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HEART TRANSPLANTATION AND DONATION BETWEEN REJECTION AND ACCEPTANCE IN SAUDI POPULATION

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Abstract

Background*:* Heart transplantation is currently the definitive gold standard surgical approach in the treatment of refractory heart failure. But still, there is a misunderstanding attitude and awareness regarding heart or organ donation and transplantation in general. The primary rate-limiting step for heart transplantation remains the availability of donors. Waiting for a suitable donor heart can extend for months or even years. This process involves obtaining consent for donation and confirming brain death, along with matching the right blood type and meeting other criteria. The worldwide shortage of suitable donor hearts leads to tragic outcomes, with adult waiting list mortality rates at 15% and paediatric rates ranging from 5% to 32%. In this study, we have measured the knowledge and attitudes level among the general population of Saudi Arabia about Heart transplantation and donation and found out the associated factors.

Methodology: This study was conducted among the Saudi population using an online questionnaire from August 2023 until May 2024. The questionnaire included sociodemographic data and questions exploring the population's knowledge and attitude regarding heart donation. The study was made available to Saudi Arabian citizens who were willing to take part. Most of the study was done online. For this study, a non-probability, convenience sampling strategy was used. Version 25 of SPSS statistic software was used to analyze the data that was given. **Results:** The majority of Saudi community accepts the concept of transplantation (85%) and are generally willing to donate; however, many still have some reservation towards heart donation. The study identified significant associations between knowledge scores and several factors, including age, additionally, occupation and residential area also exhibit significant associations with knowledge level. Moreover, marital status seems to be linked to knowledge level, there is also a significant association between residential area and attitude towards transplantation ($p=0.041$). Furthermore, while gender, age group, occupation, education level, and marital status do not show significant associations with attitude towards transplantation. **Conclusion:** With the growing burden of heart failure and advanced disease there is an increasing need for heart transplants and

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donation. The Saudi community accepts the concept of transplantation (85%) and are generally willing to donate; however, many still have some reservation towards heart donation. More effort is required to dispel current misconceptions, increase the awareness, and work with regulators to identify their role and expand the pool of donors in Saudi Arabia.

Keywords: Heart transplantation, donation, Saudi Arabia, knowledge, attitude, organs, cardiac, heart failure, cross-sectional study.

Introduction:

Organ donation (OD) is the act of donating a living or dying individual's living tissue or an actual physical organ to a receiver who remains breathing and in demand of a transplant (1). The sole choice for treating people with end-stage cardiac conditions, as well as the most appropriate choice for curing patients with end-stage diseases, is organ transplantation (2). Unfortunately, due to a limited number of Donation after Brain Death (DBD), lifesaving treatment is rationed worldwide (3). The largest barrier to carrying out greater heart transplants is the disparity between the requirement seeking organs and the availability of organs, notwithstanding the fact that the number of patients on the transplantation waiting list climbs every day (4).

According to the WHO Global Observatory on Donation and Transplantation data for 2020, the number of solid organ transplants worldwide exceeds 130,000, accounting for 10% of global demand. There will be 200 heart transplants. On the other hand, In Saudi Arabia, there are only two cardiac centers that do approximately 30 heart transplants each year (5). Also, in Saudi Arabia, the estimated number of donated organs is 2-4 million, compared to more than 20 million in nations such as the United States and Spain (6). According to the causes of this low number of donors, sociocultural factors have been recognized as one of the primary drivers of variation in studies on attitudes regarding organ donation. Furthermore, the geographical location can influence the inclination to donate organs. Individuals with comparable cultural backgrounds who live in different geographical places may have opposing views on organ transplantation. Furthermore, opinions toward organ donation and transplantation have been found to be highly influenced by the notion of death, religious beliefs, or sociodemographic characteristics (age, gender, level of education) (7).

In 2017, a study was conducted to recognize the Saudi population's beliefs toward heart donation and transplantation. A total of 1250 individuals approved the theory of organ transplantation, while only about 17% consented to the idea of heart transplantation. In general, Saudis come up to be familiar with the concept of transplantation and are ready to be involved, however, they have concerns about heart donation (8).

In Residents of Riyadh, Saudi Arabia the level of organ donation awareness was high, but knowledge of the Islamic perspectives of organ donation was lacking among most of our sample, which helps to explain the high organ donation denial rate. There remains an urgent requirement for expanding the public's consciousness about the significance of donating organs and to eliminate Islamic misunderstandings (9).

In the survey, 62.3% of the people surveyed stated that they recognized little or nothing about organ

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transplantation and donation in Morocco. 48.8% of those who were surveyed claimed they weren't going to donate their organs. The major arguments for refusing were worried over the possibility of medical error and the belief that organs were being sold (10).
A cross-sectional study of 381 New Delhi residents showed that families of transplant patients rated statistically significantly better on knowledge and attitude assessments than the population. Even though relatives of transplant patients were more educated, more knowledgeable, and had a more favorable mindset toward tissue and organ donation (11).
The findings reveal that only three families out of all participants have donated an organ in the previous five years, or 79.17% of participants. 3.33%, chose to donate their organs. 12.5% of those who participated in the study had a belief that some beliefs could prevent some segments of the local population from donating organs. More than fifty percent of the study participants (51.67%) believed that at least one of the causes leading to the inadequate acceptance of organ donation is a lack of society's awareness. In conclusion, India's North-Eastern area has practically no organ donation programs, which are still in their very early stages (12).
Likert-scale Congenital Heart Surgeons (CHS) Society and Pediatric Heart Transplant Society members in the USA received an anonymous survey regarding the use of XTx in pediatric patients. By the outcomes, CHS and PTC members could consider using XTx if it created leads that were on a level with allotransplantation. It is yet unclear if other congenital heart stakeholders agree with this (13).
End-stage heart failure (HF) is frequently only treatable with a heart transplant, but Saudi Arabia lacks sufficient organ donors. On the other hand, studies that evaluated knowledge, attitude, and desire toward heart donation in KSA have not been adequately documented. In this study, we sought to comprehend Saudi citizens' readiness and desire for posthumous heart donation.

Objectives:

Main objective:

The main objective of this study was to measure the knowledge and attitudes level among the general population of Saudi Arabia about Heart transplantation and donation.

Specific objectives:

Our study aimed to assess the knowledge and attitudes of Heart transplantation and donation among adult males and females who are older than 18 from the general population of Saudi Arabia, to associate between rejection and acceptance of Heart transplantation and donation among theSaudi population, to identify the association between Knowledge and attitude about heart donation and transplantation and the socio-demographic data among the general population. To find out the general concept and concerns of heart donation and transplantation among the general population in Saudi Arabia.

Materials and Methods:

Study design and setting:

This study was carried out as an observational cross-sectional survey employing a questionnaire covering the entire nation of Saudi Arabia.

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Subject: participants, recruitment, and sampling procedure:
The study was distributed to people willing to participate in this study from August 2023 until May 2024 and living in the Kingdom of Saudi Arabia. The study setting was mostly online. A non-probability, convenience sampling approach was taken as the approach in sampling in this study. Participants were provided with an introductory message that explains the purpose of this study and if they consented to participate.

Inclusion and exclusion criteria:

Inclusion: The target group in this research was all individuals over 18 years old, Saudis, male and female, single or even married, pregnant, high school students, university students or postgraduates, and from various professions, regardless of health conditions, whether sick or healthy, except mental illness.
Exclusion: Any individual under 18 years of age, non-Saudi, or mentally unstable person is excluded from this research

Methods for data collection and instruments:
We have conducted our research using a structured questionnaire. Following a survey of Taif City`s general population, this tool was modified to be among the general population of Saudi Arabia. Arabic as well as English languages throughout every platform used for social media (5).
consists of four sections, the initial one being the one that asks the subject whether they agree to take part in the study. The information on sociodemographics has been presented in the second section. The third section of the questionnaire cover knowledge assessment concerns regarding heart donation and transplantation, and the fourth section of the questionnaire contains attitude assessments regarding our objective.

Scoring system
There were 20 questions in the knowledge segment of our questionnaire. Each question had only two options to choose from, the right answer gave the participant a “1” score point and the wrong gave a “0”. Making the maximum score “20” and the minimum a “0”. To the assess level of knowledge, we adopted the Original Bloom’s cut-off points which are <59.0% (low level), 60.0%-79.0% (moderate level), 80.0%-100.0% (high level), or in other words 0-12 questions right is a low level of knowledge, 13-15 questions answered right will be counted as a moderate level of knowledge and 16-20 questions answered right is considered a high level of knowledge.
On the other hand, the attitude section included 12 total questions. Each question was assigned two possible answers the right answer gave a “1” score point and the wrong answer gave 0. Making the highest possible score “12” and the minimum score “0”. The Original Bloom’s cut-off points were adapted like the way done in the knowledge segment. In other words, 0 - 7 answers right are considered negative attitude, 7 – 9 considered to be moderate attitude, and10-12 considered positive attitude.

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4.6 Analysis and entry method:

Analysis of submitted data was done using SPSS statistic software version 22 (IBM corporation, Chicago, United States). Attitude, knowledge, and beliefs were analyzed using a scoring system Sociodemographic Data was analyzed and presented with frequencies and percentages. Regression analysis was done to give an impression regarding the effect of certain variables on willingness to donate.

Results:

Table (1) provides valuable insights into the demographic characteristics of individuals involved in the process. The distribution of age groups reveals that a significant proportion of individuals (55.8%) fall within the 18-30 age bracket, followed by 29.4% in the >40 age group and 14.8% in the 30-40 age category. Furthermore, the gender distribution indicates a higher representation of females (77.1%) compared to males (22.9%). In terms of occupation, the data reflects a diverse spread, with the majority being students (36.0%) and government employees (26.1%). The regional distribution shows a relatively balanced representation across the Eastern (29.9%), Northern (21.5%), Southern (19.1%), Western (17.2%), and Middle (12.3%) regions. Additionally, the educational level of the participants skews heavily towards university or higher education (76.8%). The marital status distribution indicates that a significant portion of the population is single (49.8%) or married (44.6%).

Table (1): Sociodemographic characteristics of participants (n=1238)

Parameter		**No.**	**Percent (%)**
Age	18-30	691	55.8
	30-40	183	14.8
	>40	364	29.4
Gender	Male	284	22.9
	Female	954	77.1
Occupation	Student	446	36.0
	Government employee	323	26.1
	Non-government employee	137	11.1
	Unemployed	207	16.7
	Retired	35	2.8
	Other	90	7.3
Area	The Eastern region	370	29.9

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	The Northern region	266	21.5
	The Southern region	237	19.1
	The Western region	213	17.2
	The Middle region	152	12.3
Education level	Primary school	7	0.6
	Middle school	25	2.0
	High school	245	19.8
	University or higher	951	76.8
	Other	10	0.8
Marital status	Single	617	49.8
	Married	552	44.6
	Divorced	48	3.9
	Widowed	21	1.7

Figure (1): illustrates the acceptance of the concept of organ transplantation among participants (n=1238)

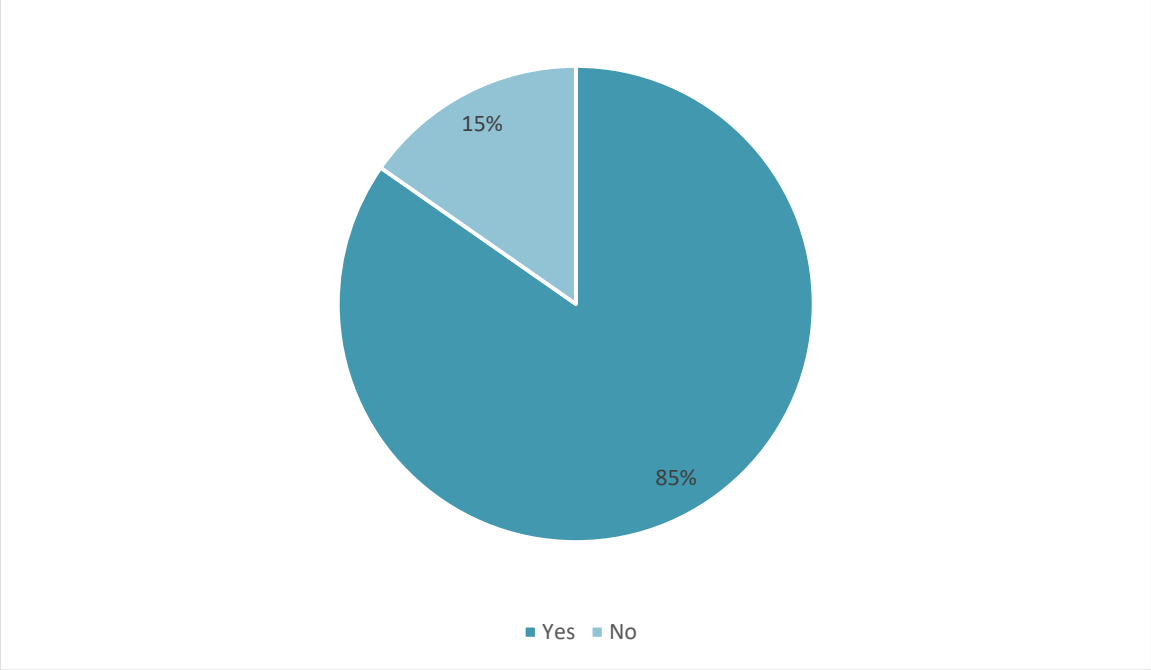

Table (2) reveals several noteworthy trends and attitudes. The overwhelming majority of respondents,

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84.7%, expressed acceptance of the concept of organ transplantation, indicating a positive disposition towards this life-saving medical procedure. Furthermore, an even higher percentage, 96.2%, deemed organ transplantation as a humane practice, underscoring the prevailing sentiment of compassion and empathy towards individuals in need of organ transplants. Interestingly, a significant proportion of respondents, 45.5%, reported knowing someone who has undergone an organ transplant, highlighting the pervasive impact of this medical intervention within the community. However, it is noteworthy that a considerable number of individuals, 15.3%, expressed reservations about organ transplantation, with 18.3% attributing their reluctance to religious reasons. This suggests a complex interplay between medical advancements and deeply held cultural and religious beliefs. Moreover, the data indicates a relatively lower awareness and acceptance of heart transplantation, with 15.1% expressing disapproval of this specific procedure.

The finding that 19.0% of those opposed to heart transplantation cited religious reasons further underscores the influence of religious beliefs on medical decision-making. Additionally, the data reveals a high level of awareness regarding brain death, with 93.9% of respondents indicating familiarity with this concept, and 85.0% demonstrating an understanding of its implications. This indicates a relatively well-informed populace regarding critical medical considerations related to organ donation and transplantation. Overall, the data provides valuable insights into the perceptions and attitudes of the Saudi population towards organ transplantation and donation, shedding light on the interplay between medical, cultural, and religious factors in shaping these perspectives.

Table (2): participants knowledge regarding heart donation and transplantation (n=1238).

Parameter		**No.**	**Percent (%)**
Do you think the concept of organ transplantation is acceptable?	Yes	1048	84.7
	No	190	15.3
If not, is it for religious reasons?	Yes	227	18.3
	No	1011	81.7
Do you think organ transplantation is humane?	Yes	1191	96.2
	No	47	3.8
Do you think the concept of heart transplantation is acceptable?	Yes	1051	84.9
	No	187	15.1
If not, is it for religious reasons?	Yes	235	19.0
	No	1003	81.0
Do you know someone who has had an organ transplant?	Yes	563	45.5
	No	675	54.5

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Do you know someone who has had a heart transplant?	Yes	209	16.9
	No	1029	83.1
Do you know someone who is waiting for an organ transplant?	Yes	352	28.4
	No	886	71.6
Do you think organ donation saves lives?	Yes	1172	94.7
	No	66	5.3
Do you think organ donation is regulated?	Yes	999	80.7
	No	239	19.3
Do you have a heart problem?	Yes	81	6.5
	No	1157	93.5
Do you have a relative with a heart problem?	Yes	641	51.8
	No	597	48.2
Have you ever donated blood?	Yes	380	30.7
	No	858	69.3
Do you think that doctors would try less to save your life if they were aware that you are a registered organ donor?	Yes	438	35.4
	No	800	64.6
Do you think that the body is treated respectfully by doctors and nurses after organ donation?	Yes	1054	85.1
	No	184	14.9
Do you think the heart is taken from a person after their death?	Yes	745	60.2
	No	493	39.8
Do you think the heart is taken whilst the person is alive?	Yes	433	35.0
	No	805	65.0
Have you heard of brain death?	Yes	1163	93.9
	No	75	6.1
Do you know what brain death means?	Yes	1052	85.0
	No	186	15.0
Have you heard of artificial hearts?	Yes	709	57.3

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	No	529	42.7

Table (3) reveals that the majority of individuals exhibit a low level of knowledge, with 75.1% falling into this category. Meanwhile, 22.4% show a moderate level of knowledge, and only 2.5% display a high level of knowledge. These findings underscore the need for targeted efforts to increase knowledge level and address potential barriers to heart transplantation and donation in Saudi Arabia.

Table (3): Shows knowledge regarding heart donation and transplantation score results.

	Frequency	**Percent**
High level	31	2.5
Low level	930	75.1
Moderate level	277	22.4
Total	1238	100.0

As illustrated in table (4), The majority of respondents expressed willingness to donate organs while alive, particularly to relatives, with 67.6% indicating a positive inclination towards such donations. However, the percentage decreases significantly when considering donation to non-relatives, with only 33.5% expressing a similar willingness. When specifically asked about donating a heart, 36.7% of respondents indicated their readiness, while 63.3% were not inclined towards such a donation. Interestingly, a higher percentage (75.8%) expressed willingness to donate organs to relatives after their death, compared to the percentage willing to donate to non-relatives (63.5%). Moreover, a significant proportion (82.6%) expressed willingness to donate money to support organ transplantation, highlighting a positive attitude towards contributing to the cause. In terms of personal preferences, a substantial majority (74.9%) indicated a preference for heart transplantation if needed for themselves, while a smaller percentage (48.7%) expressed a preference for an artificial heart. Similarly, when considering a family member's need for transplantation, 85.9% preferred heart transplantation, while 56.7% preferred an artificial heart. This data provides valuable insights into the attitudes and preferences of the Saudi population regarding organ donation and heart transplantation, indicating a generally positive outlook towards donation and transplantation, particularly within familial contexts.

Table (4): Parameters related to attitude about heart donation and transplantation among Saudi population (n=1238).

Parameter		**No.**	**Percent (%)**
Would you donate an organ while alive to a relative?	Yes	837	67.6

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	No	401	32.4
Would you donate an organ to a non-relative whilst alive?	Yes	415	33.5
	No	823	66.5
Would you donate a heart?	Yes	454	36.7
	No	784	63.3
Would you donate an organ to a relative after your death?	Yes	939	75.8
	No	299	24.2
Would you donate an organ to a non-relative after your death?	Yes	786	63.5
	No	452	36.5
Would you consent to the organ donation of a relative whilst they are alive?	Yes	443	35.8
	No	795	64.2
Would you consent to the organ donation of a relative after his death?	Yes	682	55.1
	No	556	44.9
Would you donate money to support an organ transplantation?	Yes	1023	82.6
	No	215	17.4
If needed for yourself, would you prefer heart transplantation?	Yes	927	74.9
	No	311	25.1
If needed for yourself, would you prefer an artificial heart?	Yes	603	48.7
	No	635	51.3
If needed for a family member, would you prefer heart transplantation?	Yes	1064	85.9
	No	174	14.1
If needed for a family member, would you prefer an artificial heart?	Yes	702	56.7
	No	536	43.3

Table (5) reveals the attitudes of the Saudi population towards heart transplantation and donation. The table indicates that 21.9% of respondents exhibited a positive attitude, 26.4% displayed a moderate attitude, and 51.7% expressed a negative attitude. These findings highlight the prevalence of scepticism or reluctance towards heart donation and transplantation within the Saudi population. Understanding and addressing the factors contributing to these attitudes is crucial for promoting organ donation and

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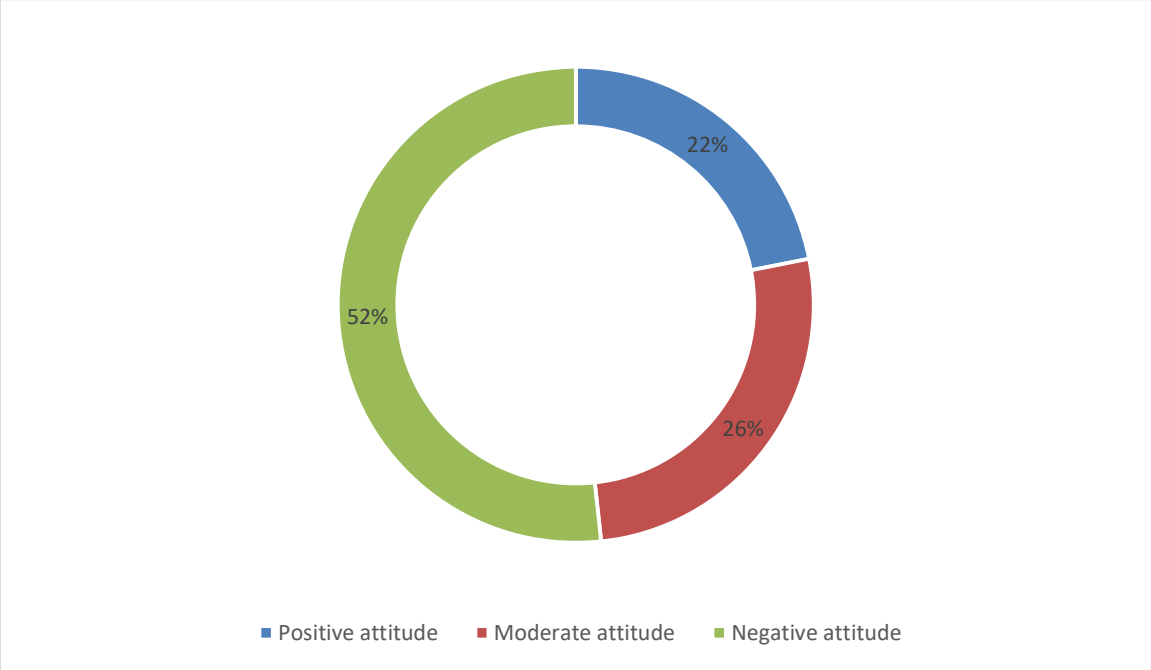
improving acceptance rates for heart transplantation.

Table (5): Shows attitude regarding heart donation and transplantation score results.

	Frequency	**Percent (%)**
Positive attitude	271	21.9
Moderate attitude	327	26.4
Negative attitude	640	51.7
Total	1238	100.0

Figure (2): illustrates the attitude towards organ transplantation among participants (n=1238)



In Table (6) there is a significant association between age group and knowledge level, additionally, occupation and residential area also exhibit significant associations with knowledge level. Moreover, marital status seems to be linked to knowledge level, with single individuals displaying a lower level of knowledge compared to married individuals.

Table (6): Relation between level of knowledge regarding organ transplantation and sociodemographic data (n=1238).

Parameters	**Knowledge level**		**Total (N=1238)**	**P value***
	Low	**Moderate or high**		

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Gender	Female	722	232	954	0.403
		77.6%	75.3%	77.1%	
	Male	208	76	284	
		22.4%	24.7%	22.9%	
Age group	18-30	566	125	691	0.0001
		60.9%	40.6%	55.8%	
	30-40	123	60	183	
		13.2%	19.5%	14.8%	
	> 40	241	123	364	
		25.9%	39.9%	29.4%	
Occupation	Student	374	72	446	0.0001
		40.2%	23.4%	36.0%	
	Other	65	25	90	
		7.0%	8.1%	7.3%	
	Unemployed	153	54	207	
		16.5%	17.5%	16.7%	
	Retired	25	10	35	
		2.7%	3.2%	2.8%	
	Government employee	207	116	323	
		22.3%	37.7%	26.1%	
	Non-government employee	106	31	137	
		11.4%	10.1%	11.1%	
Residential Area	Southern	171	66	237	0.003
		18.4%	21.4%	19.1%	
	Eastern	279	91	370	
		30.0%	29.5%	29.9%	

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	Northern	182	84	266	
		19.6%	27.3%	21.5%	
	Western	176	37	213	
		18.9%	12.0%	17.2%	
	Middle	122	30	152	
		13.1%	9.7%	12.3%	
Education Level	Primary school	5	2	7	0.605
		0.5%	0.6%	0.6%	
	Middle school	20	5	25	
		2.2%	1.6%	2.0%	
	High school	190	55	245	
		20.4%	17.9%	19.8%	
	University or higher	706	245	951	
		75.9%	79.5%	76.8%	
	Other	9	1	10	
		1.0%	0.3%	0.8%	
Marital status	Widowed	13	8	21	0.0001
		1.4%	2.6%	1.7%	
	Single	505	112	617	
		54.3%	36.4%	49.8%	
	Married	381	171	552	
		41.0%	55.5%	44.6%	
	Divorced	31	17	48	
		3.3%	5.5%	3.9%	

P value was considered significant if ≤ 0.05.

Table (7) shows there is a significant association between residential area and attitude towards transplantation (p=0.041). Furthermore, while gender, age group, occupation, education level, and

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marital status do not show significant associations with attitude towards transplantation, these factors still provide valuable insights into the diverse perspectives within the Saudi population.

Table (7): participants attitude towards organ transplantation in association with Saudi population sociodemographic data (n=1238).

Parameters		**Attitude towards transplantation**			**Total (N=1238)**	**P value***
		Positive	**Moderate**	**Negative**		
Gender	Female	215	259	480	954	0.204
		79.3%	79.2%	75.0%	77.1%	
	Male	56	68	160	284	
		20.7%	20.8%	25.0%	22.9%	
Age group	18-30	143	192	356	691	0.666
		52.8%	58.7%	55.6%	55.8%	
	30-40	45	44	94	183	
		16.6%	13.5%	14.7%	14.8%	
	> 40	83	91	190	364	
		30.6%	27.8%	29.7%	29.4%	
Occupation	Student	93	124	229	446	0.846
		34.3%	37.9%	35.8%	36.0%	
	Other	21	23	46	90	
		7.7%	7.0%	7.2%	7.3%	
	Unemployed	44	59	104	207	
		16.2%	18.0%	16.3%	16.7%	
	Retired	8	6	21	35	
		3.0%	1.8%	3.3%	2.8%	
	Government employee	68	85	170	323	
		25.1%	26.0%	26.6%	26.1%	
		37	30	70	137	

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	Non-government employee	13.7%	9.2%	10.9%	11.1%	
Residential Area	Southern	64	59	114	237	0.041
		23.6%	18.0%	17.8%	19.1%	
	Eastern	73	94	203	370	
		26.9%	28.7%	31.7%	29.9%	
	Northern	68	66	132	266	
		25.1%	20.2%	20.6%	21.5%	
	Western	30	65	118	213	
		11.1%	19.9%	18.4%	17.2%	
	Middle	36	43	73	152	
		13.3%	13.1%	11.4%	12.3%	
Education Level	Primary school	2	1	4	7	0.236
		0.7%	0.3%	0.6%	0.6%	
	Middle school	9	4	12	25	
		3.3%	1.2%	1.9%	2.0%	
	High school	51	69	125	245	
		18.8%	21.1%	19.5%	19.8%	
	University or higher	209	252	490	951	
		77.1%	77.1%	76.6%	76.8%	
	Other	0	1	9	10	
		0.0%	0.3%	1.4%	0.8%	
Marital status	Widowed	6	5	10	21	0.189
		2.2%	1.5%	1.6%	1.7%	
	Single	124	179	314	617	

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	45.8%	54.7%	49.1%	49.8%
Married	131	136	285	552
	48.3%	41.6%	44.5%	44.6%
Divorced	10	7	31	48
	3.7%	2.1%	4.8%	3.9%

P value was considered significant if ≤ 0.05.

Discussion:

The prevalence of heart failure in developed countries ranges from 1% to 2%, rising to ≥10% among those aged >70 years. The increasing survival and the lack of decline in the incidence of patients with heart failure only contributes to the heart failure (HF) epidemic (14). Patients with HF carry a poor prognosis, with survival estimates post HF diagnosis of only 50% and 10% at 5 and 10 years (15). Advanced HF accounts for 6-25% of all patients with HF, and is associated with significant costs and resource consumption, secondly foremost to recurrent hospitalizations (16). The only viable treatment option for these patients is assist devices and heart transplantation, the latter of which is standard therapy. Organ transplantation preserves thousands of lives, affording recipients a second chance at life. Vital organs, such as the heart, pancreas, liver, kidneys, and lungs, can be transplanted to individuals experiencing organ failure. The process of organ donation presents a multifaceted challenge, encompassing medical, legal, ethical, organizational, and societal aspects (17).

Cardiac transplantation is the most effective treatment strategy for patients with end-stage heart disease who do not respond to medication or device therapy. It is used as a last-resort, efficient technique to enhance patients' quality of life and extend their life expectancy. In Saudi Arabia, only 2 cardiac centers perform a total of approximately 30 heart transplantations per year (18). Data pertaining to requirements for heart transplantation are lacking; however, by extrapolating from US data, (19) there is more than 400 persons per year require heart transplantation, resulting in over 90% of patients in need of this lifesaving treatment. This lack of supply is likely due to the low rate of donation and shortages in organ donor utilization. Until recently, no study has specifically addressed the need for heart transplantation in Saudi Arabia. Here, we sought to understand the attitudes and willingness of the Saudi populations towards heart donation and transplantation to identify areas that may help bridge the gap between demand and availability of donor hearts.

Regarding participants knowledge towards heart donation and transplantation, we have found that the overwhelming majority of respondents, 84.7%, expressed acceptance of the concept of organ transplantation, indicating a positive disposition towards this life-saving medical procedure. Furthermore, an even higher percentage, 96.2%, deemed organ transplantation as a humane practice. A significant proportion of respondents, 45.5%, reported knowing someone who has undergone an organ transplant, highlighting the pervasive impact of this medical intervention within the community. However, it is noteworthy that a considerable number of individuals, 15.3%, expressed reservations about organ transplantation, with 18.3% attributing their reluctance to religious reasons. Moreover, the data indicates a relatively lower awareness and acceptance of heart transplantation, with 15.1%

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expressing disapproval of this specific procedure. We have also found that the majority of respondents expressed willingness to donate organs while alive, particularly to relatives, with 67.6% indicating a positive inclination towards such donations. However, the percentage decreases significantly when considering donation to non-relatives, with only 33.5% expressing a similar willingness. According to 2015 data from the Saudi Center for Organ Transplantation (SCOT), only 30.4% of families to the 332 eligible DBD donors consented to organ donation, (20) a figure that is significantly lower than the 57.8% of survey respondents who would consent if in the same situation. On the other hand, A US 2012 National Survey of organ donation attitudes and behavior showed that 94.9% of adults supported organ donation which is much higher than our results (21). Almost two-thirds of respondents (60.1%) were registered for donation on their driver's license, 24.2% were open to considering donation, and 15% were hesitant on the concept. A large proportion of family members stated they would consent to organ donation of a relative if they were aware of the relatives wishes, and to a lesser extent (but still considerably high) if unaware of the relatives wishes (96.7% versus 75.7%), which is relatively higher than our results. A study in Belgium examined the attitudes to organ donation across 3 generations (22). Overall, 80.2% of respondents were in favor of organ donation which is relatively higher than our results, 60% of whom were 'unconditionally positive', and the remaining 40% 'positive, with reservations' which is relatively lower than our results. A survey in Iran involving 93 teachers found that 86% favored organ donation which is similar to our results, with 70% open to donating their organs after death (23).

Regarding parameters related to attitude about heart donation and transplantation among Saudi population, we have found 36.7% of respondents indicated their readiness towards heart donation, while 63.3% were not inclined towards such a donation. Interestingly, a higher percentage (75.8%) expressed willingness to donate organs to relatives after their death, compared to the percentage willing to donate to non-relatives (63.5%). Moreover, a significant proportion (82.6%) expressed willingness to donate money to support organ transplantation, highlighting a positive attitude towards contributing to the cause. In terms of personal preferences, a substantial majority (74.9%) indicated a preference for heart transplantation if needed for themselves, while a smaller percentage (48.7%) expressed a preference for an artificial heart. Similarly, when considering a family member's need for transplantation, 85.9% preferred heart transplantation, while 56.7% preferred an artificial heart. Unlike our study results regarding religious factor in heart donation, a cross-sectional study conducted by Walid Abukhudair et.al, in Saudi arabia revealed that the most prevalent reason for donating was the belief of obtaining heavenly rewards and preserving the survival and vitality in others which was reported by 79.7% of respondents, which can be related to the religious belief. Religion was, in fact, a major factor in the willingness or unwillingness to donate in many parts of the world; therefore, these findings highlight the significance of religious leaders' roles in this regard around all over the world (24). Regarding the relation between level of knowledge about organ transplantation and sociodemographic data, we have found a significant association between age group and knowledge level Additionally, occupation and residential area also exhibit significant associations with knowledge level. Moreover, marital status seems to be linked to knowledge level, with single individuals displaying a lower level of knowledge compared to married individuals, there is also a significant association between residential area and attitude towards transplantation ($p=0.041$). Furthermore, while gender, age group, occupation,

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education level, and marital status do not show significant associations with attitude towards transplantation. Another study conducted in Saudi arabia revealed a clear difference in response according to age, with regard to gender, a similar proportion of males and females accepted the concept of organ transplantation (90.2% versus 93.2%; *p*=0.052), heart transplantation (84.4% versus 81%; *p*=0.2), and organ donation to a relative (80.1% versus 82.3%; *p*=0.3) which is inconsistent with our results, there is also a significantly lower willingness to donate a heart in the lower education group compared with those with higher education (38.6% versus 45.6%; *p*=0.024) which is inconsistent with our results (p value = 0.236) (25). Regarding attitude towards heart donation and transplantation score, there is 21.9% of respondents exhibited a positive attitude, 26.4% displayed a moderate attitude, and 51.7% expressed a negative attitude. These findings highlight the prevalence of scepticism or reluctance towards heart donation and transplantation within the Saudi population. On the other hand, another study conducted in Saudi Arabia, revealed that participants displayed a moderate level of knowledge about HD, with roughly half holding unfavorable attitudes toward HD. A considerable percentage of participants 62.0% were unwilling to register as heart donors (26, 27).

Conclusion:

With the growing burden of heart failure and advanced disease there is an increasing need for heart transplants and donation. The Saudi community accepts the concept of transplantation (85%) and are generally willing to donate; however, many still have some reservation towards heart donation. More effort is required to dispel current misconceptions, increase the awareness, and work with regulators to identify their role and expand the pool of donors in Saudi Arabia. Aligning these initiatives with current policies will help increase heart donation rates and curb the growing gap between supply and demand.

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Ethical approval

Ethical approval was obtained from the research ethics committee of New Najran General Hospital, Najran Health Cluster, with Application number: [2024-04 E]. An informed consent was obtained from each participant after explaining the study in full and clarifying that participation is voluntary. Data collected were securely saved and used for research purposes only.

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Conflict of interests

The authors declare that there are no conflicts of interest.

Informed consent:

Written informed consent was obtained from all individual participants included in the study.

Data and materials availability

All data associated with this study are present in the paper.

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