

# Knowledge, Attitude and Practice Related to Organ Donation Among Healthcare Workers at University of Kebangsaan Malaysia Medical Centre (UKMMC)



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## ABSTRACT

**Purpose:** The demand for organ donation is progressively increasing in Malaysia. Healthcare personnel play a crucial role in educating potential donors. This study is aimed to determine the level of knowledge, attitude and practice (KAP) regarding organ donation and associated factors among healthcare workers in UKMMC.

**Patients and methods:** A cross-sectional study was conducted among 255 healthcare workers in UKMMC. Subjects were divided into three groups: doctors, nurses and health assistants. There were 85 participants in each group. A validated 39-item self-administered questionnaire was used to assess participants' level of knowledge, attitude and practice regarding organ donation.

**Results:** The mean score is highest among doctors as compared to nurses and health assistants respectively in terms of knowledge ( $121.74 (84.0\%) \pm 12.19$ ;  $115.32 (79.5\%) \pm 14.16$ ;  $109.71 (75.7\%) \pm 13.63$ ,  $p < 0.001$ ), attitude ( $50.27 (83.8\%) \pm 5.70$ ;  $43.00 (71.7\%) \pm 6.88$ ;  $42.34 (70.6\%) \pm 6.85$ ,  $p < 0.001$ ) and practice ( $6.33 (63.3\%) \pm 1.75$ ;  $4.33 (43.3\%) \pm 2.19$ ;  $3.33 (33.3\%) \pm 2.31$ ,  $p < 0.001$ ). Further analysis showed the attitude and practice towards organ donation were significantly higher among doctors ( $p = 0.001$ ), those with tertiary education ( $p = 0.001$ ), males ( $p = 0.001$ ), the Indian ethnicity ( $p = 0.001$ ), Hindus ( $p = 0.001$ ) and those with a high monthly income ( $>RM10000$ ) ( $p = 0.001$ ). However, knowledge was significantly associated with younger age (21-30) ( $p = 0.026$ ), being Chinese ( $p = 0.034$ ) and having a moderate monthly income (RM5000-10000) ( $p = 0.001$ ).

**Conclusion:** The factors which affect attitude and practice are not associated with knowledge. Despite good knowledge, willingness to donate is low when attitude is poor. An organ donation campaign should be conducted to increase attitude and practice among those who have knowledge but are not willing to practise.

**Keywords:** healthcare worker, practice, attitude, knowledge, organ donation.

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## INTRODUCTION

Organ transplantation is the replacement of human cells, tissues or organs from a donor to a recipient to restore its function in the body. It is typically performed on someone in end-stage organ failure, such as failure of the heart, liver and kidneys, and are in need of a donor.<sup>1</sup> Organ donation and transplantation are widely accepted solutions for end-stage organ failure. Suitable living or cadaveric donors are usually used for organ transplantation. It can be related to a deceased donor or a living donor. Organ transplant is an established treatment for end-stage

organ failure. Various organs and tissues are introduced into the donor pool these days. Organs include the heart, lung, liver and kidneys whereas examples of tissues are heart valves, corneas, bones and skin. Recipients can lead a better life after the procedure.<sup>1</sup>

There has been a decrement in the availability of donor organs available in recent years. On top of that, the transplant waiting list has been growing steadily. The number of organ donors in Malaysia is low compared to other countries and the shortage in the number of organs for transplantation remains an unsolved

problem. In October 2014, there were 18,444 patients in the waiting list while the registered organ donors who pledged to donate their organs were only 270,000 people. Patients are required to wait for an extended period for organs from a suitable donor and some of them die while waiting.<sup>2</sup>

The increased incidence of end-stage organ failures is mainly due to changes in demography, including a rise in number of the elderly population as well as lifestyle-related diseases such as diabetes mellitus and hypertension. A gradual decrease in the health status and daily functioning of

patients with end-stage organ failure and the timing of death remains uncertain. Organ transplantation is often the only treatment for such patients. The number of pledgers willing to donate after death is low compared to the number of patients in need of organ transplantation.<sup>3</sup> According to the National Transplant Resource Centre, up until July 31st of 2017, 393,221 people nationwide were willing to donate their organs upon death. Meanwhile, statistics show that in 2015, only 71 organ donations were made nationwide, and this number was reduced to 29 in 2016. Only 17 organ donations were made until August 2017.<sup>1</sup>

A previous study regarding organ donation conducted among medical professionals working in the dialysis and transplantation units revealed that the percentage of doctors supporting organ donation is significantly higher than that of nurses and other medical staff.<sup>4</sup> In a study conducted to survey the attitude of healthcare personnel towards brain death and its influence on the organ donation process, a more positive attitude was seen in the ICU staff than in internal medicine or emergency departments.<sup>5</sup> Furthermore, based on a study conducted on organ donation in Turkey among medical, dental and health technician students, there was a significant relationship between student's willingness for organ donation and gender. In contrast, the relationships between students' willingness for organ donation with age, school and religion were insignificant.<sup>6</sup>

Each healthcare professional plays a pivotal role in identifying potential donors because they are the first-liners in contact with patients. Furthermore, healthcare professionals can advocate the importance of organ donation as patients and the public easily approach them. Effective communication is key to convey adequate information to patients. Hence, educating and motivating the public to pledge their organs for donation will run smoother.

Therefore, this study was undertaken to determine the knowledge, attitude and practice (KAP) of organ donation and associated factors among healthcare workers at the Universiti Kebangsaan Malaysia Medical Centre (UKMMC).

## MATERIAL AND METHODS

### Study design

This is a cross-sectional non-interventional study. A pilot study was performed to validate the questionnaire. The questionnaire was validated on 30 medical students in UKMMC. A Cronbach alpha value of 0.74 was obtained and considered a good agreement for validating the questionnaire.

### Sampling method

#### Sample population

A stratified random sampling was used to ensure the same proportion of participants in each subgroup. All clinical departments related directly to patient care were included in the study to avoid bias towards any department in particular.

#### Inclusion criteria

Subjects were divided according to medical qualifications. We think these qualifications are compulsory because we will compare the knowledge and attitude towards organ donation in the discussion section.

Healthcare personnel in UKMMC include the following: (1) Medical Degree - Consultants, specialists, registrars and medical officers in UKMMC, (2) Diploma in Nursing - Nurses in UKMMC, (iii) SPM and onwards - Health assistants (PK) in UKMMC. The Exclusion criteria: (1) Refusal to participate, (2) Known serious illness.

### Sample size

According to G\*Power application 3.0.10, a sample size of 255 subjects was used with a power of 0.90. Each category had 85 subjects. Subjects were taken from 11 clinical departments in UKMMC excluding the public health department. The reason for excluding the public health department was that there were no nurses and health assistants in the department and the results may be biased if we only considered doctors in one department. The health assistants, nurses and medical doctors were recruited based on their availability during recruitment.

### Study tools

A self-administered questionnaire (SAQ) in both hardcopy and softcopy (Google

Doc) forms were used. Consent was obtained from each respondent before the questionnaire was given. For the hardcopy, the researchers explained the questionnaire and terms. The respondents were given ample time without intervention from the researchers (e.g., an interviewer) to answer the questionnaire completely. However, if the respondent had difficulties, they received direction from the interviewer. The researcher asked the questions in Bahasa Malaysia for participants not proficient in English.

The questionnaires were distributed via hardcopy and softcopy according to respondent preference. The softcopy questionnaire was given to respondents through a Google Doc link via WhatsApp. The questionnaire was adapted from Paraz et al.<sup>7</sup> The original questionnaire included the three domains of knowledge, attitude and practice. For the knowledge and attitude domain, 23 five-point Likert scale questions and 12 five-point Likert scale questions were asked about knowledge and attitude towards corneal donation, respectively. For the practice domain, there were only two questions. Permission was granted to use and modify the questionnaire.

Modification and adaptation were done because the questionnaire from Paraz et al.<sup>7</sup> focused on corneal donations only. In our research, we adapted the questionnaire for organ and tissue donation in general. In the knowledge and attitude domains, we modified it by changing corneal donation to organ donation. We added more generalised questions such as types of organs to be donated, basic knowledge on how a person can become a donor, and so on. Specific knowledge for example in question number four from the original paper which asked about corneal recovery, was changed to a simpler question such as the limitations to donate depends on certain criteria like age and blood group. In the practice domain, question eight was used in our questionnaire. We used the answer for question nine as a new question and employed a scale system instead of multiple-choice questions. Questions were asked based on the scale of agreement and disagreement. A scale of 1-5 was used in the questionnaire where 5 is "strongly agree" and 1 is "strongly disagree".

### Data analysis

Data were analysed using the IBM SPSS Statistics version 20. The knowledge, attitude and practice (KAP) scores between doctors, nurses and PKs were compared using an ANOVA test. A descriptive analysis was reported using mean, standard deviation, frequencies and percentages. Association was determined using a bivariate inferential statistic such as the Pearson's correlation.

After analysing the domains of knowledge, practice and attitude, the total score was calculated for each domain. The mean total score was calculated in all participants and compared among the three groups. The mean total score was compared to other demographic data such as age, gender, ethnicity, religion, occupation and monthly income. A higher score is better regarding knowledge, attitude and practice of organ donation.

### RESULTS

A total of 255 participants were divided into three groups based on their occupation: doctors, nurses and health assistants. There were 85 participants in each group: 49 (19.2%) were male and 206 (80.8%) were female with a mean age of 31-40 years. Most participants were Malay (87.8%) and Muslim (87.8%). Table 1 below shows the scores generated from this study. The reliability of the research tool was checked using Cronbach's Alpha. Bootstrap is used in each variable to prevent bias.

One-way Anova and T-tests were used to find the significance of the demographic data on knowledge, attitude and practice between groups. A small p-value ( $\leq 0.05$ ) indicates strong evidence against the null hypothesis. Table 2 shows the p-value for each domain based on the demographic data. Analysis showed a strong significance regarding gender, ethnicity, religion, monthly income and occupation on the knowledge, attitude and practice of organ donation ( $p \leq 0.05$ ).

Table 3 shows the knowledge score based on the demographic data. Regarding knowledge on organ donation, those aged between 21-30 ( $n=47$ ) had the highest mean score of 117.89. Males ( $n=49$ ) had a higher mean score of 120.53 than females ( $n=206$ ) with a mean score of 114.41.

**Table 1.** Distribution of study subjects according to their age, gender, ethnicity, religion, level of education, occupation and monthly income ( $n=255$ ).

Categories	Variables	Frequency (%)
Age in years	21-30	47 (18.4)
	31-40	153 (60.0)
	41-50	34 (13.3)
	51-60	21 (8.2)
Gender	Male	49 (19.2)
	Female	206 (80.8)
Ethnicity	Malay	224 (87.8)
	Chinese	17 (6.7)
	Indian	14 (5.5)
Religion	Islam	224 (87.8)
	Buddhism/Taoism	7 (2.7)
	Hindu	14 (5.5)
	Christianity	10 (3.9)
Education	Secondary education	90 (35.3)
	Diploma	76 (29.8)
	Tertiary education	89 (34.9)
Occupation	Doctor (Prof/ Specialist/ Medical officer)	85 (33.3)
	Health Assistant	85 (33.3)
	Nurse	85 (33.3)
Monthly Income	<RM 1000	5 (2.0)
	RM 1000 – RM 3000	80 (31.4)
	RM 3000 – RM 5000	73 (28.6)
	RM 5000 – RM 10000	61 (23.9)
	>RM 10000	36 (14.1)

**Table 2.** P-value of each domain.

Domain	p-value					
	Age (Anova)	Gender (T-test)	Ethnicity (Anova)	Religion (Anova)	Occupation (Anova)	Salary (Anova)
Knowledge	0.026	0.006	0.034	0.090	0.001	0.001
Attitude	0.238	0.001	0.001	0.001	0.001	0.001
Practice	0.391	0.001	0.001	0.001	0.001	0.001

Regarding ethnicity, while Chinese consist of only 6.7% of all participants, they show the highest mean score (123.29) compared to the Malay majority (88%) at 114.83 and Indians (5.5%). Buddhism had the highest score at 127.00. Among the three groups, doctors had the highest knowledge on organ donation. From this analysis, staff with higher salaries had better knowledge on organ donation.

Based on the data in Table 3, those aged from 31-40 ( $n=153$ ) show the highest mean score of 45.82, slightly higher than the 21-30 ( $n=47$ ) age group with a score of 45.09. The male group has a better attitude towards organ donation than the female group. From here, we can observe that despite Malays being the majority, Chinese and Indians had significantly higher scores. In terms of religion, Hindus

had the best attitude towards organ donation (mean=52.00) followed by Christians (mean=50.60) and Buddhists (mean=50.29). Meanwhile, Muslims had a poor attitude towards organ donation with a mean score of 44.38. Doctors show the best attitude as compared to nurses and health assistants. From Table 4, we can see that attitude improves as monthly income increases.

Table 4 shows the practice score based on demographic data. In terms of practice, the oldest (age 51-60) and youngest (age 21-30) groups were more willing to donate their organs with mean scores of 5.50 and 5.1 respectively. Similar to knowledge and attitude, males had better practice compared to females. From the analysis, we can see that although the Chinese had a higher score in knowledge and

**Table 3. Knowledge and attitude score based on demographic data.**

Categories	Variables	Knowledge			Attitude		
		N	Mean	Std. Deviation	N	Mean	Std. Deviation
Age in Years	21-30	47	117.89	12.264	47	45.09	5.823
	31-40	153	116.05	14.548	153	45.82	7.592
	41-50	34	115.65	12.685	34	44.21	8.175
	51-60	21	106.95	15.577	21	42.62	7.694
Gender	Male	49	120.53	12.926	49	49.06	7.273
	Female	206	114.41	14.245	206	44.29	7.156
Ethnicity	Malay	224	114.77	14.520	224	44.31	7.235
	Chinese	17	123.29	8.837	17	51.35	4.756
	Indian	14	119.29	10.695	14	52.00	5.791
Religion	Islam	224	114.87	14.507	224	44.38	7.246
	Buddhism/ Taoism	7	127.00	8.718	7	50.29	5.090
	Hindu	14	119.29	10.695	14	52.00	5.791
	Christianity	10	118.50	10.113	10	50.60	6.398
Education	Secondary education	90	109.86	13.379	90	42.33	6.569
	Diploma	76	115.93	14.004	76	43.09	6.919
	Tertiary Education	89	121.09	12.968	89	49.91	6.268
Occupation	Doctors	85	121.74	12.187	85	50.27	5.695
	Nurses	85	115.32	14.162	85	43.00	6.882
	Health assistant	85	109.71	13.633	85	42.34	6.853
Monthly income	<RM 1000	5	111.20	3.033	5	38.20	2.490
	RM 1000 – RM 3000	80	111.30	14.706	80	42.01	6.956
	RM 3000 – RM 5000	73	113.79	14.171	73	44.90	6.906
	RM 5000 – RM 10000	61	121.02	11.776	61	47.03	7.550
	>RM 10000	36	120.17	13.985	36	50.78	4.923

attitude, Indians were better in practice (mean=7.00). Muslim Malays showed the least score in practice (mean=4.59). Doctors had the highest score (mean=6.33) followed by nurses (mean=4.33) and health assistants (mean=3.33). The trend in practice is the same as attitude where the practice of organ donation improves with the increase of monthly income.

With the Pearson correlation, we could measure the degree of linear association between total knowledge and total attitude with total practice. The Pearson correlation coefficient between total knowledge and total practice was  $r=0.383$ , indicating a fair and linear relationship with  $p=0.001$ . The Pearson correlation coefficient between total attitude and total practice was  $r=0.709$ , indicating a moderately strong and linear relationship with  $p=0.001$ . Hence, we can say that generally 50.3% of total attitude affects willingness to practice but only 14.7% of total knowledge affects willingness to practice.

Next, we compared each variable from the willing and unwilling groups to see if the variables are related to their total practice. The groups are divided based on

their score in the practice segment; a score of more or equal to five is categorised as willing to donate organs (practice) while a score less than five is categorised as unwilling to donate (non-practice). The willing-to-donate group ( $n=154$ ) has a mean of  $118.60 \pm 14.524$  for their total knowledge score and a mean score of  $48.66 \pm 6.283$  in their total attitude score. The unwilling group ( $n=101$ ) had a mean score of  $111.00 \pm 12.372$  for total knowledge and a mean score of  $39.93 \pm 5.700$  for total attitude.

Table 5 shows the mean differences of total knowledge between the practice and non-practice group is only 7.60 (5.2%). This indicates that the amount of knowledge does not affect practice. However, the mean difference of total attitude between the practice and non-practice groups was 8.73 (14.6%). This shows that attitude affects practice more than knowledge. A higher knowledge on organ donation does not signify a greater practice in organ donation. A higher score in attitude shows an increase in the practice of organ donation.

Figure 1 shows the reasons for donating

organs. In this segment, the participants were allowed to choose more than one answer. The main reason for those who are willing to donate their organs is their willingness to help others (44.1%) followed by religion (24.5%), beliefs (14.9%) and culture (13.0%). On the other hand, the main reasons for those unwilling to donate include fear of losing organs (41.4%) followed by a lack of knowledge (23.8%) and religion (9.9%).

## DISCUSSION

### Knowledge

In this study, doctors are shown to have better knowledge about organ donation than nurses and health assistants. Education levels play an important role in knowledge about organ donation. Therefore, doctors have better knowledge regarding this matter. Doctors also have more exposure to organ donation and transplantation during medical school. Our study is supported by a study done by Farukkh M.<sup>8</sup> in Saudi Arabia that compared the knowledge between nursing and medical students, which showed the knowledge of medical students to



be significantly higher than the nursing group.

In addition, the upper-middle class group's knowledge about organ donation was significantly higher (RM 5000-10000). Most of the time, monthly income is associated with occupation. Since doctors have more income, this indirectly shows that doctors have more knowledge than nurses and health assistants.

Our study demonstrated that healthcare workers between 21-30 years old have better knowledge on this matter, followed by those aged 31-40 years old. This shows that the younger age group is more knowledgeable as they are Internet-savvy and can access information online. Additionally, they have more recent knowledge since they are recent graduates and theoretically fresh compared to the other age groups. A study done by Wong L. P.<sup>9</sup> showed that people from the age of 18 to 39 years old have good knowledge

regarding organ donation.

Moreover, our study showed that males are significantly more knowledgeable regarding organ donation than females. These results are similar to those of a study conducted by Jothula et al.<sup>10</sup> which showed that 89.6% of males had better knowledge.

In our study, in terms of ethnicity, the Chinese group had better knowledge followed by Indians and Malays, which contrasts with a study done by Wong L. P.<sup>9</sup> in Malaysia. Their study showed that Indians had better knowledge than Chinese and Malays. This difference among ethnicities may be due to different interest levels among race and religion when attending lectures on organ donation.<sup>11</sup>

#### Attitude

In our study, doctors and those with tertiary education showed a more positive attitude towards organ donation than nurses and health assistants. A study by Farukkh M.8

showed that medical students have a better attitude towards this matter than nursing students. A study by Jothula et al.<sup>10</sup> at a medical college in Telanga, India showed that interns generally had positive attitudes (77.5%) towards organ donation. A study by Wong L. P.<sup>9</sup> showed that respondents with tertiary education have a better attitude towards organ donation than the secondary education group. Medical students have more exposure to organ donation and transplantation during medical school than nurses. Adequate understanding on organ donation will give a good impact towards the attitude of the people. Therefore, campaigns on organ donation are essential for the public to have a better understanding about organ donation.

In our study, we found that Indians and Hindus had a better attitude towards organ donation than other ethics and religions. This is because Hindus believe in karma and that good acts will be repaid in the afterlife, leading them to have a good attitude towards organ donation. A study by Wong L. P.<sup>9</sup> reported that Malays believe a body should remain intact even after death.

Our study found that high income groups (above RM 10000) have better attitudes towards organ donation. This result was similar to a study by Wong L. P.<sup>9</sup> The high-income group in our study were likely doctors, especially specialists and consultants who have a better understanding on organ donation.

#### Practice

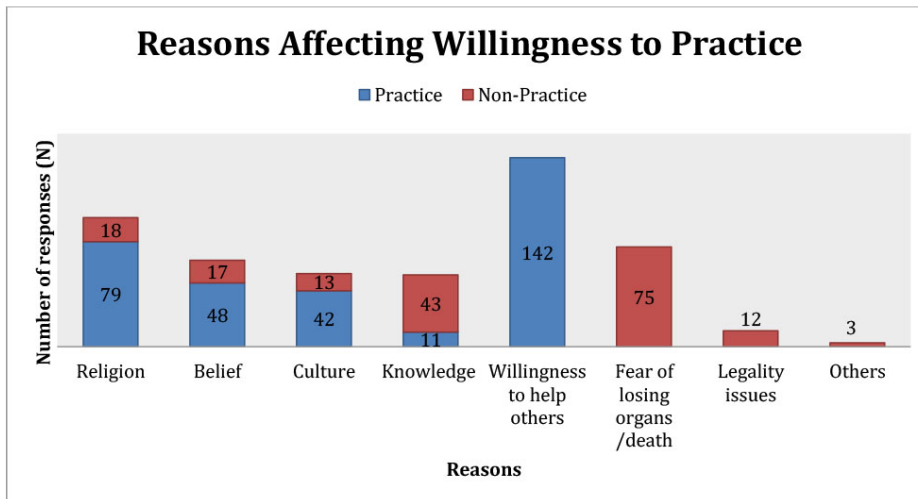
In our study, we found a fair and linear relationship between the total knowledge and practice scores. At the same time, there is a moderately strong and linear relationship between the total attitude and practice scores. Despite good knowledge, willingness to practice is low if the attitude towards organ donation is poor. Thus, we can say that attitude generally affects their willingness to practice more than

**Table 4.** Practice score based on demographic data.

Categories	Variables	N	Mean	Std. Deviation
Age in Years	21-30	47	5.11	2.024
	31-40	153	4.91	2.429
	41-50	34	4.41	2.401
	51-60	21	4.29	2.390
Gender	Male	49	6.12	1.641
	Female	206	4.52	2.395
Ethnicity	Malay	224	4.57	2.326
	Chinese	17	6.41	1.622
	Indian	14	7.00	1.617
Religion	Islam	224	4.60	2.320
	Buddhism/ Taoism	7	6.86	0.900
	Hindu	14	7.00	1.617
	Christianity	10	5.50	2.506
Education	Secondary education	90	3.84	2.283
	Diploma	76	4.33	2.199
	Tertiary education	89	6.25	1.830
Occupation	Doctor	85	6.33	1.748
	Nurse	85	4.33	2.190
	Health assistant	85	3.33	2.310
Monthly income	<RM 1000	5	2.60	1.517
	RM 1000 – RM 3000	80	4.10	2.320
	RM 3000 – RM 5000	73	4.56	2.327
	RM 5000 – RM 10000	61	5.51	2.335
	>RM 10000	36	6.14	1.624

**Table 5.** Mean differences between practice and non-practice groups.

Variables	N	Mean	SD	Mean	SD
		Total Knowledge (%)	Total Knowledge	Total Attitude (%)	Total Attitude
Practice (willing)	154	118.60 (81.8%)	14.524	48.66 (81.1%)	6.283
Non-practice (unwilling)	101	111.00 (76.6%)	12.372	39.93 (66.6%)	5.700
Mean Differences		7.60 (5.2%)		8.73 (14.6%)	



**Figure 1.** Reasons affecting the practice or non-practice of donating organs.

knowledge. Our study shows that doctors have the highest mean score for practice on organ donation compared to nurses and health assistants. This is because doctors have better attitudes compared to nurses and health assistants.

The younger age group (21-30 years old) was more willing to donate their organs. The same result was obtained by Wong L. P.<sup>9</sup> in their youngest age group (18-24 years old). This could be because they have gained more exposure on organ donation from the internet. This tendency to have an interest to practice organ donation shows that age is significant towards practice in our study.

Among the three major ethnic groups, Indians are most likely to donate their organs, followed by Chinese and Malays. Ethnicity is directly related to religion. Our study shows that Hindus have better practices towards organ donation than other religions. Hindus have more positive attitudes towards organ donation than Buddhists and Muslims. No law prohibits the Hindus to donate their organs as they believe that by donating their organs it would give a positive effect to their rebirth process after death.<sup>10,11</sup> Within the Islamic faith, despite fatwa (religious rulings) stating that giving and receiving organs is compatible with Islam, many Muslims are still unsure whether organ donation is allowed.<sup>12</sup>

In addition, the male group had better practice towards organ donation than the female group in our study. A similar result was obtained by Wong L. P.<sup>9</sup> where 60.4% (n=154) of males were willing to donate

their organs while 39.6% (n=101) were not. The most common reason for wanting to donate is their willingness to help others (41.4%) followed by religion (24.5%). Healthcare workers are always dealing with sick patients and some of them need to receive transplants to survive. Thus, healthcare workers may feel it is their call to help others in need.

In our research, about 24.5% of healthcare workers were willing to donate their organs due to religion and 9.9% were not. Further analysis showed that the 9.9% were Muslim. It is perplexing that 24.5% of healthcare workers including Muslims and others, support organ donation but 9.9% were against it because of religion. No religion is against organ donation.<sup>9</sup> However, some religious misconceptions about organ donation exist, especially in Islam.

Our study shows that the most common reason for the unwillingness to donate organs is the fear of losing their organs or that organ donation might cause deformity or death. There are some common beliefs among Chinese and South Asians that organ removal and post-mortems interfere with their afterlife and that people need all of their "parts" after they die to enjoy an afterlife existence thus, the body should remain intact to enter the spirit world.<sup>9</sup> About 32% of those unwilling to donate their organs mentioned that they lack knowledge about organ donation. Further analysis showed the 32% to be health assistants and nurses. Their ignorance about the process and handling of organ donations might be the

reason for their fear of losing their organs. Thus, this poor knowledge reflects their attitude towards organ donation.

Some reports mention that when religious leaders favor organ donation, the community is more likely to support donating their organs.<sup>9</sup> These findings reflect the importance of creating awareness about organ donation from the perspective of religion. To promote organ donation, we suggest that public figures from each religion become ambassadors of organ donation.

Education about organ donation is required especially among healthcare workers. In Europe, there are several training programmes on organ donation for example, the European Training Program on Organ Donation, the European Donor Hospital Education Programme and the Transplant Procurement Management.<sup>13</sup> Our local hospitals should implement a training program to educate healthcare workers regarding organ donation. This will increase their knowledge and understanding towards organ donation.

We faced some limitations while conducting this research. Firstly, the questionnaire was done in English so, the health assistants faced some difficulties in completing the questionnaire. However, we translated the questionnaire orally and conducted it using an interview technique to limit inaccurate data collection. Mistranslation and misinterpretation might happen during the process. Other than that, the questionnaire was adapted from another country. Therefore, it might not benefit the local population and culture. Lastly, there was an imbalance of sample sizes in terms of gender, ethnicity and religion. However, we used a bootstrapping method to prevent bias in the results.

We would like to recommend some suggestions to improve organ donation knowledge, attitude and practice. Firstly, parents and schoolteachers should play a role in improving practice towards organ donation. We should educate our society at a young age since attitude cannot be taught but is part of the growth process. We should not only invite a doctor or a survivor but also extend the invitation to religious leaders in organ donation campaigns as the Malaysian community and society are very religious. This is vital to clear out the

misconceptions of organ donation from a religious view. Lastly, the government can implement rules to increase organ donation and transplantation practice. For example, we can implement a HOTA act as in Singapore to raise the number of organ pledgers and donors.

## CONCLUSION

In conclusion, our study on healthcare professionals has indicated differences in knowledge towards organ donation appear to exist between the doctors, nurses and health assistants. Our study suggests that doctors have adequate knowledge, attitude and practice towards organ donation. Our study revealed that doctors, healthcare professionals with tertiary education, males, Indians, Hindus and those with a high monthly income had significantly higher attitudes and practices towards organ donation. Meanwhile, knowledge was significantly associated with people of younger age, the Chinese ethnicity and an upper middle-class income. The main barrier for organ donation was found to be the fear of losing organs. Willingness for organ donation was significantly associated with willingness to help others and religion.

Furthermore, factors affecting practice is associated with attitude but not with knowledge. Despite good knowledge, the willingness to donate is low when the attitude is poor. Therefore, an organ donation campaign should be conducted to improve attitudes and practices among those who have knowledge but who are not willing to practice organ donation.

## DISCLOSURE

### Conflict of interest

We hereby acknowledge there are no competing of interests with any parties.

### Ethics approval and consent to participate

Ethics approval was granted by the UKM Ethics Committee – JEP-2018-337

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### Authors' contributions

Wan Haslina W. A. H. – principal investigator, original idea and proposal, data analysis, manuscript write-up. Norshamsiah M. D. (corresponding author) – main investigator, original idea and proposal, data analysis, manuscript write-up. Viknesh K. Sinaran S. Nurul Ayuni Syafiqah M. R. Thivyasri K. Nur Najihah M. S. B. – proposal preparation, data collection, analysis.

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