The Obesity Burden and Impact of Weight Loss on Saudi Public Payers Using Value of Weight Loss Simulation Model

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Introduction

 Obesity is an abnormal or excessive accumulation of fat that poses a health risk. Body mass index (BMI) is a weight-to-height ratio index used to diagnose obese patients, where a BMI of 30 kg/m² or more is considered an obese.¹

 It was found that countries with high income, defined by a high gross domestic product (GDP) per capita, have a high prevalence of obesity. Saudi Arabia, a Gulf Cooperation Council (GCC) country, had an estimated prevalence of obesity by 20.2% in 2019. ²⁻⁵ The costs for each ORC were collected from the literature through the systematic literature review. Data that were not found in the literature were collected from surveying physicians to identify the healthcare resource utilization (HCRU) for each ORC, and payers to identify the unit costs for each one of the HCRU. (Figure 2 & 3) & (Table 1) provide a detailed explanation. Costs were collected in Saudi Arabian Riyals (SAR) and converted to United States Dollar (USD) based on the World Bank average official exchange rates (1 USD = 3.75 SAR)

Figure 3: Collection of cost data from systemic literature review & surveys

Table 2: Cost savings over 10 years per year in USD & SAR

Year	Cost per year (SAR)	Cost per year (USD)
Year 1	669,902,890	178,640,771
Year 2	1,342,245,821	357,932,219
Year 3	1,989,885,500	530,636,133
Year 4	2,631,652,915	701,774,111
Year 5	3,254,281,666	867,808,444
Year 6	3,870,344,835	1,032,091,956
Year 7	4,471,893,893	1,192,505,038
Year 8	5,064,396,124	1,350,505,633
Year 9	5,651,154,391	1,506,974,504
Year 10	6,213,164,380	1,656,843,835
Cumulative total	35,158,922,415	9,375,712,644

• The clinical and economic burden of obesity stems largely from an increased risk of numerous chronic complications such as type 2 diabetes (T2D), hypertension, dyslipidemia, and osteoarthritis that can adversely affect health, productivity, and healthcare costs. ⁶

Objective

 To estimate the potential benefits of weight loss in Saudi Arabia, in terms of both reduced complications and cost-savings in patients 20 – 69 years with BMI of 30 – 50 kg/m² over 10-year time horizon.

Methods

• A simulation-based model was developed to predict reductions in 10 obesity related complications (ORC); T2D, heart failure, angina, hypertension, atrial fibrillation, dyslipidemia, obstructive sleep apnea, osteoarthritis, asthma and chronic kidney disease (CKD); rates and cost savings achievable with 15% weight loss in Saudi Arabia over 10 years.

 To obtain model inputs, we conducted a systematic literature review to identify data on the prevalence of obesity and its complications in Saudi Arabia, and surveyed specialist physicians and hospital administrators in public (governmental) and private healthcare sectors. We used combinations of age, sex, obesity and T2D rates in Saudi Arabia to sample a United Kingdom (UK)



Table 1: The annual cost of managing obesity-related complications⁸

Cost category	Public costs (SAR)	Public costs (USD)					
Heart failure							
Tota	al 26,900	7,173					
Angina							
Tota	al 10,646	2,839					
Hypertension							
Tota	al 8,437	2,250					
Atrial fibrillation							
Tota	al 10,081	2,688					
Sleep apnea							
Tota	al 11,362	3,030					
Asthma							
Tota	al 7,121	1,899					
Chronic kidney disease							
Tota	al 17,945	4,785					

SAR: Saudi Arabian Riyals, USD: United States Dollars



The savings also found to be steadily increasing every year and are mainly attributed to the reduction of incidence of ORCs. The number of ORC cases reduced was correlated with the cost savings over 10 years. Hypertension, type 2 diabetes mellitus, and dyslipidemia incidence were the highest ORCs affected by the weight status. Weight reduction prevented 140,768 cases, 127,350 cases, and 90,898 cases occurrence, respectively. (Table 3)

cohort, creating a synthetic Saudi Arabia cohort expected to be representative of the population. ⁷ (Figure 1)





^aRecord indicating either a weight-loss diet, weight-loss drug prescription, or referral to a dietician or for bariatric surgery during the baseline period, to confirm the intention to lose weight; ^bDate of first BMI calculation. *Follow-up ended at the date of the first event, death, transfer-out or the last data collection for the corresponding practice (January 2020) BMI, body mass index; CKD, chronic kidney disease, MI, myocardial infarction; T2D, type 2 diabetes. Haase CI et.al. Int J Obes (Lond). 2021;3, 1-10.

The data from the UK study was calibrated to match the Saudi Arabian's demographic data in terms of the overall population, prevalence of obesity by BMI category, age group, and gender, and prevalence of obesity-related complications. A systematic literature review was conducted to identify relevant data. ^{8,9} (Figure 2)

SAR: Saudi Arabian Riyals, USD: United States Dollars

Results

According to the latest estimates from the General Authority for Statistics, the number of the Saudi population in 2022 was around 32,175,224 million. Based on the estimated prevalence of obese patients with BMI between 30 – 50 kg/m², it is estimated that there are 5,733,980 million obese patients. The model showed that, over a 10-year time horizon for a population of 32,175,224, for the selected sub-population of 5,733,980 individuals with a BMI of 30 to 50 and age from 20 to 69, a 10% weight loss is estimated to result in fewer individuals developing complications and consequently lower treatment costs.

 The model showed that a 10% weight loss would result in over USD \$9 billion savings over 10 years (Figure 4 & Table 2). The main drivers for the savings are the reduction in the number of cases of T2D, dyslipidemia, and hypertension. (Figure 5)

Table 3: Number of cases prevented per obesity-related complication

Obesity-Related	Cases Per Weight Status		Cases	
Complication	Stable Weight	Weight Change	Reduced	Percentage
Hypertension	1,149,150	1,008,382	140,768	12.2%
Type 2 Diabetes	491,008	363,658	127,350	25.9%
Dyslipidemia	1,131,667	1,040,769	90,898	8.0%
Sleep Apnoea	126,981	76,776	50,205	39.5%
Hip/Knee Osteoarthritis	275,618	245,936	29,682	10.8%
Asthma	149,083	130,252	18,831	12.6%
Chronic Kidney Disease	365,947	347,693	18,254	5.0%
Atrial Fibrillation and Flutter	174,976	162,215	12,761	7.3%
Heart Failure	126,578	117,054	9,524	7.5%
Unstable Angina/MI	187,122	185,747	1,375	0.7%
MI, Myocardial infarction				



Figure 4: Cost savings over 10 years per year in USD



Conclusion

• The results indicate the need for support with weight management programs in Saudi Arabia. We have demonstrated the burden of obesity in terms of its direct impacts on individuals and healthcare systems, and these are also expected to lead to additional effects not captured in this study, such as indirect costs and decreased health-related quality of life.

Our findings also show that sustained weight loss can significantly alleviate this burden, with large cost savings resulting from reductions in ORCs. Therefore, if the obesity epidemic is to be halted and ultimately reversed, ensuring universal access to weight management support and treatment must be considered a major policy aim in Saudi Arabia.

