 were equivalent to 682.568 people (Table 3). Population estimates were calculated based on a sample of 28525 adults (aged 18-65) with full height and weight data who completed the Turkish Health Survey by giving a complete answer. The number of obese people between the ages of 18-65 is 11,288,623. The number of people between the ages of 18-65 is 52,505,223 according to the 2019 population statistics. (Table 3).

After following these stages and according to the analysis results obtained from the model with the lowest AIC value, being in the Class I group affects the number of services receiving 1.28 times, Class II affects 1.57 times and Class III affects 1.93 times ($p<0,01$).

The presence of diabetes in a person increases the number of services receiving 1.42 times, being a woman

Table 3: Estimates of the population of adult Turkish citizens aged 18-65, who are potentially eligible for bariatric surgery according to the obesity class. Findings from the 2016-19 Turkish Health Survey.

Groups	Number of bariatric surgery candidates by classes between the ages of 18-65	Turkey obese population aged between 18-65 years (sample n = 6147 n = estimated population of 11,288,623)%
All obese groups (n = 6147)	11 288 623	21,5
Class 1 (n = 4522)	8 348 331	15,9
Class 2 (n = 1259)	2 310 230	4,4
Class 3 (n = 366)	682 568	1,3

Table 4: Negative Binomial Regression Basic Model

				95% Exp(B) Confidence Interval			
Names	**Estimate**	**SE**	**exp(B)**	**Lower**	**Upper**	**z**	**p**
(Intercept)	1.543	0.00807	4.68	4.61	4.75	191.19	<.001
CLASS 1	0.251	0.02205	1.28	1.23	1.34	11.37	<.001
CLASS 2	0.453	0.03878	1.57	1.46	1.70	11.69	<.001
CLASS 3	0.660	0.06996	1.93	1.69	2.22	9.43	<.001

Akaike's Information Criterion (AIC): 150833,342; Log Likelihoodb -75412,671; Bayesian Information Criterion (BIC): 150866,376; Likelihood Ratio Chi-Square: 526,952; Deviance (value/df):1,549

Table 5: Negative Binomial Regression Advanced Model

Parameter Estimates							
				95% Exp(B) Confidence Interval			
Names	**Estimate**	**SE**	**exp(B)**	**Lower**	**Upper**	**z**	**p**
(Intercept)	1.4431	0.00767	4.23	4.17	4.30	188.17	<.001
CLASS 1	0.0598	0.02121	1.06	1.02	1.11	2.82	0.005
CLASSS 2	0.1195	0.03715	1.13	1.05	1.21	3.22	0.001
CLASS 3	0.1657	0.06640	1.18	1.04	1.35	2.49	0.013
GENDER	0.3974	0.01565	1.49	1.44	1.53	25.39	<.001
PRESENCE OF THE DISEASE IN THE LAST 6 MONTHS	0.7142	0.01625	2.04	1.98	2.11	43.94	<.001
DIABETES	0.3516	0.02784	1.42	1.35	1.50	12.63	<.001
TREATMENT COST _SGK	0.1344	0.02332	1.14	1.09	1.20	5.76	<.001

Akaike's Information Criterion (AIC): 146230,016; Log Likelihoodb -73107,008; Bayesian Information Criterion (BIC): 146296,085; Likelihood Ratio Chi-Square: 5138,277; Deviance (value/df):1,388

1.49 times, having any illness in the last six months 2.04 times and having a social security umbrella 1.14 times. Being in the Class 1 group increases 1.06 times, Class 2 1.13 times, and Class 3 group increases 1.18 times (p<0,05).

DISCUSSION

This study aims to estimate the number of people potentially eligible for obesity surgery through survey data from the 2016-19 Turkey Health Survey and to determine how much it affects the number of people receiving services based on their demographics.

According to the information received from SSI (SGK) officials, the number of people who contributed to the financing of SSI (SGK) was 12371 in 2018, and 7402 in 2019. The cost of the SGK in 2018 was 43.826.401.05 ₺ in total and the average cost was 2.702.51 ₺. In 2019, the total cost was 31,096,729.88 ₺ and the average cost

was 2,772.50. ₺ Since permission to use the information obtained from SSI as a table cannot be obtained, we can only talk about numbers and distribution. As a result of the individual interview with the President of the Turkish Obesity Surgery Foundation and the head of the obesity surgery department of Düzce University Research Hospital, it was understood that the sector did not have a clear number for years, but it was stated that around 20,000 operations were performed annually by tracing the materials used in the surgical process.

In Turkey, when only 5% of those who are estimated to be potentially suitable for obesity surgery seek this path, the amount of demand (682568*0.05) increases to 34,128 people. This number will mean that we will face a demand that is more than twice the current surgeries. As more than two-thirds of the surgeries performed are carried out with public health financing, there will be more financial pressure on the SSI (Social Security Institution).

Therefore, there is no official figure for how many people in the group in class 3 had surgery. However, according to the results obtained by the authors studying on this subject, the number of surgeries performed in Turkey in 2018 was 15,800 and the total number of operations performed in 2015-2018 was 44,453 (Koçkaya et al. 2020).

It will be necessary to make use of the health economics discipline to determine who should be prioritized for limited resources. Arrangements such as "Bariatric Surgery Registration Center" depending on central planning have the potential to provide rationalization in patient selection (Brown et al. 2017; Sharman et al. 2018).

There are randomized controlled studies that suggest that bariatric surgery is safe and effective. In addition, according to these studies, the quality of life of obese people who choose to do one of these procedures and lose weight increases (O'Brien et al. 2013). Since much of the published data comes from specialist centres, the applicability of these studies to wider community outcomes must be questioned. Community-level data is needed to confirm the effectiveness and safety of bariatric surgical procedures seen in these smaller studies when applied to the general population (Brown et al. 2017). A reliable bariatric surgical recording system can meet these data.

There are publications stating that people with bariatric surgery had to undergo re-surgery (sometimes consecutively) (Pinto-Bastos et al. 2019; Yan et al. 2017). The re-operation rate in gastric band application was determined as 30.9% (Courcoulas et al. 2017). In order to prevent the burden of reoperative bariatric surgery on the healthcare system, it is beneficial to monitor those who have been operated again and consecutively in the surgical registry system as a quality indicator.

One of the important findings in this study is that more than one-third of the patients in both the class 2 (70.9%) and class 3 (82%) groups are women. This finding overlaps with Canadian and US data (Flegal et al. 2016). Some of the reasons why women are more overweight than men may be that the weight taken during and after pregnancy cannot be given immediately and becomes permanent. As a matter of fact, many studies are examining this issue (Njagu et al. 2020; Ledbetter, 2020). More research is needed to understand the reasons why women are more likely to be in class 2 and 3 groups than men and have surgery (Sharman et al. 2018).

Finally, when an assessment is made in the context of age groups, the group of patients aged 45-64 years, especially in the Class 1 group, accounts for 57.2 %. In the Class 2 Group, 63.1% were in the same age group and 71% were in Class 3. Especially in the 18-64 age group, as people get older, the most weight gain occurs in the Class 3 group.

There is considerable flexibility in Bariatric and Methabolic Surgery Guidelines. Patients as young as 12 have been offered surgery. Sometimes a lower BMI between 30-35 is accepted if patients have difficult to control diabetes. Especially for Class 1 obesity group surgery is a reasonable alternative against medical theraphy. This will be an additional burden on the health budget in near future.

In OECD, G20 and EU28 countries, 425 billion USD is spent annually for obesity, according to purchasing power parity. In addition, obesity and associated chronic diseases negatively affect the productivity of the workforce. Individuals with at least one chronic illness are 8% less likely to be employed in the following year, and if they are employed, they are more likely to be absent or less productive. All these factors negatively affect the social welfare and economy of countries. Depending on the countries, between 1.6% and 5.3% of the national income of countries is spent on obesity and overweight diseases (OECD, 2019).

LIMITATIONS

Turkey Health Survey data does not include data on the prevalence of rural and urban distinction. Therefore, a comparison could not be made with the results of the studies conducted in urban and rural areas (Hales et al.2018; Batsis et al.2020). There is also no information on what drugs people use, test results and whether the disease was diagnosed by an official authority or if it was identified by ICD codes. It is not known whether

the person went to the hospital due to his/her weight before becoming ill with BMI data obtained from weight and height values.

CONCLUSION

In Turkey, the potential demand for bariatric surgery has the potential to exceed the current capacity. Prioritization guidelines should be developed for patients demanding bariatric surgery. Good surgical planning is based on determining the potential patient group. A health policy document is needed for both the planning of trained manpower and its equal distribution among geographical regions. Besides, identifying 682 568 potentially eligible people for bariatric surgery can be used as an input in calculating the magnitude of funding needed for effective interventions. Thus, financial planning will be based on evidence and data.

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ANNEX 1: Variable Table

VARIABLE	VARIABLE EXPLANATION	Data Source
Age	18-65 age	TSI, 2016 and 2019 TURKISH HEALTH SURVEY DATA MICRO SET
Gender	1=Female 0= Male	
Disease Health Status	0= He/She hasn't had an illness in the last 6 months 1= He/She has had an illness in the last 6 months	
Body Mass Index	Below 18.5…… Underweight 18.5–24.9……Normal weight 25.0–29.9…….. Pre-obesity 30.0–34.9…….. Obesity class I 35.0–39.9…….. Obesity class II Above 40……Obesity class III	
General health status	1 = Excellent 2 = Very good 3 = Good 4 = Fair 5 = Poor	
Diabetes	0= No Disease 1= Have Disease	

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