Original Article

How Informed Are the Saudi Public about the Value of Organ Donation: A Community-Based Cross-Sectional Study

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ABSTRACT. Organ transplantation is often the ideal option for some end-stage organ diseases. However, organ donation is not keeping pace with growing demand for it. Saudi Arabia has one of the widest gaps between supply and demand with respect to transplants, estimated at 2–4 per million population. The purpose of this study is to survey the public’s perceptions and opinion about organ donation and transplants in general. This is a cross-sectional study targeting the age group of 18–60 years as they represent potential organ donors in any community. An Arabic-language questionnaire was distributed online. The questionnaire comprised specific questions to assess participants’ willingness to donate their organs. The study included 1453 Saudi adults. More than two-thirds (77.7%) expressed a willingness to donate. Interestingly, 325 (22.3%) refused organ donation in principle. Of the participants, 329 (29.1%) were willing to donate only to their relatives. Among those over 40 years, 77.4% were willing to donate to anyone in the community, compared to 78% of those under 40 years, P <0.001. Positive attitudes toward organ donation are evident in the high number of people willing to donate their organs.

Introduction

Organ donation involves giving human cells, tissues, or organs to a recipient who has end-stage organ failure to restore the recipient’s normal functioning.¹ Organs can be taken from a living or deceased donor (cadaveric organ donation). Patients who receive a donated organ from a living donor have a better survival rate than who receive an organ from a deceased donor. Organs and tissues that can be transplanted include the heart, liver, kidney, lungs, and cornea.² In 2013, it is estimated that more than 60,000 potential recipients were on awaiting list in the European Union, and in the U.S., more than 120,000 patients are listed as waiting for an organ donation.³⁵ Locally, in Saudi Arabia, about 6000 patients are on a waiting list.⁶

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The gap between organ needs and organ donation is large and still increasing, which makes it a global issue. Saudi Arabia has a low organ donation rate estimated at 2–4 per million population (PMP). This number is considered low when compared to other countries; for example, in western countries, the number can reach 30 PMP. About 8000 renal transplantations have been performed in Saudi Arabia by the end of 2012. In 1984, the Saudi Center for Organ Transplantation (SCOT) was created to organize all organ donations and transplantations in the country. SCOT benefits from sharing a program with Spain, Kuwait, and Qatar. SCOT also works on improving community awareness about organ donation and transplantation. The public’s knowledge and awareness of organ donation globally are generally limited. Studies have reported that neither television nor healthcare professionals provide enough information about organ donation, yet despite lack of knowledge among participants in previous studies, 67% of the participants were willing to donate.

There is no recent local study that shows the general populations’ opinion about organ donation and transplant. In addition, most past studies were focused on specific groups or locations (e.g., healthcare staff or a specific region in the country). Moreover, they were conducted 12 years ago and do not represent current public opinion. Thus, it is important to measure current community awareness. This study aimed to examine Saudi citizens’ opinions and attitudes toward organ donation.

**Methods**

Ethical approval was granted by the Institutional Review Board, King Abdullah International Medical Research Center, Riyadh, Saudi Arabia. All participants in this study were informed about the objectives of the study and that their participation was totally voluntary. A cross-sectional study targeting the Saudi population was conducted between November 2017 and January 2018 to explore their opinions and attitudes about organ donation and transplant. The participants’ age ranged from 18 to 60 years, and all held Saudi nationality.

A previously validated Arabic questionnaire was used in the study. The questionnaire was uploaded as an online Google form and sent to Saudi social media celebrities with over 1–2 million followers. They distributed the questionnaire link among their followers five times to achieve different population distributions. The first and fourth times were during weekends, the second and third were during the work-days, and the fifth was during a national holiday. All of the celebrities were contacted personally by the researchers, and all of them agreed to post the survey link.

The questionnaire included two sections: the first section included demographic data on age, gender, nationality, educational level, job, and marital status, while the second section was concerned with knowledge and attitudes toward organ donation and transplant. A total of 207 participants were excluded from the study; of these, 59 respondents were <18 years old, 51 were older than 60 years, 96 did not hold Saudi nationality, and one respondent was literate.

The sample size was determined according to the previous study undertaken only in the western region of Saudi Arabia (73.5%) awareness among Saudi population about organ donation. As a result, sample of 1130 participants was minimally needed to calculate a 95% confidence interval, with a margin of error of 2.5%. However, we attained a sample of 1455 participants after applying the above-mentioned inclusion criteria.

The Statistical Package for the Social Sciences for Windows version 22.0 (IBM Corp., Armonk, NY, USA) was used for data analysis, and Microsoft Excel was used for data entry and data management. Descriptive statistics were used to assess the baseline demographics and socioeconomic factors, which are presented as frequencies and percentages, while mean and standard deviation were calculated for quantitative variables. The respondents’ opinions and attitudes toward organ donation were assessed, analyzed, and compared by subjects’
gender and age categories (≤40 vs. >40 years) using appropriate statistical tests (Chi-square or Fisher’s exact test). All tests were considered statistically significant if \( P < 0.05 \).

**Results**

The study was conducted from November 2017 and January 2018. Of the Saudi adults who satisfied the inclusion criteria, 1453 were included and the age range was between 18 and 60 years. The mean age was 35.07 years (standard deviation ±12.17). A majority of the respondents were female (1104, 75.9%). A total of 1105 (76%) had college degrees. In terms of marital status, 907 (62.3%) were married, 492 (33.8%) were single, and the rest were divorced or widowed 56 (3.8%). The majority of the respondents were from Riyadh (1101, 75.7%) (Table 1).

As shown in Table 2, there were 432 (32.5%) participants willing to donate their organs with no significant differences found between males and females. Interestingly, 325 (22.3%) were not willing to donate their organs. The majority were willing to donate their organs to anyone (785, 69.5%), with a significant difference found between males and females (\( P = 0.001 \)). Only 33 (2.3%) reported having an organ donation card—13 males (3.7%) and 20 females (1.8%). There was a significant difference (\( P = 0.001 \)) found between males and females in terms of the factors having the greatest importance when donating; most females (658, 61.6%) considered the health status of the recipient to be most important, while the majority of males (180, 53%) considered age, religion, and relation to the recipient the most important. The majority (87.4%) perceived organ donation as intended “to save someone’s life” and were not aware of any legislation with regard to organ donation; an almost similar percentage was found on this issue among both males and females. Only 0.8% of the participants had donated an organ.

Table 3 shows the responses to attitude and awareness questions about organ donation.

| Category                                    | n (%)     |
|---------------------------------------------|-----------|
| Age in years, mean±SD (range)               | 35.07±12.17 (18–60) |
| Age in years (categories)                   |           |
| ≤40                                        | 944 (65)  |
| >40                                        | 509 (35)  |
| Gender                                      |           |
| Male                                       | 351 (24.1) |
| Female                                     | 1104 (75.9) |
| Educational level                           |           |
| Less than university                        | 350 (24.1) |
| University degree                           | 948 (65.2) |
| Higher than university                      | 157 (10.8) |
| Occupation                                  |           |
| Students                                   | 351 (24.1) |
| Employed                                   | 624 (42.9) |
| Unemployed                                 | 480 (33)  |
| Marital status                             |           |
| Single                                     | 492 (33.8) |
| Married                                    | 907 (62.3) |
| Divorced or widowed                        | 56 (3.8)  |
| Region                                     |           |
| Riyadh region                              | 1101 (75.7) |
| Other regions                              | 354 (24.3) |

SD: Standard deviation
among the respondents by age. The majority of the younger group (≤40 years) were willing to donate under special circumstances \((P = 0.001)\). By comparison, the older group of participants was mostly willing to donate irrespective of circumstances. The majority in both age groups were willing to donate to anyone regardless of their relationship with the recipient. Both age groups considered health status of the recipient as the most important factor when donating an organ, and neither group was aware of any legislation with regard to organ donation. For other attitudes and awareness, there was no significant difference between the age groups, yet the majority of the younger group perceived organ donation as intended to “save someone’s life” (838, 88.8%). However, it was the older group that had been more likely to donate (1.2%).

Table 4 presents the responses to beliefs and knowledge questions about organ donation among the respondents by gender; 1262 participants (86.7%) believed that the organ that is donated most often is the kidney, with women believing this significantly more than men. For donations from living donors, the participants believed that the donor should give consent before donation (87.1%), with no significant difference found between the genders. Men indicated more often than women that organ donation should be promoted and there should be an effective law to govern the process of organ donation. A total of 949 participants (65.2%) believed that free health treatment,
monetary benefits for the donor family, and awards would be effective incentives for promoting organ donation.

Table 5 presents responses to beliefs and knowledge questions concerning organ donation among the respondents by their age groups. A significant belief among the majority in both groups was that kidney is the organ that is donated most (85.5%, ≤40 years; 89.2%, >40; P = 0.047). For donations from a living donor, the older age group believed that the donor should give consent (90.4%, P = 0.003). Furthermore, the older age group has a higher percentage of promoting organ donation and establishing effective laws to manage organ donation; the majority believed that free health treatment, monetary benefits to the donor family, and awards would be effective incentives for promoting organ donation.

Table 6 presents the responses to attitude and awareness questions about organ donation by respondents’ educational level. The majority of the less-educated group were more willing to donate their organ, irrespective of the circumstances (44%), compared to the more highly educated group where only 28.9% were willing to donate irrespective of the circumstances (P <0.001). Moreover, the less-educated group considered the health status of the recipient to be the most crucial factor when donating an organ (66.2%). There were no significant differences between the two groups.

### Table 3. Responses to attitude and awareness questions about organ donation by age.

| Variable | Category | Total | ≤40 years | >40 years | P  |
|----------|----------|-------|-----------|-----------|----|
|          |          | n (%) | n (%)     | n (%)     |    |
| Are you willing to donate your organs? | Yes, irrespective of circumstances | 473 (32.5) | 253 (26.8) | 219 (43) | <0.001* |
|          | Yes, under special circumstances | 657 (45.2) | 478 (50.6) | 178 (35)   |    |
|          | No       | 325 (22.3) | 213 (22.6) | 112 (22)   |    |
| Who would you like to donate your organs to? | Family member | 329 (29.1) | 232 (31.7) | 96 (24.2) | <0.001* |
|          | Friend   | 16 (1.4) | 15 (2.1)  | 1 (0.3)    |    |
|          | Anyone   | 785 (69.5) | 484 (66.2) | 300 (75.6) |    |
| Do you have an organ donor card? | Yes | 33 (2.3) | 24 (2.5)  | 9 (1.8)    | .345 |
|          | No       | 1422 (97.7) | 920 (97.5) | 500 (98.2) |    |
| Which factor holds the greatest importance to you when considering whether to donate an organ? | Age of recipient | 90 (6.4) | 56 (6.2)  | 34 (6.9)   | <0.001* |
|          | Religion of recipient | 311 (22.1) | 165 (18.1) | 146 (29.6) |    |
|          | Health status of recipient | 815 (58) | 548 (60.2) | 266 (54)   |    |
|          | Relation to recipient | 189 (13.5) | 141 (15.5) | 47 (9.5)   |    |
| What is your perception of organ donation? | To save someone’s life | 1272 (87.4) | 838 (88.8) | 433 (85.1) | 0.23 |
|          | Out of compassion/sympathy | 68 (4.7) | 41 (4.3)  | 27 (5.3)   |    |
|          | For money | 7 (0.5) | 4 (0.4)   | 3 (0.6)    |    |
|          | As a social responsibility | 108 (7.4) | 61 (6.5)  | 46 (9)     |    |
| Are you aware of any local or international legislation with regard to organ donation? | Local legislation | 97 (6.7) | 58 (6.1)  | 38 (7.5)   | 0.028* |
|          | International legislation | 24 (1.6) | 22 (2.3)  | 2 (0.4)    |    |
|          | Both of the above | 63 (4.3) | 44 (4.7)  | 19 (3.7)   |    |
|          | None of the above | 1271 (87.4) | 820 (86.9) | 450 (88.4) |    |
| Have you ever donated an organ? | Yes | 12 (0.8) | 6 (0.6)   | 6 (1.2)    | 0.28 |
|          | No       | 1443 (99.2) | 938 (99.4) | 503 (98.8) |    |

*P significant <0.05
on other variables.

**Discussion**

The gap between demands for organs and their supply is widening, which is part of a serious problem that requires concerted global attention. In this study, 1453 Saudi participants were involved from various areas of the country. This sample size is the largest that has been achieved in Saudi Arabia when compared to other local studies. Most previous local studies were either limited to healthcare providers, medical students, or specific cities or regions. As in other studies, younger women were more willing to share their opinions and attitudes toward organ donation and organ transplantation.

The study showed a positive attitude toward organ donation as indicated by 77% of the respondents who were willing to donate their organs. This is similar to a study conducted in the western region of Saudi Arabia where 73.5% of the respondents were willing to donate an organ. It was much higher than other studies, such as that conducted by El-Shoubaki et al in one of the Arab Gulf countries, which showed only 36% of the participants were willing to make a donation. In addition, this finding was higher than a study undertaken in India where only 53.5% of the respondents showed favorable responses toward organ donation. However, it was considerably lower than a study conducted in Ohio, where over 96% of the participants had a positive attitude about donation.

The high rate of willingness to donate can be explained by the high rate of educated participants in this study. As several studies have shown, education plays a critical role in improving community and public awareness about the importance of organ donation. This study and several others, both local and global, indicate that educated people are more aware...
of the need and thus willing to donate their organs in comparison to less-educated individuals. This finding has been reported in two studies conducted in the western region of Saudi Arabia\textsuperscript{7} and Pakistan,\textsuperscript{14} where socioeconomic status and level of education were associated with a high level of willingness to donate. Similarly, a study from Turkey suggested that training and education had a positive role to play in encouraging organ donation.\textsuperscript{15}

In this study, 87\% of the participants believed that consent should be acquired from the donor and only 9.7\% thought that the family should have that role in cases of living donations. Similarly, a study done in Pakistan found that 76\% of participants felt that the donor must be the one who gives approval for donation.\textsuperscript{16} In the study of Balwani et al, this number was even lower; only 59\% said that the donor should decide, while 33\% felt that the family should be involved.\textsuperscript{12}

The factor that held the greatest importance among the study participants when considering whether to donate an organ was the health status of the recipient (58\%); only 22.1\% of the respondents considered the religion of the recipient to be most important. Similarly, the study of Soubhanneyaz et al reported that 53\% of the participants viewed the health status of the recipient as the most important factor.\textsuperscript{7} On the other hand, Saleem et al reported that the religion of the recipient (29.6\%) was the most essential factor, while only 12.6\% considered the health status of the recipient to be most important.\textsuperscript{16} This difference can be explained by cultural and religious differences.

More than 30 years had passed since the establishment of SCOT,\textsuperscript{17} nonetheless, the majority of the study population in Saudi Arabia are not aware of any local or international organ donation legislation. The level of knowledge was as low as 12.6\% among the Saudi population. This surely has led to a low

### Table 5. Responses to belief and knowledge questions about organ donation by age.

| Variable                                           | Category                  | Total | <40 years | >40 years | P     |
|----------------------------------------------------|---------------------------|-------|-----------|-----------|-------|
| What organs can be donated?                        | Liver                     | 1040  | 645 (62.3)| 394 (77.4)| <0.001*|
|                                                    | Lung                      | 228   | 144 (15.3)| 84 (16.5) | 0.532 |
|                                                    | Kidney                    | 1262  | 807 (85.5)| 454 (89.2)| 0.047*|
|                                                    | Skin                      | 224   | 159 (16.8)| 65 (12.8) | 0.040*|
|                                                    | Heart                     | 489   | 328 (34.7)| 160 (31.4)| 0.202 |
|                                                    | Blood                     | 458   | 272 (28.8)| 185 (36.3)| 0.003*|
|                                                    | Eye                       | 244   | 138 (14.6)| 106 (20.8)| 0.003*|
|                                                    | Bone marrow               | 593   | 335 (35.5)| 257 (50.5)| <0.001*|
| For living donations, who should give consent?    | Donor                     | 1267  | 805 (85.3)| 460 (90.4) | 0.003*|
|                                                    | His family                | 141   | 110 (11.7)| 31 (6.1)  |       |
|                                                    | His spouse                | 47    | 29 (3.1)  | 18 (3.5)  |       |
| Should organ donation be promoted?                 | Yes                       | 848   | 547 (57.9)| 300 (58.9)| 0.714 |
|                                                    | No                        | 607   | 397 (42.1)| 209 (41.1)|       |
| Is there any need to have effective laws to govern the process of organ donation? | Yes                      | 1281  | 810 (85.8)| 469 (92.1)| <0.001*|
|                                                    | No                        | 174   | 134 (14.2)| 40 (7.9)  |       |
| In your opinion, which of the following measures taken by government would be most effective in promoting organ donation? | Monetary benefit to donor family | 140   | 110 (11.7)| 30 (5.9)  | 0.001*|
|                                                    | Giving awards             | 40    | 28 (3)    | 12 (2.4)  |       |
|                                                    | Free health treatment for donor family | 326   | 194 (20.6)| 132 (25.9)|       |
|                                                    | All of the above          | 949   | 612 (64.8)| 335 (65.8)|       |

*P significant <0.05
Table 6. Response to attitude and awareness questions about organ donation by educational level

| Variable | Category | Total | Less than bachelor's degree | Bachelor's degree and above | P |
|----------|----------|-------|------------------------------|----------------------------|---|
|          |          | n (%) | n (%)                        | n (%)                      |   |
| Are you willing to donate your organs? | Yes, irrespective of circumstances | 473 (32.5) | 154 (44) | 319 (28.9) | <0.001* |
| | Yes, under special circumstances | 657 (45.2) | 150 (42.9) | 507 (45.9) |   |
| | No | 325 (22.3) | 46 (13.1) | 279 (25.2) |   |
| Who would you like to donate your organs to? | Family member | 329 (29.1) | 74 (24.3) | 255 (30.9) | 0.1 |
| | Friend | 16 (1.4) | 4 (1.3) | 12 (1.5) |   |
| | Anyone | 785 (69.5) | 226 (74.3) | 559 (67.7) |   |
| Do you have an organ donor card? | Yes | 33 (2.3) | 5 (1.4) | 28 (2.5) | 0.23 |
| | No | 1422 (97.7) | 345 (98.6) | 1077 (97.5) |   |
| Which factor holds the greatest importance to you when considering whether to donate an organ? | Age of recipient | 90 (6.4) | 22 (6.5) | 68 (6.4) | 0.002* |
| | Religion of recipient | 311 (22.1) | 62 (18.4) | 249 (23.3) |   |
| | Health status of recipient | 815 (58) | 223 (66.2) | 592 (55.4) |   |
| | Relation to recipient | 189 (13.5) | 30 (8.9) | 159 (14.9) |   |
| What is your perception of organ donation? | To save someone’s life | 1272 (87.4) | 309 (88.3) | 963 (87.1) | 0.08 |
| | Out of compassion/sympathy | 68 (4.7) | 22 (6.3) | 46 (4.2) |   |
| | For money | 7 (0.5) | 2 (0.6) | 5 (0.5) |   |
| | As a social responsibility | 108 (7.4) | 17 (4.9) | 91 (8.2) |   |
| Are you aware of any local or international legislation with regard to organ donation? | Local legislation | 97 (6.7) | 21 (6) | 76 (6.9) | 0.028 |
| | International legislation | 24 (1.6) | 8 (2.3) | 16 (1.4) |   |
| | Both of the above | 63 (4.3) | 6 (1.7) | 57 (5.2) |   |
| | Neither of the above | 1271 (87.4) | 315 (90) | 956 (86.5) |   |
| Have you ever donated an organ? | Yes | 12 (0.8) | 1 (0.3) | 11 (1) | 0.201 |

*P significant <0.05

number of potential organ donors in the country. In a similar study, the awareness and knowledge about organ donation in Delhi were also low but higher than in our population, where only 49% of the participants were currently not aware of the regulations concerning organ donation and transplantation.18

The results of this study should be interpreted bearing in mind its limitations. The participants in this study were self-selected using social media, which is not representative of the actual population in the country; moreover, we limited the study to educated people and excluded those who were under 18 and over 60 years old. In addition, most of the participants were from the central region of Saudi Arabia, and this might be because it is both highly populated and the capital of the country.

Organ donation is crucial since the demand for organ transplantation is rapidly increasing. However, in our region, especially, inadequate availability of organs for transplantation is a major challenge for stakeholders. Based on the findings, we recommend a more rigorous public awareness campaign to increase knowledge of the importance of organ donation. This can be done by addressing the public through the media and through campaigns carried out in schools, colleges, and other public places. Further research is needed to
shed more light on this topic and to understand the factors affecting the study population’s desire to donate their organs.

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Date of manuscript receipt: 21 May 2018.
Date of revised copy receipt: 12 July 2018.
Date of final acceptance: 16 July 2018.