



## Knowledge and Attitudes towards Solid Organ Donation Among Healthcare Workers, Medical Students, and Public in Sub-Saharan Africa: a Systematic Review

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### Abstract

**Background:** African countries are facing several multifaceted obstacles in tissue and organ donations and transplantations. Some of the challenges include a lack of public education, awareness, and motivation for organ donation and transplantation programs. The purpose of this article is to assess knowledge and attitude towards solid organ donation among healthcare workers, medical students, and the public in sub-Saharan Africa.

**Methods:** A systematic literature search was conducted through PubMed, Psyc INFO, and Google scholar databases which were searched using controlled and free-text language. As this is the first work for the region, we included studies published between 2004 and 2020. The relevant data of the selected studies were extracted and categorized based on their target populations, and findings on the knowledge and attitude were summarized and described.

**Results:** Of the 241 retrieved studies, twenty-two fulfilled the pre-defined criteria included in the review. The knowledge and attitude toward solid organ donation were varying among healthcare workers, medical students, and the public. Accordingly, healthcare workers had adequate knowledge with a positive attitude; medical students had moderate or good knowledge with a poor attitude; the public had a poor knowledge with a relatively positive attitude toward organ donation.

**Conclusions:** A comprehensive medical education along with adequate information is required to improve the attitude toward the organ donation program in sub-Saharan Africa. Yet again, enhanced knowledge about cultural and attitudinal obstacles against organ donation should be addressed to improve the knowledge and attitude toward the program in the region.

**Keywords:** Organ donation; Knowledge; Attitudes; Sub-saharan africa; Systematic review

### Introduction

Functional organ transplant programs began to expand in African countries in 1967 when the world's first successful human-to-human heart transplant was performed in South Africa [1]. This was more than a decade later after the first kidney transplant at

Harvard University [2]. Any human body tissue or organ such as kidneys, heart, liver eyes, lungs, skin, etc. can be donated when living or after death [3]. In Africa, the need for appropriate treatment interventions for organ failures is emphasized by the high prevalence of chronic kidney disease in the general population [4]. According to the world health organization (WHO) African region report, about 350 kidney transplants from living donors were performed in four sub-Saharan African countries, 15, 12, 45, and >270 in Côte d'Ivoire, Ethiopia, Kenya, and Nigeria, respectively [5]. Globally, there was an improving public motivation for solid organ donation and increasing rates of organ donors; however, still, there was significant transplant waiting in several countries indicating an imbalance between demand and supply of organs [3]. According to the WHO African region, there were limited organ and tissue donations and transplantation in Africa [5] despite a possible increase in the number of patients waiting for organ transplantation [6-9]. The public's knowledge and attitude towards organ donation (OD) play important roles in individuals' willingness to become donors and/or involve in donation campaigns and transplantation centers [10,11]. In society, the level of overall knowledge and attitude towards OD may vary among different populations and lack of public education, awareness, and motivation for the program were the perceived obstacles especially in the countries with many religious, cultural, and social traditions [5]. This was in line with a study in the United States which showed that Chinese and Koreans share some common barriers such as lack of knowledge and communication about OD [12]. Improving public knowledge and awareness of OD could improve a person's willingness to donate and participate in donation campaigns [13, 14]. Accordingly, synthesis of the research results of knowledge and attitude towards OD will provide a summary of current evidence that may be relevant to inform appropriate interventions to improve the accessibility of organs for transplantation. The present systematic review, therefore, aimed to address the current evidence of knowledge and attitude towards OD among healthcare workers (HCWs), medical students, and the general public in sub-Saharan Africa.

### Methods

#### Study protocol

Protocol for the present systematic review was registered on the International Prospective Register of Systematic Reviews (PROSPERO) a registration number of CRD 42020218864. It was reported as per the Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement guidelines [15].

#### Inclusion and exclusion criteria

We included original studies conducted in sub-Saharan African countries with a study population consisting of healthcare workers, medical students, and the general public; with study outcome of at least knowledge, attitude, or willingness about OD; reported in English; and published in the years from 2004 to 2020.

On the other hand, we excluded studies conducted in non-sub-Saharan African countries; studies on blood and other tissue donations; studies reporting only results of specific organs such as liver, kidney, or eye donations; and studies reported with non-English

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Received: July 24, 2021 Accepted: August 09, 2021 Published: August 17, 2021

language. Moreover, we excluded articles that did not meet the quality requirements, which were identified after reading the whole text, abstract, methodology, and result.

### Search strategy

The present review included studies published between 2004 and December 2020. Two authors (JY and FA) independently searched for articles in the databases of MEDLINE /PubMed, PsycI NFO, and Google scholar using both controlled and free-text language. In our open text search strategy, we used the following keywords; (knowledge OR attitude) AND (healthcare workers OR medical students OR public) AND (organ donation) AND sub-Saharan Africa. For the controlled language search the following Medical Subject Headings (Me SH) terms were used: “knowledge”, “attitude”, “willingness”, “awareness”, “Healthcare Workers”, “Medical Students”, “Public”, “Organ Donation”, and “sub-Saharan” [S 1 Appendix]. In addition, a manual search for additional articles in the references of the included studies was also conducted to make the search processes more comprehensive.

### Study selection

During the selection process, we (JY and FA) identified, registered, and removed duplicate records by using Endnote software as well as manually. The remaining articles were independently screened according to the pre-determined inclusion and exclusion criteria, and articles about knowledge and or attitude toward organ donation among healthcare workers and or medical students and or the public in Sub-Saharan Africa that reported in English were considered for inclusion.

### Quality assessment and data extraction

We conducted methodological quality assessment using JBI’s Critical Appraisal Checklist [16] [S 2 Appendix]. We included all studies which fulfilled the eligibility requirements and with overall positive scores higher than 50%. Accordingly, the quality of the included studies was also described as <75%, ~75%, and >75%.

Two reviewers (JY and FA) independently extracted the relevant data from the included studies into the data extraction format. The

data extraction format had the following components: name first author, year of publication, country, study design, study setting, respondents, mean age, and main results from the selected articles (Table 1).

### Data synthesis

During data synthesis, we gathered the extracted results under the population groups (healthcare workers, medical students, and the public), and sorted them to be topically similar together (particularly knowledge, attitude, willingness, and awareness). Then, we integrated the findings and created concise but comprehensive translations by removing redundancies. Overall, data on the knowledge and attitude was summarized with proportion and the result was qualitatively described accordingly.

## Results

### Selection process

We retrieved a total of 241 articles from systematic databases and manual searching. After removing 114 duplicates and retain 127 records. Then, we screened the records initially by their titles, then abstracts and full document. Ninety-six records were removed and retained thirty-one records. The retained articles were screened for eligibility based on the pre-defined inclusion and exclusion criteria. Accordingly, we excluded 9 articles because of their insufficient information; irrelevant outcomes; and mixed results (Figure 1). Finally, we selected 22 articles for systematic review.

### Characteristics of the studies

General background of the studies: A total of 7,935 participants were involved in the 22 included primary studies. The studies were conducted in 4 sub-Sahara African countries namely Nigeria, Ethiopia, South Africa, and Ghana from where 9, 6, 5, and 2 studies were originated, respectively. Of the included studies in this review, more than 68% were published in the last five years, and about 91% were published within the last nine years. Only two studies were older than 10 years.

*Knowledge and attitudes evidenced by the studies: More than 95%*

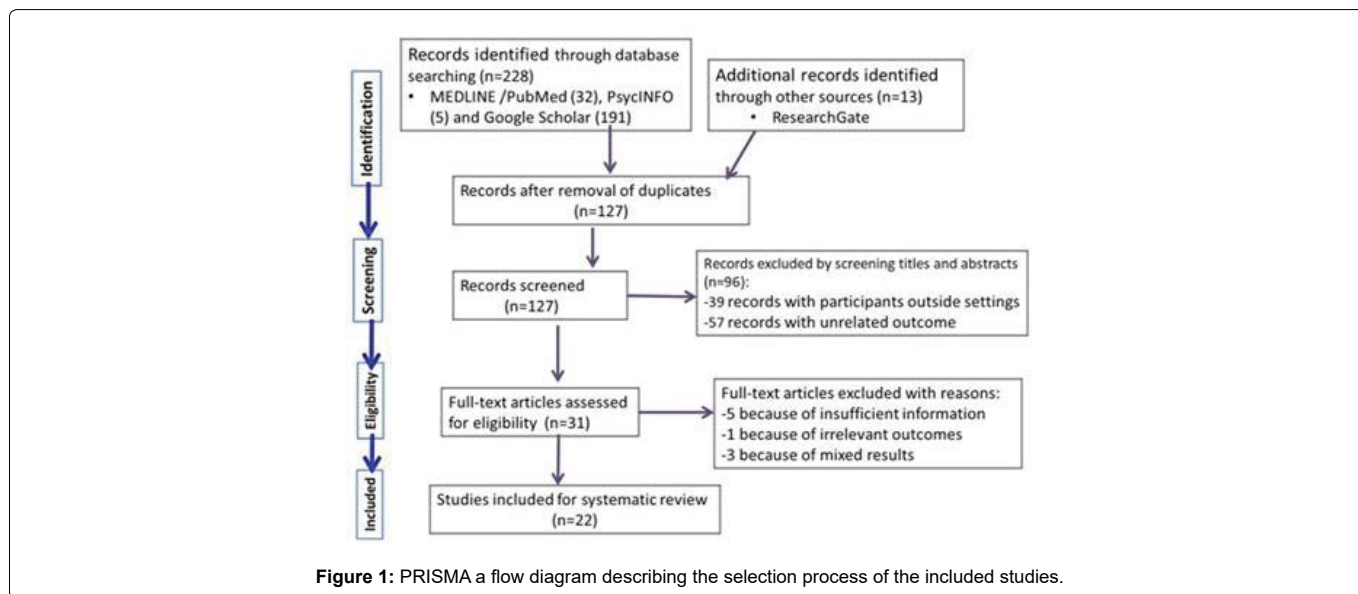


Figure 1: PRISMA a flow diagram describing the selection process of the included studies.

Table 1:

Author, year & reference	Country	Study population & settings	Respondents (RR) mean age	Study design	Outcomes and main findings		Quality
					Knowledge and awareness	Attitude and willingness	
Girma et al., 2020 [31]	Ethiopia	HCWs; university & health centers	382 (90.3%); 29.2 years	A cross-sectional study	-81.4% of health professionals had awareness	-Among HCWs, 79.1% had a favorable attitude toward OD -74.6% were willing to donate an organ.	~75%
Oluyombo et al., 2016 [30]	Nigeria	HCWs from three care levels; hospitals	766 (90.1%); 36.7 years	A cross-sectional study	-Health workers were well informed, amongst which 82.5% had adequate knowledge of OD -93.3% were aware	-Health workers had a poor attitude toward OD -29.5% of them would be willing to donate an organ	>75%
Gerbi, et al., 2020 [19]	Ethiopia	Healthcare professional; university	296; 28 years	A cross-sectional study	-78.7% of the HCWs had adequate knowledge of cadaveric OD - Majority were well aware of the topic	-About 55.4% of the professionals had a good attitude towards OD after death -39.5% were willing to donate a cadaveric OD	>75%
Wolide et al., 2020 [18]	Ethiopia	Healthcare providers; private clinics & university Hospital	326 (77.3%); 29.7 years	A cross-sectional study	-Care providers had good knowledge; and the overall weighted knowledge score was 4.344 -84.7% were aware of the purpose of OD	-Care providers showed a good attitude -58.6% of them are willing to donate organs in the future -The overall weighted practices score was 5.64 (5.39, 5.89).	>75%
Crymble et al., 2017 [27]	South Africa	Nurses; in private and state health sectors	273 (68.6%); >50 years of age	A cross-sectional study	-Nurses' knowledge regarding the supply of organs, access to transplants, and legal rights of donors/next of kin was fair	-Most nurses had positive attitudes towards OD -64.2% of them were willing to donate their own organs after death.	>75%
Esezobor et al., 2012 [33]	Nigeria	Medical doctors & nurses; in workshops	172 (83.9% ); 39.9 years	A cross-sectional study	-	-HCWs were favorable to OD -59.3% were willing to donate -They prefer to donate: 54.9% anytime; 27.5% after death; and 10.8% while alive	<75%
Dibaba et al., 2020 [17]	Ethiopia	Medical students; university hospital	320; 39.9 years	A cross-sectional study	-Medical students had a high level of knowledge -96.9% of them were aware of OD	-Students had a low level of positive attitude -willingness (58.1%) was noticed among the participants toward OD	>75%
Bekele et al., 2020 [34]	Ethiopia	Medical students; university of a teaching hospital	236 (98.3%); 17 years	A cross-sectional study	- 88.6% of the medical students had good knowledge	-Medical students had a poor attitude towards OD, and only 10.2% of them had a positive attitude -Only 38.9% of them were willing to donate an organ after death, but 93.6% support OD	<75%
Wolide et al., 2020 [26]	Ethiopia	Medical & health students; university	421 (41.5% were medical students); 23.5 years	A cross-sectional study	-Medical students had good knowledge of OD -Overall knowledge score was 3.96 -Around three fourth of the total students knew the OD to treat failed organs	-They had a positive attitude to OD -Overall attitude score was 6.3914 -62% of the total students were willing to donate an organ	<75%
Emem-Chioma & Bell-Gam, 2020 [35]	Nigeria	Medical students & HCWs; university of a teaching hospital	286 (97.9%); 25.4 years	A cross-sectional study	-Most of the respondents had good knowledge about OD -Know the definition of OD, donation when living or after death	-About 79.1% would donate an organ -Cadaveric donation was more acceptable than living OD	≥75%
Oluoha et al., 2018 [29]	Nigeria	Students in tertiary institutions; from colleges	600; 21.3 years	A cross-sectional study	-69.8% of the students had fair to good overall knowledge about OD -Around 86% were aware about OD	-About 72.8% had fair to good attitudes toward OD -Willingness to donate organs of the students was 23.1%	~75%

Buthelezi & Ross, 2011 [28]	South Africa	Undergraduates from universities; set for pre- & post-test	18; 22 years, range 18-25	A cross-sectional study (interview)	-Pretest, all had good to moderate knowledge scores about OD -Posttest, their knowledge scores increased, suggesting an improvement	-Pretest, they had positive attitudes toward OD -Posttest, their attitude was improved -Willingness to donate was also increased posttest	<75%
Ibrahim <i>et al.</i> , 2019 [32]	Nigeria	Undergraduates; from health & life sciences	400 (93%); about 95% were 16-30 years	A cross-sectional study	-89.8% of the respondents were well aware of OD	-64% were willing to donate while they are still alive out of which 91% were only willing to donate to their family members -43.5% were willing to donate organs after death and 64.2% can only donate to their family members	~75%
Etheredge <i>et al.</i> , 2013 [36]	South Africa	Public; in 5 urban residents	1048; two-thirds aged 25 to 50 years	A cross-sectional study (interview)	-This urban community had good knowledge about OD -89% of respondents had heard of OD	-Public attitudes toward OD among this population are generally positive -70% of respondents specified they would be willing to donate their organs after death	~75%
Lartey <i>et al.</i> , 2019 [20]	Ghana	Public; applicants and driver & license staff	100; 32.1 years	Cross-sectional study (interview)	-50.5% of respondents had not much information on OD -Only 32.7% were aware of corneal donation	-67% of participants were willing to donate their organs after death -Attitude toward OD among this population generally appears positive	>75%
Iliyasu <i>et al.</i> , 2014 [23]	Nigeria	General public; urban	383 (95.8%); 34.3 years	A cross-sectional study	-79.6% of them had heard about OD, but 65.9% knew that donation is when living only	-Majority of respondents (79.1%) were willing to donate an organ	<75%
Odusanya & Ladipo, 2006 [21]	Nigeria	General public; urban	428; 31.1 years	A cross-sectional study	-Overall knowledge was poor, but 60% were aware of OD. -Knowledge was higher among those with tertiary-level education.	-Attitude towards OD was generally fair -30% of them were willing to donate an organ	~75%
Akinyemi <i>et al.</i> , 2020 [22]	Nigeria	Elders; attending outpatient, hospital	412; 46.3 years	A cross-sectional study (interview)	-Overall, 80.1% were aware, at least of one organ	-Only 33.7% of them were willing to donate an organ	~75%
Rabiu <i>et al.</i> , 2016 [24]	Nigeria	Relations of neurosurgical patients in hospital	127 (95.8%); 36 years	A cross-sectional study (interview)	-Only a few knew that organs can be transplanted, except for kidneys (85.8%)	-About 67% would donate an organ -82.7% of them supported organ transplantation.	<75%
Bhengu & Uys, 2004 [37]	South Africa	Zulu speaking; urban & rural	48; Adults	A cross-sectional study	-Majority of respondents lack knowledge of OD, which excludes transplant coordinator	-Most of the respondents showed some positive attitude towards OD -40.4% of them were willing to donate at death	<75%
Agbenorku <i>et al.</i> , 2013 [25]	Ghana	Public; in a city	1020; 27.5 years	An observational study (interview)	-More than half of them were aware of organ transplant	-Respondents had a positive attitude towards OD -59.1% would donate /receive organ -But few had an organ donor card	~75%
Bookholane <i>et al.</i> , 2020 [38]	South Africa	Families for consent to OD; in Hospitals	83; 49 years	Prospective descriptive study	-55.4% of the family had prior knowledge of OD	-27.7% granted consent -89.2% of cases; were receptive to OD discussion -48% of donor families agreed to tissue and eye donation	<75%

of the reviewed studies assessed the status of knowledge of OD among the target population, though only around two-thirds of them reported the level of overall knowledge. The majority of authors evaluated knowledge using 5 to 11 questions, which contained multiple-choice response alternatives [17-21]. Some studies measured respondents'

overall knowledge and reported the results in percentage or average scores. Although awareness was also asked as a question under knowledge, some authors, especially those who studied the general public, assessed it independently as a main outcome [20-25].

Although the manner of assessment and reporting method was

varying, most of the included studies assessed the status of attitude towards OD. The attitude was measured using multiple-choice responses ranging from 8 to 14 questions [17,19-21,24-27], and using a 2- to 5-point Likert scale [18,28]. When the authors evaluate attitude, the most frequently asked question and determined was about participants' willingness to donate organs (Table 1). Some studies reported statistical value of overall attitude; but, it should be noted that some of the questions used were related to measuring perception rather than attitude [18,28,29].

Table 1 Characteristics of reviewed studies and description of knowledge and attitude towards OD among HCWs, medical students, and the public in sub-Saharan Africa

Healthcare workers' knowledge and attitudes towards OD: Some of the included studies explicitly assessed overall knowledge and attitude towards OD among HCWs who had varying levels of occupations [18,19,27,30,31,33]. These studies were conducted in three countries of sub-Saharan Africa (eastern of South Africa [27], southwest of Nigeria [33], and western [18,19] and northern [31] of Ethiopia).

The respondents' overall knowledge toward OD was reported by using terms of quality such as poor, moderate, fair, and good; which was also presented numerically (percentage or average scores) in some studies. As an example, a study conducted in Nigeria among 766 HCWs, reported the level of knowledge toward OD among HCWs numerically (proportion) in which 82.5% of HCWs had adequate knowledge about OD [30]. Besides, a study conducted among 326 HCWs in Ethiopia, reported the level of knowledge numerically as an average score [18]. Although the overall result indicated that HCWs had good knowledge about OD, there was a variation by study setup [18,19,30]. On the other hand, results from the included studies revealed that the majority of HCWs had awareness toward OD (ages: 84.7% to 93.3%).

The level of attitude towards OD among HCWs was described using terms of quality such as "good", "favorable" for positive attitudes, and "poor" for negative attitudes [33]. Some studies measured and presented it in percentage [19,31] and an average of the weighted score [18]. Findings from these studies indicated that the majority of HCWs had positive attitudes towards OD. On the other hand, the willingness of HCWs to donate an organ was determined and reported numerically as a proportion in all of the studies. The result revealed that there is a huge gap in the willingness of HCWs to donate an organ which ranged from 29.5% in a study conducted in Nigeria [30] to 74.6% in a study conducted in Ethiopia [31]. The main reasons for the willingness of the respondents to donate organs were "to save the lives of patients", "to avoid unnecessary wastage of organs", "to facilitate medical teaching and research", and "to be lived by other people's life" [19]. On the other hand, the most commonly reported reasons for unwillingness to donate organs were "fear of complications arising from donation", "lack of trust in the health sector", and "family refusal" [19,31,33].

Medical students' knowledge and attitudes towards OD: Although several of the included studies evaluated this subgroup along with other participants, only two studies [17,34] separately assessed medical students' knowledge and attitude toward OD. Both of these studies were conducted in Ethiopia, in the Horn of Africa.

Results of the included studies in this subgroup showed that medical students had good information on OD. The student's level

of knowledge about OD was described in terms of quality and numerically (proportion) as well. Concerning the attitudes of the medical students toward organ donations, the studies [17,34] reported that they had a negative attitude toward OD. Although the studies of this subgroup were conducted in the same country, Ethiopia, a big gap was noticed in the willingness to donate organs among the study participants ranging from 58.1% [17] to only 10.2% [34].

Public knowledge and attitude towards OD: More than half of the total included studies assessed knowledge and /or attitude towards OD among the general public. These studies were conducted in four countries of sub-Saharan Africa including Ghana [20,25], South Africa [28,36-38], Nigeria [21-24,29], and Ethiopia [26].

Results of the included studies indicated that the public had inadequate knowledge about OD and the majority had no much information about it. However, a study conducted in South Africa reported that they had good knowledge about OD [36]. The participants' level of awareness toward OD was varying among the included studies and it was ranged from 32.7% to as high as 89.0%. Despite having poor knowledge of OD, the public had generally a favorable attitude and inspiring willingness to donate an organ. Results from the included studies revealed that most of the public had a positive attitude toward OD [20,23,24,36,37]. Fortunately, encouraging results were presented regarding the willingness of the public to donate an organ. The level of willingness was ranged from 30% [21] to 79.1% in this target population [23]. The common reasons to donate an organ to the public include "love for humanity", "being a religious obligation", "moral obligation", and compassion [20,23]. On the other hand, having "a poor knowledge of solid OD", "desiring to be entombed with their whole body", "restriction by family members", and "religious restriction" were the reasons for unwillingness to donate organs after death [20].

## Discussion

The focus of this systematic review was to provide a synthesis of current evidence on knowledge and attitudes towards solid OD among HCWs, medical students, and the general public in the Sub-Saharan African region. Despite our great attempt to include articles from more countries, all of the included studies (22) were originated from only 4 countries in the sub-Saharan African region. However, these countries look geographically good representatives of the region as they are located in the western (Nigeria and Ghana), eastern (Ethiopia), and southern (South Africa) parts of the region. Although most of the included studies were used a cross-sectional study design, the methods used to conduct surveys and structures of the questionnaires were largely varied. The studies were also used multifaceted questions to assess the levels of knowledge and attitude toward OD among the target populations. Furthermore, some studies did not report overall magnitude or average knowledge and attitude toward OD. Apart from their lack of diversity, the heterogeneity of the studies may lessen the evidence of this review to be a good representative of the region.

This review identified that the overall knowledge about OD was varying among the population groups. Almost all studies, which assessed knowledge of OD among HCWs and medical students, showed that the majority of the respondents had adequate knowledge and awareness on the topic. On the other hand, the majority of the studies reported that the overall knowledge of OD among the general public appears to be low, though their awareness was encouraging

(Table 1). In addition, some studies revealed that the knowledge and awareness of the respondents about which human body part could be donated for transplantation was limited to a few organs, such as kidneys, eyes, liver, heart, and lungs [22,24,29,30,34,36]. There was a slight limitation in our generalization of the knowledge because some of the included studies did not report levels of overall knowledge of OD.

The people's knowledge about OD was found to positively associate with their educational status [18,19,21,32]. Other factors, such as level of awareness, ethnicity, level of income, and gender, were also found to influence people's level of knowledge of OD. This is in line with the notion that several cultural and religious factors influence individuals' willingness and attitude to donate organs and knowledge of OD [39,40]. However, the findings indicated that a high level of knowledge of OD does not necessarily support organ donation.

The main sources of knowledge and awareness of OD among the population groups include television, the internet, health workers, radio, friends, and newspapers, amongst which television was the most common source of information in each population [19,29,32]. For instance, studies conducted on the public indicated that television was the most common source of information in Ghana and South Africa with a proportion of 49.4% [20] and 48% [36], respectively.

The majority (81.8%) of the included studies measured the participants' overall attitude towards OD. We observed that the level of attitude between the population groups varies, which was generally higher in the studies of the HCWs than in the medical students and the general public ones. Most of the studies that assessed attitude towards OD among HCWs showed that the majority of the respondents had a positive attitude. Similarly, the study finding indicated that the public had a high level of attitude. On the other hand, the overall attitude towards OD among medical students appears to be low (Table 1). It may be the heterogeneity of the included studies in their methodology that has resulted in an inconsistency in the outcomes.

Apart from the knowledge and attitude toward OD, the respondents' willingness to donate organs was also varying from study to study among the target populations. This may reflect the divergent sociodemographic influence on the OD in sub-Saharan Africa and may require different policies and programs that should be implemented to improve organ supply in the region. For instance, the proportion of willingness to donate an organ was ranged from 10.2% [34] to 58.1% [17] among medical students. Likewise, the level of willingness to donate an organ was ranged from 29.5% [30] to 74.6% [31] among HCWs. In general, this review recognized that more than half of HCWs and the general public in sub-Saharan Africa would be willing to donate their organs. Whereas, medical students would be reluctant to donate their organs that may suggest the need for implementation of formal education about OD in medical curricula [39].

This study observed that the main reasons for the willingness of the respondents to donate their organs were varied between the population groups. Accordingly, among HCWs, the main reasons for their willingness to donate an organ were "to save the lives of patients", "to avoid unnecessary wastage of organs", "to facilitate medical teaching and research", and "to be lived by other people's life" [19, 31]. In the public, the predominant reasons for donating an organ include "love for humanity", "being religious obligation", "moral obligation", and "compassion" [20,23]. On the other hand,

the main reasons given for unwillingness to donate organs among the population groups include "fear of complications arising from donation", "family refusal", "psychological anxiety", "religious belief", and "lack of trust in the health sector" [19,29,31,33,38].

## Limitations

Even though this review was the first of its kind to be conducted in this region, it was not without limitations. For instance, all of the included studies were derived from only four Sub-Saharan African countries (South Africa, Ghana, Ethiopia, and Nigeria), which may affect the generalizability of the study. In addition, the method of assessment, the data collection tool, and ways of reporting the outcomes varied among the included studies. Moreover, unpublished articles and articles written in other languages were not included in the study.

## Conclusion

This review has provided the current evidence of OD in sub-Saharan Africa that would play an important role in solving the growing demand for organs for transplantation in the region. The result of the review revealed a wide variation in the knowledge about OD and an attitude to donate organs among the HCWs, medical students, and general public. HCWs had adequate knowledge about organ donation and a positive attitude to donate organs. The medical students had moderate to good knowledge about OD and a poor attitude to donate an organ. The public had poor knowledge about OD and a positive attitude to donate organs. On the other hand, HCWs and the general public had more willingness to donate their organs than medical students. The level of awareness about OD was promising among all target populations. On the other hand, the time when an individual would donate an organ was identified to vary among the target population.

The reasons for willingness or reluctance to donate an organ were also reported in the included studies, and several sociodemographic and attitudinal factors appear to influence the OD program in sub-Saharan Africa.

## Acknowledgment

The authors acknowledged the staff of the school of medicine and pharmacy, department of health and medical sciences, Haramaya University, Ethiopia.

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