

## SAUDI PUBLIC AWARENESS OF INDICATIONS AND COMPLICATIONS REGARDING BARIATRIC SURGERIES

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### ABSTRACT

Approximately 580,000 people undergo bariatric surgery annually, it's currently considered the most effective treatment for class III obesity. Stigmatized by many as the "easy way out" it's unclear whether people are aware of bariatric surgery-related complications. This paper aims to assess the public's awareness levels of indications and complications regarding bariatric surgery. A cross-sectional study was conducted among the general public in Saudi Arabia including all Saudis aged 18 years and older. Data collection was conducted through self-administered questionnaires. The sample size was calculated manually using the infinite population formula with a standard deviation of 1.96 for a 95% confidence interval and a maximum accepted marginal error of 0.05. Data was transferred to the Statistical Package of Social Science Software (SPSS) program, version 20 (IBM SPSS Statistics for Windows, Version 20.0. Armonk, NY: IBM Corp.), to be statistically analyzed. The study included 412 participants, 50.5% of whom were males. 80.6% of the respondents knew someone who had undergone bariatric surgery, and 96.1% of those individuals lost weight after the operation. 96.6% of the respondents have heard of these procedures. Only 43.2% had good knowledge scores regarding bariatric surgeries, 52.9% had moderate knowledge, and 3.9% had poor knowledge scores. In conclusion, Saudi public awareness of indications and complications regarding bariatric surgeries is poor. a critical issue that requires attention and action. Knowledge scores were associated with the male gender.

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### Introduction

The descriptions of overweight and obesity include excessive or abnormal accumulations of fat that could harm one's health [1]. The WHO defines it as a BMI (body mass index) greater than 30 kg/m<sup>2</sup>, which raises a person's risk of developing a number of several diseases [2]. According to the Saudi Health Evaluation Study, obese people constitute 24.1% of women and

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33.5% of men in Saudi Arabia, while overweight people make up 33.4% and 28.0% of both males and females [3]. Until now, the most successful approach for the long-term management of morbid obesity was surgical intervention, or "Bariatric surgery (BS)" [4]. When dietary and lifestyle modifications have failed and a patient has a body mass index of 35 kg/m<sup>2</sup> and comorbidities associated with obesity like hypertension or type 2 diabetes, weight loss surgery is usually suggested as a treatment option [5]. Other medical problems, such as type 2 diabetes, hypertension, ischemic heart disease, esophageal reflux disease, and intestinal motility disorders, are greatly enhanced by the surgeries, in addition to helping patients lose their weight [6]. Few previous studies have shown an insufficient level of awareness and knowledge about the indications and complications of gastric sleeve surgery. In 2021, research was conducted by Hayfa Alolayan *et al.* among the general population in the Qassim region, and the results showed that the percentage of 1091 participants who were aware of the sleeve gastrectomy's indications and complications were 49% and 82.4%, respectively [7]. In Recent research at King Khalid University Hospital, Riyadh, 59.0% of all 480 participants were unaware of the indications of sleeve gastrectomy [8]. Another study was conducted in 2017, in Saudi Arabia, and the perception of bariatric surgery revealed that more than half of participants (68.4%) had poor knowledge of the value of surgery for controlling obesity [9]. A survey was conducted for adult citizens by Tariq Abdullah Aldawqi et Riyadh city, to assess the efficacy of bariatric surgery in reducing weight. The results showed that over half of the respondents doubted its safety, and just 16.2% thought it was the best option [10]. Most of the recent research in Saudi Arabia that is related to our topic is localized to one region only. Moreover, due to the technological and overall development of Saudi Arabia, the view of bariatric surgery indications and complications has changed recently as the obesity level is increasing. The main objective of this study was to measure the knowledge level among the general population of Saudi Arabia about the indications and complications of bariatric surgery.

## Materials and Methods

### Study Design

The cross-sectional survey was used in the current research among adult Saudi people in Saudi Arabia.

### Study Setting: Participants, Recruitment, and Sampling Procedure

The study population consisted of Saudi adults who aged 18 years and above, from both genders. Participants were interviewed using a new questionnaire that was developed based on previous studies.

### Inclusion and Exclusion Criteria

The target population will include all Saudis who are aged 18 years and above, and will exclude non-Saudi, aged under 18 years, those who do not complete the questionnaire, and those who refuse to participate.

### Sample Size

The sample size was calculated manually by using the infinite population formula with a standard deviation of 1.96 for a 95% confidence interval, and a maximum accepted marginal error of 0.05, The minimum sample size calculated is:  $n = (1.96)^2 \times 0.50 \times (1 - 0.50) / (0.05)^2 = 384$

$$n = \frac{z^2 \times \hat{p}(1 - \hat{p})}{\varepsilon^2} \quad (1)$$

### Method for Data Collection and Instrument (Data Collection Technique and Tools)

A structured questionnaire was used as a study tool. This tool was developed after consulting relevant studies conducted in Saudi Arabia and elsewhere. The final version of the questionnaire consisted of 21 questions classified into three main sections. The first one contained sociodemographic background characteristic questions. The second section investigates the general information that people have about obesity, obese people, and bariatric surgeries. The third section evaluates the knowledge and awareness of the public about the indications and complications of bariatric surgeries.

### Scoring System

Overall, twelve statements were used to assess the level of knowledge and awareness of the public about the indications and complications of bariatric surgeries. One point "1" is given for correct answers and zero point "0" for incorrect answers, or I don't know. The scoring system was divided as follows, more than or equal to 8 was considered a high level of knowledge, less than 8 but more than or equal to 4 was considered a medium level of knowledge, less than 4 was considered a low level of knowledge.

### Analyzes and Entry Method

Data was transferred to the computer using the "Microsoft Office Excel Software" program (2016) for Windows. Data was then transferred to the Statistical Package of Social Science Software (SPSS) program, version 20 (IBM SPSS Statistics for Windows, Version 20.0. Armonk, NY: IBM Corp.), to be statistically analyzed. A simple frequency was done for all univariate

variables. Across tabulation was done for bivariate variables. The association between variables was measured using Chi-square. A p-value of < 0.05 was considered significant.

## Results and Discussion

Based on **Table 1**, it can be observed that the majority of respondents fall within the 18-25 age range, with 41.3% of the total. Additionally, there is a fairly even distribution of respondents across the gender categories, with 50.5% male and 49.5% female. In terms of location, the highest percentage of respondents (72.8%) are located in the West. In regards to education level, the majority of respondents hold a Bachelor's degree, accounting for 64.3% of the total. This is followed by those with a secondary education level at 29.1%. It is interesting to note that there is a small percentage of respondents with a Ph.D, at 1.9%.

**Table 1.** Sociodemographic characteristics of participants (n=412)

Parameter	No.	Percent	
Age	Less than 18	29	7.0
	18-25	170	41.3
	26-35	89	21.6
	36-45	89	21.6
	46-55	32	7.8
	56-65	3	.7
Gender	Male	208	50.5
	Female	204	49.5
Location	East	19	4.6
	Middle	67	16.3
	North	8	1.9
	South	18	4.4
	West	300	72.8
Education Level	primary	1	.2
	middle	6	1.5
	secondary	120	29.1
	Bachelor's	265	64.3
	Master's	12	2.9
	Ph.D	8	1.9

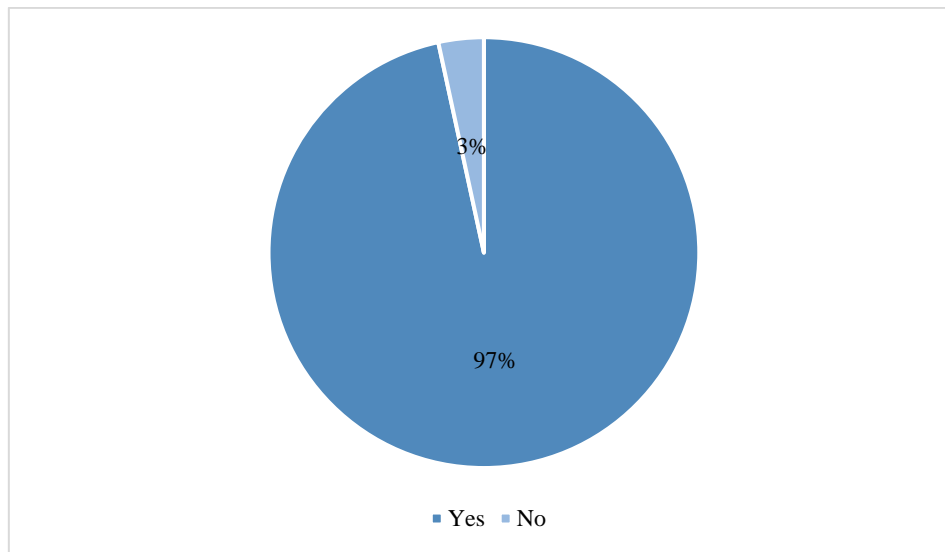
According to **Table 2**, 80.6% of the respondents knew someone who had undergone bariatric surgery, and 96.1% of those individuals lost weight after the operation. The majority of respondents (65.7%) were close to the person who had the surgery, and 18.7% reported that the individual lost between 21-30 kilos. Additionally, 43.4% reported no complications after the procedure.

**Table 2.** Participants experience with bariatric surgeries (n=412)

Parameter	No.	Percent	
Know someone who has undergone bariatric surgery	Yes	332	80.6
	no	80	19.4
If yes, did he/she lose weight after having the operation?	Yes	319	96.1
	no	6	1.8
	I don't know	7	2.1
How are you related to him/her?	Co-worker	17	5.1
	friend	58	17.5
	close	218	65.7
	Other than that	39	11.7
How many kilos did he/she lose after the surgery	11 20	40	12.0
	21 30	62	18.7
	31 40	47	14.2

	41 60	40	12.0
	5 10	15	4.5
	61 80	30	9.0
	81 100	7	2.1
	more than 100	3	0.9
	I don't know	88	26.5
Did he/she have any complications after the procedure?	Yes	87	26.2
	no	144	43.4
	I don't know	100	30.1

As shown in **Figure 1**, 96.6% of the respondents have heard of these procedures.



**Figure 1.** Participants heard of bariatric surgery

As illustrated in **Table 3**, 60.4% of the respondents have heard of BMI. However, it is concerning that only 5.6% of the respondents know the BMI range for obesity, with 33.3% admitting that they don't know. However, the sources of information are varied, with social media being the most common source at 35.9%. The survey also revealed that 93.4% of the respondents do not believe that weight loss surgeries are the first choice for weight loss. Instead, the majority believe that exercise (43.4%) and a low-calorie diet (45.9%) are the best ways to lose weight for an obese person.

Regarding indications for bariatric surgeries, 10.9% reported a BMI of 18.5-24.9, 59.7% reported a BMI > 30 kg/m<sup>2</sup>, 66.5% reported a BMI of more than 40 kg/m<sup>2</sup>, 55.8% reported a BMI of more than 35 kg/m<sup>2</sup> as well as multiple concomitant chronic diseases, and 59.7% reported having type 2 diabetes and not adhering to the treatment plan, or suffering from the risk of cardiovascular disease.

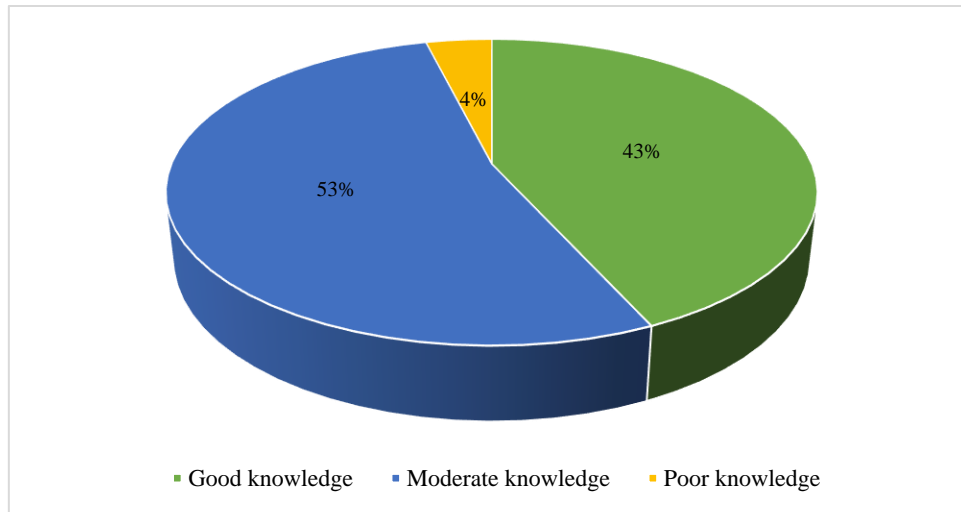
Regarding complications, leakage of stomach contents is identified as a severe complication, with 21.1% of patients experiencing this issue. Other acute complications include gastric wrap (36.2%), abscess (13.1%), bleeding (44.9%), iron deficiency (50.7%), anemia (45.9%), other nutritional or mineral deficiency (51.2%), gain weight again (32.5%), and neuropathies (28.6%). On the other hand, chronic complications of bariatric surgery include iron deficiency (52.7%), bleeding (28.2%), gain weight again (37.9%), anemia (52.9%), other nutritional or mineral deficiency (50.0%), abscess (16.7%), gastric wrap (22.3%), pulmonary embolism (18.4%), leakage of stomach contents (26.2%), and neuropathies (30.6%).

**Table 3.** Participants' knowledge of bariatric surgeries (n= 412)

Parameter	No.	Percent
Have you ever heard of the so-called body mass index (BMI)?	Yes	249
	no	163
What is the BMI range based on which we can say that this person is obese?	30 and more	213
	18 - 24.9	23
	25 - 29.9	34
	Under 18	5

	I don't know	137	33.3
Have you ever heard of bariatric surgeries?	Yes	398	96.6
	no	14	3.4
If your answer is yes, what is the source of your information?	Physicians or bariatric surgeons	39	9.8
	Internet	30	7.5
	the study	1	0.3
	Family, relatives, or friends	62	15.6
	Books	11	2.8
	A person who underwent obesity surgery	112	28.1
Do you think that weight loss surgeries are the first choice for weight loss?	Yes	27	6.6
	no	385	93.4
If not, what is the best way to lose weight for an obese person?	Exercise	179	43.4
	Fasting	36	8.7
	Low-calorie diet	189	45.9
	I don't know	8	1.9
Do you know the indications of bariatric surgery?	Yes	260	63.1
	no	152	36.9
Which of the following is an indication for bariatric surgery?	An adult with a body mass index of less than 18.5	8	1.9
	An adult with a BMI equal to 18.5	13	3.2
	Adult with a BMI of 18.5-24.9	45	10.9
	Adults with a body mass index > 30 kg/m <sup>2</sup>	246	59.7
	An adult with a body mass index of more than 40 kg/m <sup>2</sup>	274	66.5
	Adults with a body mass index of more than 35 kg/m <sup>2</sup> as well as multiple concomitant chronic diseases	230	55.8
	In addition to having type 2 diabetes and not adhering to the treatment plan, or suffering from the risk of cardiovascular disease.	246	59.7
	The procedure is performed for cosmetic purposes only	30	7.3
Do you know the complications of bariatric surgery?	Yes	231	56.1
	no	181	43.9
Which of the following is an acute complication of bariatric surgery?	Leakage of stomach contents	87	21.1
	Gastric wrap	149	36.2
	abscess	54	13.1
	bleeding	185	44.9
	Iron deficiency	209	50.7
	Anemia	189	45.9
	Other nutritional or mineral deficiency	211	51.2
	Gain weight again	134	32.5
	Leakage of stomach contents	169	41.0
	Neuropathies	118	28.6
Which of the following is a chronic complication of bariatric surgery?	Iron deficiency	217	52.7
	bleeding	116	28.2
	Gain weight again	156	37.9
	Anemia	218	52.9
	Other nutritional or mineral deficiency	206	50.0
	abscess	69	16.7
	Gastric wrap	92	22.3
	Pulmonary embolism	76	18.4
Leakage of stomach contents	108	26.2	

As illustrated in **Figure 2**, only 43.2% had good knowledge scores regarding bariatric surgeries, 52.9% had moderate knowledge, and 3.9% had poor knowledge scores.



**Figure 2.** Participants' knowledge scores of bariatric surgeries

**Table 4** shows that the 18-25 age group has the highest percentage of good knowledge scores at 18.4%, while those in the 56-65 age group have the lowest percentage at 0.2%. Similarly, marital status seems to have an impact on knowledge scores as well. The table indicates that single individuals have the highest percentage of good knowledge scores at 23.3%, while divorced and widowed individuals have the lowest percentages at 0.7% and 0.5% respectively. Furthermore, gender appears to be a significant factor influencing knowledge scores. Males have a higher percentage of good knowledge scores at 17.0% compared to females at 26.2%. Individuals in the West region have the highest percentage of good knowledge scores at 30.6%, while those in the East region have the lowest percentage at 1.5%. Additionally, individuals with a Bachelor's degree have the highest percentage of good knowledge scores at 28.9%, while those with a primary education level have the lowest percentage at 0.0%.

**Table 4.** Participants' knowledge scores in association to their sociodemographic characters (n=412)

		Knowledge scores			Total (N=412)	P value
		Good knowledge	Moderate knowledge	Poor knowledge		
Age	Less than 18	10	19	0	29	0.065
		2.4%	4.6%	0.0%	7.0%	
	18-25	76	87	7	170	
		18.4%	21.1%	1.7%	41.3%	
	26-35	35	48	6	89	
		8.5%	11.7%	1.5%	21.6%	
36-45	37	51	1	89		
	9.0%	12.4%	0.2%	21.6%		
46-55	19	12	1	32		
	4.6%	2.9%	0.2%	7.8%		
56-65	1	1	1	3		
	0.2%	0.2%	0.2%	0.7%		
Marital status	Single	96	111	15	222	0.065
		23.3%	26.9%	3.6%	53.9%	
	Married	77	101	1	179	
		18.7%	24.5%	0.2%	43.4%	
Divorced	3	2	0	5		
	0.7%	0.5%	0.0%	1.2%		
widow	2	4	0	6		

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		0.5%	1.0%	0.0%	1.5%
Gender	Male	70	125	13	208
		17.0%	30.3%	3.2%	50.5%
	Female	108	93	3	204
		26.2%	22.6%	0.7%	49.5%
					0.001
Residence	East	6	13	0	19
		1.5%	3.2%	0.0%	4.6%
	Middle	29	33	5	67
		7.0%	8.0%	1.2%	16.3%
	North	4	4	0	8
		1.0%	1.0%	0.0%	1.9%
	South	13	5	0	18
		3.2%	1.2%	0.0%	4.4%
	West	126	163	11	300
		30.6%	39.6%	2.7%	72.8%
					0.170
Education Level	primary	0	1	0	1
		0.0%	0.2%	0.0%	0.2%
	middle	1	4	1	6
		0.2%	1.0%	0.2%	1.5%
	secondary	51	64	5	120
		12.4%	15.5%	1.2%	29.1%
	Bachelor's	119	138	8	265
		28.9%	33.5%	1.9%	64.3%
	Master's	4	7	1	12
		1.0%	1.7%	0.2%	2.9%
Ph.D	3	4	1	8	
	0.7%	1.0%	0.2%	1.9%	
					0.636

Bariatric surgery, also known as weight loss surgery, is a surgical procedure that is performed on individuals who are severely overweight or obese. It is a major surgery that involves altering the digestive system to reduce the amount of food that can be consumed and absorbed by the body. The surgery is typically recommended for individuals who have not been able to achieve significant weight loss through diet and exercise alone.

Previous studies on general population knowledge of bariatric surgeries have shown varying levels of understanding and awareness. According to the current study results, Saudi general population exhibits inadequate knowledge of bariatric surgeries as only 43.2% had good knowledge scores regarding bariatric surgeries, 52.9% had moderate knowledge, and 3.9% had poor knowledge scores. This is in line with another study that was published earlier [11], which found that 57.1% of participants in a prior Saudi study knew enough about obesity and bariatric surgery [12]. In contrast, 73.1% of women in different research on women

3 in a province in eastern Saudi Arabia did not know anything about obesity [13]. Still, our research aligns with a previously published paper [14] that evaluated the local community's knowledge about obesity. Additionally, a Saudi Arabian study on senior medical students revealed that they know very little about obesity and bariatric surgery [15].

Regarding indications for bariatric surgeries, 10.9% reported BMI of 18.5-24.9, 59.7% reported a BMI > 30 kg/m<sup>2</sup>, 66.5% reported a BMI of more than 40 kg/m<sup>2</sup>, 55.8% reported a BMI of more than 35 kg/m<sup>2</sup> as well as multiple concomitant chronic diseases, and 59.7% reported having type 2 diabetes and not adhering to the treatment plan or suffering from the risk of cardiovascular disease. According to another recent Saudi study, 50% of participants were unaware of the proper reasons for bariatric surgery [11]. We can conclude that more attention has to be paid to how the Saudi Arabian public views obesity and bariatric surgery. To raise public awareness, surgeons, health educators, and other healthcare professionals must effectively coordinate across agencies. Bariatric procedures, which are performed in primary health care centers, are crucial for managing obesity and its comorbidities, in addition to obesity education programs.

The American Society for Metabolic and Bariatric Surgery (ASMBS) has established guidelines for determining who is a good candidate for bariatric surgery. One of the most important factors is body mass index (BMI), which is a measure of body fat based on height and weight. A BMI of 30 or higher is considered obese, and individuals with a BMI in this range are generally considered good candidates for bariatric surgery [16]. The ASMBS also recommends bariatric surgery for individuals with a BMI of 35 or higher who have multiple concomitant chronic diseases, such as type 2 diabetes, high blood pressure, and sleep

apnea. These individuals are at a higher risk for complications from their chronic diseases due to their obesity, and bariatric surgery can help to improve their overall health [16].

In addition, bariatric surgery may be recommended for individuals with a BMI of 30 or higher who have type 2 diabetes and are not adhering to their treatment plan, or who are at high risk for cardiovascular disease. These individuals may benefit from the weight loss and improved health outcomes that can result from bariatric surgery [16].

It is important to note that bariatric surgery is not performed for cosmetic purposes only. While weight loss can improve a person's appearance, the primary goal of bariatric surgery is to improve overall health and reduce the risk of complications from obesity-related diseases [16].

Regarding the perception of complications, leakage of stomach contents is identified as a severe complication, with 21.1% of patients experiencing this issue. Other acute complications include gastric wrap (36.2%), abscess (13.1%), and bleeding (44.9%). On the other hand, chronic complications of bariatric surgery include iron deficiency (52.7%), bleeding (28.2%), gain weight gain (37.9%), and anemia (52.9%). A previous Saudi study findings indicated that the most reported were dumping and vomiting (86.9%), behavioral/psychosocial changes (83.4%), nutritional deficiencies (80.7%), GIT diseases (76.3%), and the least reported complications were ulcers (62.8%), hemorrhage (60.4%), hernias (58.9%), and infection (54.4%). As for chronic complications, 26.3% reported DM and insulin resistance, 25.7% reported blood clotting, 21.3% reported disturbed liver functions, and 19.7% know about renal diseases [12].

The issue of public awareness of indications and complications regarding bariatric surgeries is a matter of great concern in the medical community. Bariatric surgery is a weight loss surgery that involves altering the digestive system to limit the amount of food a person can eat and absorb. It is a complex procedure that requires careful consideration and evaluation of the patient's medical history, lifestyle, and overall health [7].

One of the primary reasons for the lack of public awareness of bariatric surgeries is the misconception that it is a quick fix for obesity. Many people believe that undergoing bariatric surgery will instantly result in significant weight loss, without considering the long-term implications of the procedure. This is a dangerous misconception that can lead to serious health complications [3].

The public needs to understand that bariatric surgery is a major surgical procedure that carries significant risks and potential complications. These complications can include infection, bleeding, blood clots, and even death. Additionally, bariatric surgery can lead to nutritional deficiencies, which can cause long-term health problems if not properly managed [5].

The study is undoubtedly an important and timely piece of research, shedding light on the knowledge and understanding of bariatric surgeries among the Saudi public. However, it is essential to acknowledge the potential limitations of this study in order to provide a comprehensive and balanced interpretation of its findings.

One limitation of this study is the potential for selection bias. The sample population may not be representative of the entire Saudi public, as it may only include individuals who have access to healthcare facilities or those who are more health conscious. This could result in an overestimation or underestimation of the public's awareness of bariatric surgeries, thus limiting the generalizability of the findings. Another potential limitation is the reliance on self-reported data. The study may have used surveys or questionnaires to gather information on public awareness, which can be subject to recall bias and social desirability bias. Participants may provide answers that they believe are socially acceptable or that they think the researchers want to hear, leading to inaccurate or biased responses. Additionally, the study may face limitations in terms of the scope and depth of the information gathered. It is possible that the study did not capture all relevant aspects of public awareness regarding bariatric surgeries, such as specific indications and complications. This could limit the overall understanding of the public's knowledge of the topic and may not provide a comprehensive picture of the awareness levels. Furthermore, the study may face limitations in terms of the generalizability of its findings to other populations or cultural contexts. The awareness and perceptions of bariatric surgeries may vary across different regions and demographics, and the findings of this study may not apply to other populations without further validation and replication.

## Conclusion

In conclusion, Saudi public awareness of indications and complications regarding bariatric surgeries is poor. a critical issue that requires attention and action. Knowledge scores were associated with the male gender.

It is essential for the public to understand that bariatric surgery is a complex procedure that carries significant risks and potential complications. Additionally, individuals must be properly evaluated to determine if they are a suitable candidate for the procedure, and the type of surgery must be carefully selected based on their individual needs. By increasing public awareness and understanding of bariatric surgeries, we can ensure that patients are making informed decisions about their health and well-being.

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