

Level of Knowledge and Attitude of the General Population Regarding Kidney Donation in the Eastern Region of Saudi Arabia

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Abstract

Kidney transplantation remains the most effective treatment for end-stage kidney disease (ESKD); however, organ donation rates continue to lag behind the demand for transplantation. Understanding public knowledge and attitudes is essential to inform educational and policy interventions. A cross-sectional survey was conducted using a structured, validated online questionnaire distributed over 18 months. In total, 722 Saudi adults residing in the Eastern Region participated in this study. Associations between sociodemographic factors and attitudes toward donation were evaluated using descriptive statistics and chi-square tests. Although 63.4% of the participants expressed a positive attitude toward kidney donation, only 47.4% indicated willingness to donate a kidney. Awareness of donation complications was low (24.1%), with hypertension (13.7%) and renal failure (12.3%) being the most cited complications. Social media was the most common source of information (81.2%), whereas only 39.8% of the respondents were aware of national laws regulating donation. The main barriers were fear of inadequate medical care (39.9%) and lack of knowledge (35.5%). Notably, 65.2% of the participants expressed interest in attending the educational sessions. In the Eastern Region of Saudi Arabia, misconceptions and knowledge gaps regarding kidney donation persist despite a generally positive attitude. To address barriers and improve donor engagement, targeted, culturally sensitive educational campaigns particularly via social media and religious channels are essential.

Keyword: Kidney, donation, transplant

1. Introduction

End-stage kidney disease (ESKD) is a major global public health challenge, associated with significant morbidity, mortality, and healthcare costs. The prevalence of chronic kidney disease continues to rise worldwide due to increasing rates of diabetes, hypertension, obesity, and aging populations. For patients who progress to ESKD, kidney transplantation is widely recognized as the most effective treatment option, offering improved survival rates, enhanced quality of life, and reduced long-term healthcare expenditures

compared with dialysis. Despite these benefits, the availability of donor kidneys remains substantially lower than the growing demand for transplantation, resulting in prolonged waiting times and increased mortality among patients awaiting transplants.

Organ donation plays a crucial role in addressing the shortage of transplantable kidneys. Both living and deceased donor programs contribute significantly to transplantation services; however, their success depends largely on public awareness, acceptance, and willingness to donate. Numerous studies have shown that knowledge, cultural beliefs, religious perspectives, and trust in healthcare systems influence individuals' decisions regarding organ donation. Misconceptions about the donation process, concerns about potential health risks, and lack of understanding of legal and ethical frameworks often discourage people from becoming donors.

In Saudi Arabia, chronic kidney disease and ESKD represent an increasing healthcare burden. The country has made considerable efforts to promote organ donation through national initiatives, public awareness campaigns, and the establishment of regulatory bodies responsible for transplantation services. Furthermore, Islamic scholars have generally supported organ donation as a humanitarian act that can save lives. Nevertheless, donation rates remain insufficient to meet the needs of patients requiring kidney transplantation. Previous research has suggested that gaps in public knowledge, limited awareness of donation regulations, and concerns regarding medical complications continue to hinder donor participation.

Public perception and awareness are particularly important in regions where cultural and social factors strongly influence health-related decisions. Understanding the level of knowledge, attitudes, and perceived barriers among the general population can provide valuable insights for developing effective educational interventions and policies. In recent years, social media has emerged as a powerful source of health information, offering new opportunities for promoting awareness about organ donation and correcting common misconceptions. However, the accuracy and quality of information available through these platforms may vary, highlighting the need for evidence-based educational strategies.

Given the persistent shortage of donor kidneys and the importance of public engagement in transplantation programs, assessing community knowledge and attitudes toward kidney donation is essential. Therefore, this study aims to evaluate the knowledge, attitudes, awareness, and perceived barriers related to kidney donation among adults in the Eastern Region of Saudi Arabia. The findings are expected to support the development of targeted, culturally appropriate educational campaigns and policy initiatives that can enhance public understanding, increase willingness to donate, and ultimately contribute to improving organ donation rates in the region.

2. Materials and Methods

A descriptive cross-sectional study was conducted in the eastern region of Saudi Arabia over an estimated period of 18 months, extending across the years 2024 and 2025.

The Eastern Region of Saudi Arabia is one of the kingdom's 13 administrative regions and is the largest by area. It includes major cities and areas that are important both economically and demographically such as Al-Ahsa, Dammam, Al Khobar, and others. Eligibility for participation in this study was limited to members of the general public including both male and female residing in the eastern region of Saudi Arabia, aged 18 years or older, and willing to provide informed consent.

The exclusion criteria included all participants who are not from the eastern region of Saudi Arabia, refused participation, or did not achieve the minimum age requirement for the study.

Given a 5% margin of error, a 95% confidence level, and the assumption of maximum response variability (50% response distribution), the minimum sample size needed was found to be 360 people. To make sure the sample size was statistically adequate, an online sample size calculator was used to figure it out. An online

questionnaire was used to collect data, and it was sent out through Google Forms on different social media platforms. Even though more than 800 people responded to the survey at first, 722 were included in the final sample. The other responses were not included because they came from participants who lived outside the Eastern Region or from participants who did not agree to fill out the questionnaire.

Ethical consideration:

The consent for this study was obtained by the Deanship of Scientific Research of King Faisal University, reference number (KFU-REC-2024-MAR-ETHICS2085).

We used a questionnaire from a previous article to ensure the validity and relevance of the items [1]. The survey explored multiple areas, gathering information on participants' background characteristics, asking about things like the participants' backgrounds, whether they had chronic medical conditions, whether they had relatives who had kidney failure, and how much their knowledge and perceptions about organ donation, particularly in relation to kidney transplants.

To ensure the effectiveness of the research survey, a pilot study was carried out involving 40 volunteers selected from the intended study population. This preliminary phase aimed to evaluate the clarity, coherence, and ease of interpretation of the questionnaire items. Based on the outcomes, the survey was then submitted for expert review, during which 5 independent specialists from internal medicine critically examined its validity, reliability, and relevance in relation to the study's goals.

Statistical analysis:

Statistical analyses were performed with SPSS software version 23 (IBM, Armonk, NY, USA). Categorical variables were presented as frequencies and percentages. Continuous data were expressed as medians and interquartile ranges (IQR) for not-normally distributed data. Cross-tabulation was done between (previous hearing about kidney donation, participants' willingness to donate a kidney, and participants' demographic characteristics). Statistical significance was tested using a chi-square test to detect any association between the categorical variables. Independent-samples Mann-Whitney U Test to compare the average and to detect any association of (Age across previous hearing about kidney donation and participants' willingness to donate a kidney). The level of significance was set at a P-value <0.05

3. Results

Out of 810 individuals initially approached, 88 were excluded due to refusal to participate (n = 20), non-Saudi nationality (n = 44), or residence outside the Eastern Province (n = 24). The final sample consisted of 722 participants, predominantly female (73.7%) and residing in the city (75.6%). The largest proportions were from Qatif (44.9%) and Al-Ahsa (37.7%). Over half held a university degree or higher (56.7%), and were employed (54.1%).

Chronic diseases were reported by 26.5%, with hypertension (9.0%) and diabetes (6.1%) being the most common. Among those affected, 20.1% were on medication. A relative with kidney failure was reported by 31.4%, while 3.6% of participants had kidney failure themselves, receiving treatments such as transplantation (2.1%) or hemodialysis (1.4%) (**Table 1**).

Table 1. Distribution of studied participants according to their demographic characteristics, chronic diseases, and having a relative with kidney failure (N=722).

Variable	N (%)
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Age	37 (19)*
Gender	
Male	(26.3%)
Female	532 (73.7%)
The city	
Dammam	44 (6.1%)
Khobar	27 (3.6%)
Nairiyah	12 (1.7%)
Al-ahsa	272 (37.7%)
Jubail	18 (2.5%)
Al-khafji	5 (0.7%)
Dhahran	1 (0.1%)
Qatif	324 (44.9%)
Abqaiq	17 (2.4%)
Hafar al-batin	2 (0.3%)
Risedant	
Cities	546 (75.6%)
Villages	176 (24.4%)
Educational Level	
University or higher	409 (56.7%)
Below university	313 (43.3%)
Current work	
Housewife	40 (5.5%)
Employee	356 (49.3%)
Business owner	34 (4.7%)
Unemployed	141 (19.5%)
Student	122 (16.9%)
Retired	29 (4.0%)
Marital status	
Married	497 (68.8%)
Single	198 (27.4%)
Widow	8 (1.1%)
Divorced	19 (2.6%)
Do you suffer from chronic diseases?	
Yes	191 (26.5%)
No	531 (73.5%)
If yes, what you suffer from? (Participant can choose more than one answer)	SZ: 191
HTN	65 (9.0%)
DM	44 (6.1%)
Heart Disease	18 (2.5%)
Tumors	8 (1.1%)
Endocrin Disease	24 (3.3%)
Rheumatism	6 (0.8%)
Slipped Disec	1 (0.1%)
Hyperlipidimia	4 (0.6%)

Brain disease	5 (0.7%)	
Blood disorder	19 (2.6%)	
Respiratory	9 (1.2%)	
GIT	5 (0.7%)	
Other	11 (0.15%)	
If you have a chronic illness, do you take any medication for it?	SZ: 191	
Yes	145 (20.1%)	
No	46 (6.4%)	
Do you have a relative with kidney failure?		
Yes	227 (31.4%)	
No	495 (68.6%)	
Do you have kidney failure?		
Yes	26 (3.6%)	
No	696 (96.4%)	
If you have kidney failure, what is your current treatment?	SZ: 26	
Kidney transplant	15 (2.1%)	
Peritoneal dialysis	1 (0.1%)	
Hemodialysis	10	(1.4%)
*Median (IQR)		

As shown in **Table 2**. Among the 722 participants, only 24.1% reported being aware of complications related to kidney donation. The most commonly recognized complications included hypertension (13.7%) and renal failure (12.3%). Regarding the perceived risk of kidney failure in healthy donors' post-donation, 24.3% estimated the risk to be less than 20%, while the majority (70.8%) chose "I don't know".

Social media was identified as the primary source for raising awareness about kidney donation (81.2%), followed by programs and workshops in public places (13.7%). Most participants (96.1%) had heard of kidney donation, with social media (64.0%), family members (35.9%), and the internet (40.9%) cited as the main sources of information.

Regarding the concept of donation, 79.5% related it with living donation, 38.9% with postmortem donation, and 28.7% with brain death.

Although only 4.2% of respondents had personal experience with kidney donation, 65.2% stated they would be open to attend educational lectures on the topic. Awareness of Saudi Arabia's laws and regulations on kidney donation and transplantation was limited to 39.8% of participants.

Also, about half (49.2%) agreed to donate a relative's kidney post-mortem, but only 38.8% accepted donation in cases of brain death. When asked about recipients, 44.0% preferred donating to relatives, while 55.5% were willing to donate to both relatives and non-relatives.

Table 2. Distribution of studied participants according to their knowledge and attitude toward kidney donation (N=722).

Variable	N (%)
Do you know about kidney donation complications?	
Yes	174 (24.1%)
No	548 (75.9%)
If yes, choose the known complications of kidney donation: (Participant	SZ: 174

can choose more than one answer)

Renal failure	89 (12.3%)
HTN	99 (13.7%)
Gout	74 (10.2%)
Other	4 (0.6%)

How much kidney failure after kidney donation is for healthy donors?

Little <5%	84 (11.6%)
5%-19%	92 (12.7%)
High \geq 20%	35 (4.8%)
Don't know	511 (70.8%)

What do you think is the best way to raise awareness about kidney donation?

Social media	587 (81.3%)
TV	20 (2.8%)
Newspapers and magazines	6 (0.8%)
Programs and workshops in markets and public places	99 (13.7%)
Encouragement with money or vacations	2 (0.3%)
Putting brochures	3 (0.4%)
Government support	1 (0.1%)
All	4 (0.6%)

Have you ever heard of kidney donation?

Yes	694 (96.1%)
No	28 (3.9%)

If your answer to the previous question is yes, where did you hear about kidney donation? (Participant can choose more than one answer)

SZ: 694

Family members	249 (35.9%)
Friends	181 (26.1%)
Social media	444 (64.0%)
Internet	284 (40.9%)
Educational settings	100 (14.4%)
Healthcare workers	196 (28.2%)
Newspapers and magazines	88 (12.7%)
TV	214 (30.8%)

What does the concept of donation relate to according to your point of view (Participant can choose more than one answer)?

Life donation	574 (79.5%)
Brain death	207 (28.7%)
Postmortem donation	281 (38.9%)
Organ trading	66 (9.1%)
Don't know	80 (11.1%)

Do you have experience with kidney donation?

Yes	30 (4.2%)
No	692 (95.8%)

If we give a lecture on "Kidney Donation," would you like to participate?

Yes	471 (65.2%)
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No	251 (4.8%)
Are you aware of the laws and regulations regarding kidney donation and transplantation in your home country of Saudi Arabia?	
Yes	287 (39.8%)
No	435 (60.2%)
Would you agree to donate a relative's kidney after his or her death?	
Yes	355 (49.2%)
No	367 (50.8%)
Would you agree to donate the kidney of a relative who is suffering from brain death?	
Yes	280 (38.8%)
No	442 (61.2%)
Who would you like to donate kidneys to?	
Relatives	318 (44.0%)
Foreigners	3 (0.5%)
Both	401 (55.5%)
Do you encourage kidney donation?	
Yes	648 (89.8%)
No	74 (10.2%)
Would you like to donate one of your kidney?	
Yes	342 (47.4%)
No	380 (52.6%)

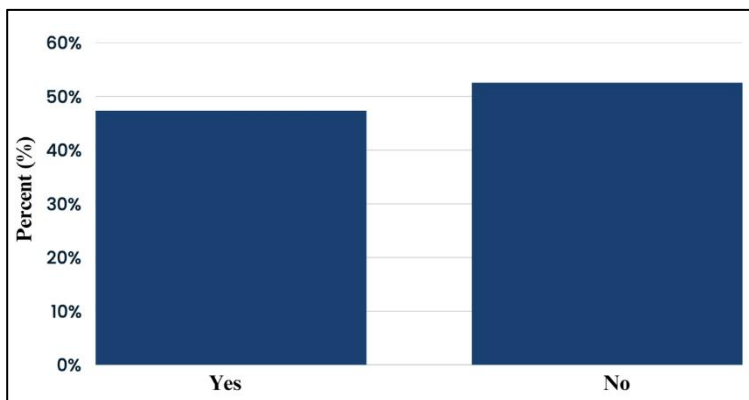


Figure 1. Percentage distribution of studied participants according to their willingness to donate their kidney one day.

As shown in **Table 3**. Among the 722 participants, 47.4% (n=342) agreed to donate a kidney, while 52.6% (n=380) refused. (**Figure 1**). Regarding the timing of donation, 9.8% preferred donating during their lifetime, 19.4% after death, and 18.1% were willing to donate at any time.

Motivations for donation included pure intention to help the needy (43.2%), religious beliefs (10.9%), and the belief that "there is no harm to me, so why not?" (15.0%).

Among those refusing donation, the main reasons were fear of inadequate medical care (39.9%), lack of knowledge about organ donation (35.5%), social and parental influence (27.8%), and concerns about posthumous body integrity (21.1%). Religious beliefs accounted for 10.8% of refusals.

Despite the refusals, 56.1% indicated they would donate if encouraged by law and religion, whereas 43.9% would still decline.

Table 3. Distribution of participants who agreed and who refused kidney donation according to circumstances related to donation and their attitude toward kidney donation.

Table 3. A. For those who agreed for kidney donation, N = 342 (47.4%)

Variable	N (%)
When would you like to donate?	
During life	71 (9.8%)
After death	140 (19.4%)
Any time	131 (18.1%)
If you agree to donate kidneys, what is the reason why you should do so? (Participant can choose more than one answer).	
Financial purpose	14 (1.9%)
Pure intention to help the needy	312 (43.2%)
Religious beliefs	79 (10.9%)
You won't hurt me, so why not?	108 (15.0%)

Table 3. B. For those who refused kidney donation, N = 380 (52.6%)

Variable	N (%)
If you refuse to donate a kidney, what is the reason for not doing the donation process? (Participant can choose more than one answer)	
Lack of financial return	31 (4.3%)
Fear of not getting the necessary medical attention	288 (39.9%)
lack of integrity in the selection of patients benefiting from organs	90 (12.5%)
The influence of parents and society	201 (27.8%)
Fear of killing or causing death in order to get organs	106 (14.7%)
Fear of talking about death	58 (8.0%)
Rejection of the idea of a posthumous body representation	152 (21.1%)
Religious beliefs	78 (10.8%)
Lack of knowledge about organ donation	256 (35.5%)
Other	33 (4.6%)
If the law and religion encourage you to donate your kidneys, do you?	
Yes	213 (56.1%)
No	167 (43.9%)

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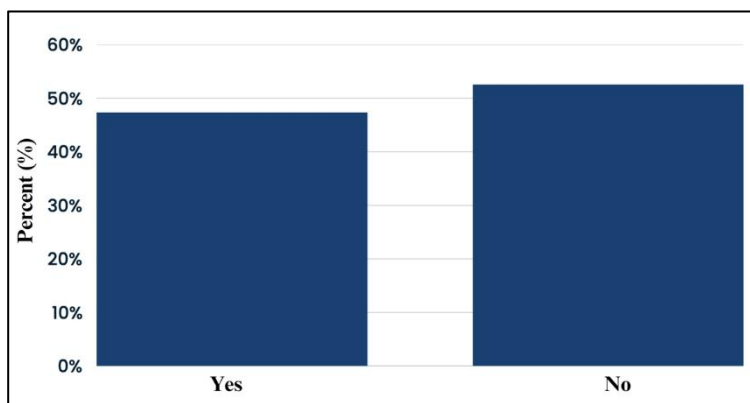


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In Table 4. Age showed no significant difference between participants who had heard of kidney donation (median 37.00) and those who had not (median 33.00) ($p = 0.304$). Gender distribution was similar with no statistically significant difference (male: 24.9% vs. 1.4%, female: 71.2% vs. 2.5%, $p = 0.249$). Also, in the city of residence, no significant difference was observed ($p = 0.206$). There was no major disparity in residency (cities vs. villages) ($p = 0.938$), educational level ($p = 0.738$), current work status ($p = 0.735$), or marital status ($p = 0.497$).

The presence of chronic diseases ($p = 0.539$), medication use for chronic illnesses ($p = 0.590$), having a relative with kidney failure ($p = 0.619$), and participants' own kidney failure status ($p = 0.305$) were not significantly associated with having heard of kidney donation. Current treatment for kidney failure also showed no significant difference ($p = 0.914$). Experience with kidney donation ($p = 0.261$), willingness to participate in a kidney donation lecture ($p = 0.268$), and willingness to donate a kidney ($p = 0.149$) also had no significant association.

Table 4. Relationship between previous hearing about kidney donation and participants' demographic characteristics, chronic diseases, having a relative with kidney failure, experience with kidney donation, and attitude toward a lecture on "Kidney Donation" and willingness to donate ($N = 722$).

Variable	Have you ever heard of kidney donation?		p-value"	p-value'	OR	95% C.I.for EXP(B)	
	Yes (%)	No (%)				Lower	Upper
Age	37.00 (19)*	33.00 (17)*	0.304	0.291	0.982	0.949	1.016
Gender							
Male	180 (24.9%)	10 (1.4%)	0.249	0.253	1.586	0.719	3.501
Female	514 (71.2%)	18 (2.5%)					
The city							
Dammam	44 (6.1%)	0 (0.0%)					
Khobar	23 (3.2%)	4 (0.6%)					
Al-Nairyiah	12 (1.7%)	0 (0.0%)					
Al-ahsa	258 (35.7%)	14 (1.9%)					
Jubail	16 (2.2%)	2 (0.3%)	0.043	0.087	0.873	0.746	1.020
Al-khafji	5 (0.7%)	0 (0.0%)					
Dhahran	1 (0.1%)	0 (0.0%)					
Qatif	316 (43.8%)	8 (1.1%)					
Abqaiq	17 (2.4%)	0 (0.0%)					
Hafar al-batin	2 (0.3%)	0 (0.0%)					
Risedant							
Cities	525 (72.7%)	21 (2.9%)	0.938	0.938	1.036	0.433	2.479
Villages	169 (23.4%)	7 (1.0%)					

Educational Level

University or higher	394 (54.6%)	15 (2.1%)	0.738	0.738	1.138	0.534	2.428
Below university	300 (41.6%)	13 (1.8%)					

Current work

Housewife	40 (5.5%)	0 (0.0%)					
Employee	341 (47.2%)	15 (2.1%)					
Business owner	33 (4.6%)	1 (0.1%)	0.633	0.933	1.012	0.772	1.325
Unemployed	134 (18.6%)	7 (1.0%)					
Student	117 (16.2%)	5 (0.7%)					
retired	29 (4.0%)	0 (0.0%)					

Marital status

Married	478 (66.2%)	19 (2.6%)					
Single	190 (26.3%)	8 (1.1%)	0.497	0.879	0.954	0.521	1.745
Widow	7 (1.0%)	1 (0.1%)					
Divorced	19 (2.6%)	0 (0.0%)					

Do you suffer from chronic diseases?

Yes	185 (25.6%)	6 (0.8%)	0.539	0.540	0.750	0.300	1.880
No	509 (70.5%)	22 (3.0%)					

If you have a chronic illness, do you take any medication for it?

Yes	141 (73.8%)	4 (2.1%)					
No	44 (23.0%)	2 (1.0%)	0.590	0.593	1.602	0.248	9.045

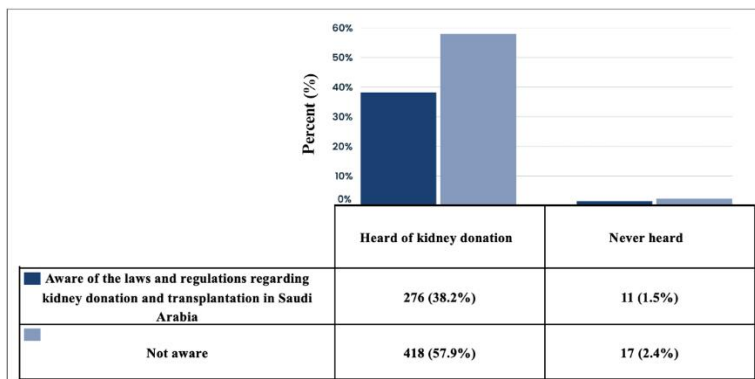
Do you have a relative with kidney failure?

Yes	217 (30.1%)	10 (1.4%)	0.619	0.620	0.819	0.372	1.803
No	477 (66.1%)	18 (2.5%)					

Do you have kidney failure?

Yes	24 (3.3%)	2 (0.3%)						
No	670 (92.8%)	26 (3.6%)	0.305	0.316	0.466	0.104	2.076	
If you have kidney failure, what is your current treatment?			SZ:26					
Kidney transplant	14 (53.8%)	1 (3.8%)						
Peritoneal dialysis	1 (3.8%)	0 (0.0%)	0.914	0.770	1.246	0.285	5.444	
Hemodialysis	9 (34.6%)	1 (3.8%)						
Do you have experience with kidney donation?								
Yes	30 (4.2%)	0 (0.0%)						
No	664 (92.0%)	28 (3.9%)	0.261	0.998	-	-	-	
If we give a lecture on "Kidney Donation," would you like to participate?								
Yes	450 (62.3 %)	21 (2.9%)						
No	244 (33.8%)	7 (1.0%)	0.268	0.273	0.615	0.258	1.467	
Would you like to donate a kidney one day?								
Yes	325 (45.0%)	17 (2.4%)						
No	369 (51.1%)	11 (1.5%)	0.149	0.129	2.370	0.779	7.209	

* Median (IQR)
 "chi-square test.
 'Binary logistic regression.
 SZ: sample size.



Variable	Would you like to donate a kidney one day?		P-value"	P-value'	OR	95% C.I.for	
	Yes (%)	No (%)				EXP(B) Lower	Upper
Age	36.00 (21)*	38.00 (16)*	0.252	0.007	1.018	1.005	1.031
Gender							
Male	83 (11.5%)	107 (14.8%)	0.236	0.007	1.591	1.135	2.230
Female	259 (35.9%)	273 (37.8%)					
The city							
Dammam	27 (3.7%)	17 (2.4%)	0.435	0.695	0.988	0.929	1.050
Khobar	14 (1.9%)	13 (1.8%)					
Aairiyah	8 (1.1%)	4 (0.6%)					
Al-ahsa	117 (16.2%)	155 (21.5%)					
Jubail	9 (1.2%)	9 (1.2%)					
Al-khafji	2 (0.3%)	3 (0.4%)					
Dhahran	1 (0.1%)	0 (0.0%)					
Qatif	154 (21.3%)	170 (23.5%)					
Abqaiq	9 (1.2%)	8 (1.1%)					
Hafar al-batin	1 (0.1%)	1 (0.1%)					
Resident							
Cities	250 (34.6%)	296 (41.0%)	0.134	0.203	1.257	0.884	1.789
Villages	92 (12.7%)	84 (11.6%)					
Educational Level							
University or higher	199 (27.6%)	210 (29.1%)	0.429	0.429	1.127	0.839	1.513
Below university	143 (19.8%)	170 (23.5%)					
Current work							
Housewife	15	25 (3.5%)	0.036	0.705	1.021	0.918	1.134

	(2.1%)							
Employee	169 (23.4%)	187 (25.9%)						
Business owner	17 (2.4%)	17 (2.4%)						
Unemployed	70 (9.7%)	71 (9.8%)						
Student	65 (9.0%)	57 (7.9%)						
Retired	6 (0.8%)	23 (3.2%)						
Marital status								
Married	224 (31.0%)	273 (37.8%)						
Single	108 (15.0%)	90 (12.5%)	0.073	0.220	0.867		0.691	1.089
Widow	2 (0.3%)	6 (0.8%)						
Divorced	8 (1.1%)	11 (1.5%)						
Do you suffer from chronic diseases?								
Yes	87 (12.0%)	104 (14.4%)	0.557	0.274	1.204		0.863	1.679
No	255 (35.3%)	276 (38.2%)						
If you have a chronic illness, do you take any medication for it? SZ: 191								
Yes	63 (33.0%)	82 (42.9%)	0.793	0.793	0.793	0.793	0.470	1.781
No	21 (11.0%)	25 (13.1%)						
Do you have a relative with kidney failure?								
Yes	110 (15.2%)	117 (16.2%)	0.691	0.108	0.194		0.026	1.430
No	232 (32.1%)	263 (36.4%)						
Do you have kidney failure?								
Yes	14 (1.9%)	12 (1.7%)	0.500	0.146	1.816		0.813	4.058
No	328 (45.4%)	368 (51.0%)						

If you have kidney failure, what is your current treatment? SZ:
26

Kidney transplant	9 (34.6%)	6 (23.1%)		0.848	0.912		0.357	2.329
Peritoneal dialysis	1 (3.8%)	0 (0.0%)	0.723					
Hemodialysis	6 (23.1%)	4 (15.4%)						

Do you have experience with kidney donation?

Yes	13 (1.8%)	17 (2.4%)		0.955	0.935		0.093	9.397
No	329 (45.6%)	363 (50.3%)	0.651					

If we give a lecture on “Kidney Donation,” would you like to participate?

Yes	223 (30.9%)	248 (34.3%)		0.460	1.999		0.319	12.537
No	119 (16.5%)	132 (38.0%)	0.987					

Are you aware of the laws and regulations regarding kidney donation and transplantation in your home country of Saudi Arabia?

Yes	137 (19.0%)	150 (20.8%)		0.448	2.147		0.298	15.463
No	205 (28.4%)	230 (31.9%)	0.873					

Figure 2. Relationship between previous hearing about kidney donation and awareness of the laws and regulations regarding kidney donation and transplantation in Saudi Arabia (p-value = 0.959).

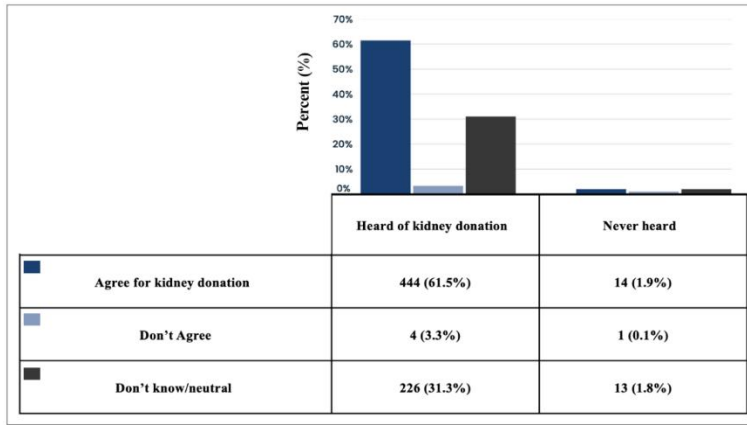


Figure 3. Relationship between previous hearing about kidney donation and attitude (p-value = 0.302).

Table 5 shows the association between participants' willingness to donate a kidney and their demographic and clinical characteristics. There was no significant difference in median age between those willing and unwilling to donate (36.00 vs. 38.00 years, $P=0.252$). Gender distribution was also not significant ($P=0.236$). No significant association was found with city of residence ($P=0.863$), residency status ($P=0.134$), educational level ($P=0.429$), Employment status ($P=0.524$), marital status ($P=0.073$), presence of chronic diseases ($P=0.557$), having a relative with kidney failure ($P=0.691$), or personal history of kidney failure ($P=0.500$). Attitude toward kidney donation, experience with donation, interest in educational lectures, and awareness of laws showed no significant differences.

Table 5. Relationship between participants' willingness to donate a kidney and participants' demographic characteristics, chronic diseases, having a relative with kidney failure, experience with kidney donation, and attitude toward a lecture on "Kidney Donation" and willingness to donate (N =722).

* Median (IQR)

“chi-square test.

‘Binary logistic regression.

SZ: sample size.

4. Discussion

Recent studies have shown that awareness and attitudes have a crucial role among people from different backgrounds in relation to kidney transplantation. Findings show that healthcare providers and the general public usually have insufficient information and comprehension of kidney donation [2].

Furthermore, the current data indicate that just a quarter of participants are aware of the issues that donors may have post-donation, signifying that almost one-quarter of the respondents possess this awareness.

Among the participants, we identified that renal failure was present more than gout.

This corresponds with other studies that shown an elevated risk of new-onset chronic kidney disease (adjusted hazard ratio (HR) = 6.7) while gout/hyperuricemia (adjusted HR = 1.73) in donors [3].

Additionally, according to our findings, the most known complication for donors' post donation was hypertension. A Danish study revealed that living kidney donors have a greater long-term absolute risk of hypertension than the control group, with a 10-year absolute risk ratio of 1.64 [4].

In contrast to our finding, another study showed that the participants were familiar and aware more with renal failure as a complication of donation (18.7%) [5].

Regarding the perceived likelihood of kidney failure among healthy donors' post-donation, 176 participants evaluated it to be below 20%, while the majority of respondents had no knowledge. Similarly, in a study of western region in Saudi Arabia, it was determined that 37.5% of respondents thought that the incidence of kidney failure in donor's post-donation is below 20%, while the most answered (don't know) [5], which aligned with our study. That means other studies are needed and important to increase the awareness of the complications even if the probability of affection is low.

Regarding social media and major Source of information, there are multiple methods and means of increasing awareness of kidney donation, "social media" has taken the top between all the other methods, which thought to be the most influencer for increasing awareness, followed by "programs and workshops in markets and public places". Around two-thirds of the individuals who responded that they heard about kidney donation, they heard from the social media.

Moreover, in another comparable research, social media emerged as the most effective mean for increasing awareness, with the majority of participants reporting that they learned about kidney donation through these platforms [5].

Social media has become an essential tool for raising awareness about living kidney donation and fostering contacts between donors and recipients. Studies indicates that social media constitutes a greater percentage of self-referrals for living kidney donation than verbal communication [6].

This is can be explained by that, the internet and social media platforms provide valuable avenues for education, the dissemination of transplant-related outcomes, and the sharing of personal narratives from both donors and recipients [7].

These findings show the importance of social media and its impact on raising awareness of kidney donation and strengthening outreach initiatives

We found even though two thirds of the participants had a positive attitude regarding kidney donation, there was only 4.2% had actual experience with it.

This trend aligns with another study of the western region, where most of the participants expressed a willingness to donate a kidney, yet, only 3.3% had actually donated [5]. Moreover, research by (Mohammed Alshehri et al., 2024; K. Alhasan et al., 2023; R. Sharaan et al., 2024) reported a significant gab between the willingness to donate kidneys and the real registration as donors [2,8,9].

Even though around a quarter of the participants declared they wanted to donate, only a small number actually signed up to be donors [8,9]. While approximately a quarter of the participants stated a willingness to donate, only a few numbers completed the process of the official donor registration.

This is can be explained more by the Theory of planned behavior. While participants generally look to kidney donation as helpful, perceived barriers and subjective norms decreased their intention. It is worth

noting that 27.8% reported family and societal disapproval as barriers, indicating the effect of social expectations.

In addition, regarding the awareness of the law and religion as dimensions governing kidney donation, in our study, less than half but more than the third of our participants were aware of the laws and regulations of kidney donation in Saudi Arabia. Furthermore, 54% of the participants in a study done in Jordan considered religion as an affecting factor toward their perspectives [10].

Notably, more than 50% of our participants who refused to donate kidneys showed that the religion and law encouragement would change their perspective toward donation.

Religious factors show a significant influence, as awareness of Islamic Fatwas permitting organ donation has been shown to positively affect individuals' willingness to donate [9,11]. These findings intensify the importance of awareness campaigns and targeted educational initiatives who aim to enhance organ donor registration rates and address cultural barriers and in Saudi Arabia.

In relation to the barriers of kidney donation, in our study, the participants who reported an unwillingness to donate a kidney represent more than half. This finding indicates not a low lack of awareness, but rather a group of multiple factors including emotional, cultural, and institutional factors that influence donation behavior.

The **fear of not getting the necessary medical attention** was the most commonly reported barrier, representing (39.9%). A similar finding was found in a study conducted in the western region of Saudi Arabia, where this concern was also the leading factor, accounting for 43% [5]. This emphasizes a deeper sense of mistrust in the healthcare system, as some individuals worry that once they have fulfilled their role as donors, their own health and well-being may no longer be a priority.

In contrast, another study from the eastern region found that the leading reason for refusing organ donation was insufficient knowledge, accounting for 37% (40). While in our study, a similar proportion of participants (35%) which represent the second most common percentage which states that reported lack of knowledge as a leading reason for refusing kidney donation. However, this differs from findings in the western region, where lack of knowledge was reported much less frequently, at only 14.5% (33).

As a result, lack of knowledge about the donation process is another substantial barrier in our study. While this may seem as a simple educational gap, its psychological impact is deep. As El Hennawy et al. (2023) found, even within healthcare circles, uncertainty surrounding brain death, legal frameworks, and religious rulings fosters hesitation [12]. Therefore, both fear of medical care and limited awareness of legal framework indicate reduced perceived behavioral control. These findings emphasize that future interventions should not only provide factual education but also normalize organ donation through family and religious support, while enhancing confidence in healthcare systems to safeguard donors.

We found that the influence of parents and society represented (27.8%) between the other barriers. Similarly, another study in China found that social representations like the “acceptance, understanding and hope” of organ donation was the highest one as a barrier of organ donation (representing 34% of the whole semantic network), followed by “family story” (26%) [13]. Interestingly, the insertion of linguistic cultural and mediators highly reduced family refusal of organ donation from 40% to 7.1% among 90 donors from diverse countries, pointing that addressing cultural barriers can decrease the rate of refusals [14].

Equally significant were cultural and spiritual barriers. About fifth of participants reported discomfort with

disturbing bodily integrity after death a belief rooted in both emotional reverence for the human body and interpretations of religious doctrine. Al-Abdulghani et al. (2024) highlighted this in their review, where concerns about body sanctity and religious ambiguity were among the most consistent reasons for refusal across Muslim populations [15]. To overcome cultural and spiritual obstacles, interventions based on community values and trustworthy authorities are needed. A specialized educational workshop merging medical information with Islamic bioethical viewpoints, facilitated by healthcare professionals and an Islamic bioethicist, significantly enhanced biomedical knowledge and religious acceptance of organ donation among American Muslim participants (Padela et al., 2021) [16].

In the UK, a national public health program run by healthcare professionals and Imams through community forums affected the perception positively toward religious permissibility (from uncertainty to approval in 72 of attendees) and upgraded the willingness to register. This concludes that faith- and trust-based interventions work out (Ali et al., 2022) [17].

Islamic scholars and official fatwas support organ donation as a charity, but these endorsements don't always get delivered to the general public. A national study (2023) demonstrated that people still think that organ donation goes in opposition to God's will, although there have been formal campaigns to increase awareness [18].

Furthermore, the insertion of educational resources in platforms such as Tawakkalna and the Saudi Center for Organ Transplantation (SCOT) still not yet resolved the disparity between institutional initiatives and personal belief [9].

These findings collectively indicate that resistance to organ donation is not purely a consequence of ignorance or disinterest. Instead, it is a multifactorial phenomenon that is shaped by emotional limitations, social norms, religious beliefs, and trust in care systems.

Despite these challenges, our results also revealed a significant tendency to learning: 65.2% of participants showed willingness to attend educational lectures about kidney donation. This readiness to learn is not matchless. Alghalyini et al. (2024) found that people who had received prior education or participated in donation events were more likely to register as donors [19].

El Hennawy et al. (2023) also stressed how structured education can change circumstances, especially in medical school, in order to cut down on misinformation [12].

In societies where family structures, collective beliefs, and religious guidance affect decisions, educational efforts must be culturally rooted, spiritually affirming and emotionally aware. Furthermore, in this study we found widespread confusion about kidney donation types. The majority of the participants associated it with living donors, while only 38.9% was knew about postmortem donation, and only 28.7% were aware that brain death is a valid criterion.

This is in line with national trends. El Hennawy et al. (2023) observed considerable ambiguity regarding brain death definitions among healthcare professionals [12]. Al-Abdulghani et al. (2024) also stressed that misunderstandings about brain death still limit Muslims to donate organs after death [15].

Brain-death-based donation is usually not included in campaigns. in order to change this, trusted voices must make messaging clear about both its medical validity and its religious acceptability. Interestingly, this study showed that the willingness to donate differed depending on the context. Almost half of the participants were willing to donating a relative's organs after death, Nevertheless, only 38.8% were open to donate in cases of brain death, which indicate that they still had concerns about the finality of brain death.

It is interesting that demographic factors such as age, gender, and chronic diseases did not have a strong impact on willingness.

Nevertheless, business owners exhibited a diminished willingness to donate ($p = 0.036$), possibly due to doubts regarding recovery duration or occupational effect.

Alghalyini et al. (2024) observed similar trends, showing a higher willingness among students and public sector employees [19]. Tailored messaging might help in specifying the concerns according to the groups.

This study has several limitations. The first one, it depended on self-reported data collected via an online survey, which might introduce recall or response bias. Second, the sampling strategy, which is mostly based on the distribution of social platforms, may not be able to reach some demographic groups, in particular older adults or individuals who don't have easy access to the internet. Third, the study's cross-sectional design hinders any conclusions about the causality between knowledge levels and donation willingness. Fourth, the females in our study represents around 75% from the included participants, indicating that there is a gender bias, that may affect the generalizability of our study to the general public.

Authors should interpret their results from the perspective of previous studies and the working hypotheses. The findings and their implications should also be understood and discussed within a broader context to provide a more comprehension.

5. Conclusions

This study identifies notable deficiencies in public knowledge and awareness related to kidney donation among residents of the Eastern Province of Saudi Arabia. Despite the presence of generally favorable attitudes toward organ donation, misconceptions remain prevalent particularly regarding the medical risks to donors, the types of donations available, and the governing legal and regulatory frameworks. Fear, insufficient access to accurate information, and culturally rooted beliefs emerged as principal barriers to donation willingness. Nevertheless, a substantial proportion of participants expressed interest in receiving further educational resources, indicating strong potential for effective outreach. These findings underscore the importance of implementing comprehensive, culturally informed educational initiatives that both address prevailing misconceptions and emphasize the safety, ethical considerations, and societal value of kidney donation.

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Abbreviations

The following abbreviations are used in this manuscript:

ESKD	End-stage kidney disease (ESKD)
CKD	Chronic kidney disease
DM	Diabetes mellitus
IQR	Interquartile ranges

SCOT Saudi Center for Organ Transplantation

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