





BMJ Open Knowledge of blood donation and associated factors in Ethiopia: a systematic review and meta-analysis

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ABSTRACT

Objective To assess the level of knowledge about blood donation and associated factors in Ethiopia.

Design Systematic review and meta-analysis.

Methods Both published and unpublished cross-sectional studies on the level of knowledge about blood donation in Ethiopia were included. Articles from different databases such as PubMed/MEDLINE, HINARI, EMBASE, Scopus, Google Scholar and African Journals Online were searched. Cochrane I² statistics were used to check for heterogeneity. Subgroup and sensitivity analyses of evidence of heterogeneity were carried out. Egger's test with funnel plot was conducted to investigate publication bias.

Result Twenty cross-sectional studies with a total of 8338 study participants (4712 men and 3626 women) were included. The overall nationwide level of knowledge about blood donation was 56.57% (95% CI 50.30 to 62.84). Being in secondary school and above (adjusted OR=3.12; 95% CI 2.34 to 4.16) and being male (adjusted OR=1.81; 95% CI 1.44 to 2.28) were the factors associated with level of knowledge about blood donation.

Conclusion More than half of the study participants were knowledgeable about blood donation. Sex and educational status were the factors significantly associated with level of knowledge about blood donation in Ethiopia. Therefore, there is a need for education and dissemination of information about blood donation among the general population to build adequate knowledge and maintain regular blood supply.

INTRODUCTION

Blood donation is life-saving for people in different emergency conditions, such as road traffic accidents, surgical procedures, pregnancy and delivery complications, chemotherapy, and diseases such as malaria, anaemia and intestinal parasites.¹ Blood donation is a noble practice of saving the life of millions of people. Donating safe and adequate blood can save up to three lives of a patient who need blood.²

Although the demand for adequate and safe blood is significantly increasing, there is a serious and critical shortage of blood stocks in low-income and middle-income countries.

Strengths and limitations of this study

- This study highlights the nationwide level of knowledge about blood donation in Ethiopia.
- This study covers a wide area and investigates different articles, making the review more accurate.
- Subgroup and sensitivity analyses were carried out to investigate the heterogeneity of the included studies.
- All included studies were cross-sectional in design, which may limit investigation of the cause-effect relationship.

In low-income and middle-income countries, family replacement and paid blood donors are the most common sources of blood transfusion.³ The availability of blood for transfusion in low-income countries is very limited due to the low level of knowledge, unwillingness to donate blood and poor blood donation practices. Meanwhile, patients suffer from lack of blood transfusion due to increased need from different medical and surgical conditions⁴

While every blood donor is considered a hero, the amount of blood collected from donors and the average rate of blood collection in low-income countries including Ethiopia are low compared with the demand for blood.⁵ The act of family replacement therapy is a common blood donation practice than collecting from volunteer blood donors, which is a common predisposing factor for misconception towards blood donation practice.⁶

As different studies have shown, the prevalence of level of knowledge regarding blood donation ranged from 32.4% to 40.45%.⁷⁻⁸ Education, sensitisation of blood donation, increasing public awareness, and campaign through the internet and media are recommended strategies to increase awareness, attitude and motivational practice of blood donation.⁹⁻¹¹ Fear of the different health risks after blood donation and lack of information



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on where, when and how to donate blood are the most common factors that hinder blood donation.¹² Even though beliefs, attitudes and behaviours regarding blood donation differ, adequate knowledge is needed among non-donors. There is a gap between willingness to donate blood and the number of donors in most populations around the world, which affects the practice of blood donation.¹³ There is a need to spread awareness on blood donation among the general population to maintain an adequate and safe blood supply, which can be done through well-designed communication strategies to overcome the problem.⁷

While there is a very high need for blood supply in Ethiopia, there is a serious shortage of blood stocks in the country. Thus, identifying the different factors that hinder knowledge about the practice of blood donation is essential. This systematic review and meta-analysis aims to review the different studies conducted so far on the level of knowledge about blood donation and associated factors in Ethiopia.

METHODS AND MATERIALS

Study protocol

In this meta-analysis, the Preferred Reporting Items for Systematic Review and Meta-analysis guidelines for reporting of findings were used¹⁴ (online supplemental table S1).

Databases and search strategy

Different databases such as PubMed/MEDLINE, Hinari, EMBASE, Google Scholar and African Journals Online were used to search for available articles. Both published and unpublished articles from the repository of Ethiopian universities were also searched. The search date was from 1 January 2000 up to 1 May 2021. Articles reporting on knowledge about blood donation and associated factors in Ethiopia were included in the final analysis. The search items were “knowledge” OR “awareness” AND “blood donation” OR “volunteer blood donation” AND “associated factors” OR “determinant factors” AND “Ethiopia”. These search strings were developed using “AND” and “OR” Boolean operators (table 1).

Search and eligibility of studies

All retrieved articles were exported to EndNote reference software V.8 citation manager (Thomson, Stamford, Connecticut, USA) to sort and delete duplicates. Two investigators (AG and AD) independently evaluated each article by title and abstract, assessed the eligibility of the articles, and critically reviewed the selected articles. Extraction was done by author name, publication year, region where the study was conducted, study subjects, sampling method, method of survey, study period, sample size, study design, level of education, level of knowledge regarding blood donation and factors associated with level of knowledge about blood donation.

Eligibility criteria

Both published and unpublished cross-sectional studies conducted on the level of knowledge about blood donation among populations in Ethiopia were included, whereas qualitative studies, different trials, case reports, review articles, updates and news were excluded from the analysis. Furthermore, articles not reporting on the outcome of the study and those without full texts were excluded.

Outcome measurement of the study

There are two main outcomes, namely level of knowledge about blood donation and the factors associated with it. Level of knowledge was measured using the mean score on the knowledge assessment questions. Study participants who scored with a mean score and above on the knowledge assessment items were considered knowledgeable about blood donation, whereas those who scored below the mean score were considered not knowledgeable.

Quality assessment

Two authors (AG and AD) independently assessed the quality of the studies using the Newcastle-Ottawa Scale for cross-sectional studies.¹⁵ Methodological quality, comparability, outcome and statistical analysis of the studies were the main assessment tools used to determine quality. Studies that scored ≥ 7 out of 10 were considered to be of high quality. During quality appraisal of the articles, any discrepancies between the two authors were resolved. All

Table 1 Search of different databases for studies about level of knowledge and associated factors regarding blood donation in Ethiopia

Databases	Search terms	Studies (n)
MEDLINE/PubMed	“knowledge” OR “awareness ”AND “blood donation” OR “volunteer blood donation” AND “associated factors” OR “determinant factors” AND “Ethiopia”.	235
Google Scholar	“knowledge” OR “awareness ” AND “blood donation” OR “volunteer blood donation” AND “associated factors” OR “determinant factors” AND “Ethiopia”.	352
Other databases		7
Total retrieved articles		694
Included studies		20

authors independently assessed the eligibility of the articles to be considered in the final analysis.

Data processing and analysis

In this systematic review and meta-analysis, a weighted inverse variance random-effects model at 95% CI was used to calculate the pooled prevalence of level of knowledge about blood donation and the associated factors.¹⁶ After extraction and cleaning using Microsoft Excel spreadsheets, the data were exported to STATA V.11 statistical software for analysis. The heterogeneity of the studies was assessed using the Cochrane Q-test and I^2 with the corresponding p value. I^2 values of 25%, 50% and 75% represent low, moderate and high heterogeneity, respectively.¹⁷ The source of heterogeneity was examined through subgroup analysis based on region, study subjects, study setting and sample size. Sensitivity analysis was also carried out to confirm the presence or absence of influential studies. The presence of publication bias was evaluated using Egger's test and presented with funnel plots.¹⁸ For associated factors, log OR was used to decide on the association between the associated factors and the level of knowledge about blood donation. A statistical test with a p value of less than 0.05 was considered statistically significant.¹⁹

Patient and public involvement

It was not appropriate or possible to involve the patients or the public in the design, conduct, reporting or dissemination plans of our research.

RESULTS

Six hundred and ninety-four articles were retrieved. Of these retrieved articles, 284 were excluded due to duplication. Three hundred and sixty-eight articles were further excluded after reviewing the titles and abstracts. Furthermore, 22 articles which did not fulfil the inclusion criteria were excluded. Finally, 20 articles were used in the analysis (figure 1).

Characteristics of the studies and study participants

Twenty cross-sectional studies with a total of 8338 study participants (4712 men and 3626 women) were involved. Of the included articles, eight were from the Amhara region,^{1 12 20-25} five from the Oromia region,^{4 26-29} two from the Addis Ababa city administration,^{5 30} two from Southern Nations, Nationalities and Peoples Region,^{31 32} two from Tigri region,^{33 34} and the remaining was from the Afar region.³⁵ The sample size of the included studies ranged from 218 to 845 (table 2).

Knowledge about blood donation

The overall pooled prevalence of level of knowledge about blood donation in Ethiopia was 56.57% (95% CI 50.30 to 62.84) (figure 2).

Heterogeneity and publication bias

In this systematic review and meta-analysis, heterogeneity was identified within the studies ($I^2=97.3%$, $p<0.001$). The funnel plot showed an asymmetrical distribution of studies included in the review and a statistically significant

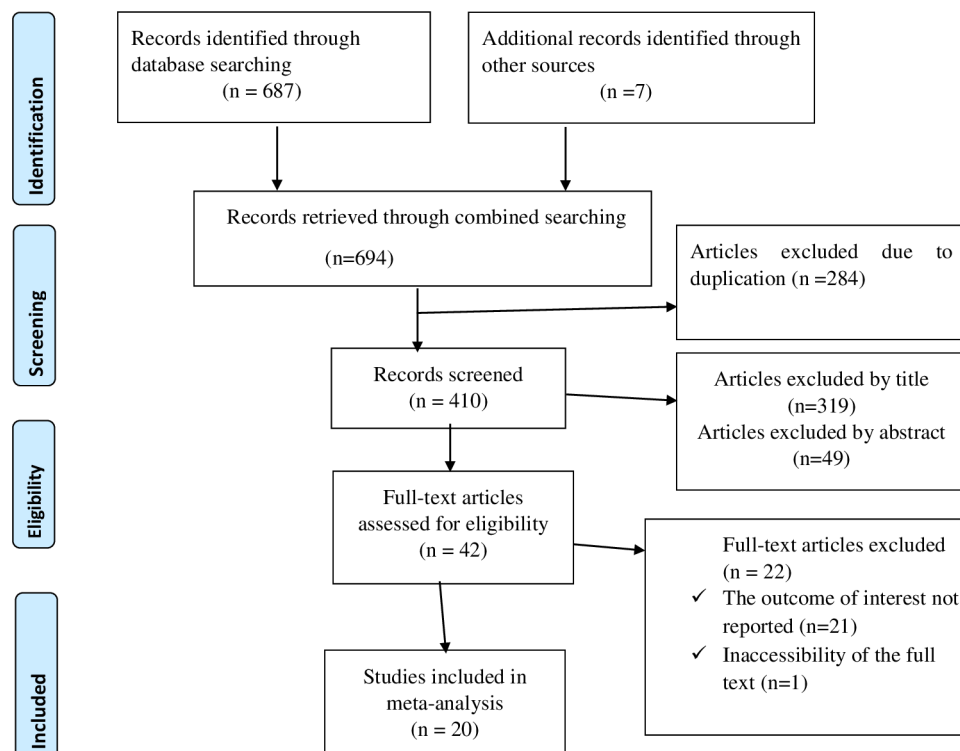


Figure 1 Flow chart of selection of studies for the systematic review and meta-analysis of the level of knowledge about blood donation and associated factors in Ethiopia.

Table 2 Characteristics of studies included in the review and meta-analysis of knowledge about blood donation and associated factors in Ethiopia

Author	Publication year	Region	Study participants	Method of survey	Sample size	Prevalence
Misganaw <i>et al</i> ⁵	2014	Addis Ababa	University student	Self-administered	384	83.59
Teklu <i>et al</i> ³⁰	2015	Addis Ababa	Healthcare worker	Self-administered	295	54.24
Nigatu and Demissie ⁴	2014	Oromia	University student	Self-administered	399	40.35
Mulatu <i>et al</i> ³²	2017	SNNPR	Community	Face-to-face interview	250	76.00
Gebresilase <i>et al</i> ²⁶	2017	Oromia	University student	Self-administered	360	46.67
Abera <i>et al</i> ¹	2017	Amhara	Healthcare worker	Self-administered	276	75.36
Mekonnen and Melesse ²³	2016	Amhara	Community	Face-to-face interview	387	56.07
Addisu <i>et al</i> ²⁰	2017	Amhara	Community	Face-to-face interview	376	38.30
Malako <i>et al</i> ³¹	2019	SNNPR	Healthcare worker	Self-administered	218	82.57
Beyene ²⁷	2020	Oromia	Community	Face-to-face interview	410	47.07
Mijena <i>et al</i> ²⁸	2019	Oromia	Community	Self-administered	383	57.18
Jemberu <i>et al</i> ²²	2016	Amhara	Community	Face-to-face interview	772	56.48
Enawgaw <i>et al</i> ²⁵	2019	Amhara	Community	Face-to-face interview	401	35.41
Melku <i>et al</i> ¹²	2016	Amhara	Community	Face-to-face interview	768	56.77
Melku <i>et al</i> ²⁴	2018	Amhara	University student	Self-administered	255	48.24
Arage <i>et al</i> ²¹	2017	Amhara	Healthcare worker	Self-administered	427	51.99
Urgesa <i>et al</i> ²⁹	2017	Oromia	Community	Face-to-face interview	845	43.55
Tadesse <i>et al</i> ³⁴	2018	Tigri	Healthcare worker	Self-administered	556	57.19
Tadesse <i>et al</i> ³⁵	2017	Afar	University student	Self-administered	339	53.98
Seid <i>et al</i> ³³	2017	Tigri	Healthcare worker	Self-administered	237	70.46

SNNPR, South Nations, Nationalities and Peoples Region.

Egger's test ($p=0.02$), suggesting the presence of publication bias (figure 3).

Subgroup analysis

Subgroup analysis was done by region, study subjects, study setting and sample size. The highest pooled prevalence of level of knowledge about blood donation was

reported by healthcare workers (65.28%, 95% CI 55.16 to 75.40). Similarly, the level of knowledge about blood donation was higher among studies done in institutions (institution-based) (60.45%, 95% CI 51.05 to 69.83) than studies conducted in the community (table 3).

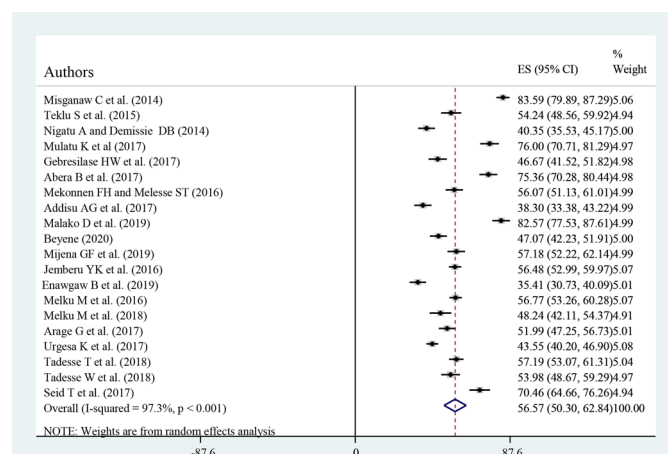


Figure 2 Forest plot of the pooled prevalence of knowledge about blood donation and associated factors in Ethiopia. ES, Effect Size.

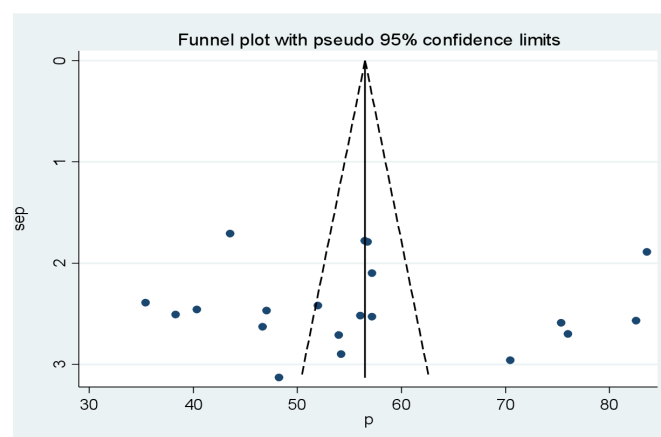


Figure 3 Funnel plot with 95% confidence limits of the pooled prevalence of knowledge about blood donation and associated factors in Ethiopia. sep; standard error of prevalence.

Table 3 Subgroup analysis of the level of knowledge about blood donation and associated factors in Ethiopia (n=20)

Variables	Subgroup	Studies (n)	Population	Prevalence (95% CI)	I ² (%)	P value
Region	Northern Ethiopia	10	4455	54.81 (47.65 to 61.57)	95.7	<0.001
	Southern Ethiopia	5	1637	58.52 (41.66 to 76.38)	98.2	<0.001
	Other	5	2246	58.53 (42.67 to 74.38)	98.4	<0.001
Study participants	Healthcare workers	6	2009	65.28 (55.16 to 75.40)	95.9	<0.001
	Community	9	4592	51.84 (44.60 to 59.08)	96.1	<0.001
	University students	5	1737	54.62 (36.86 to 72.42)	95.8	<0.001
Study setting	Institution-based	11	3746	60.45 (51.05 to 69.83)	97.5	<0.001
	Community-based	9	4592	51.84 (44.80 to 59.08)	96.1	<0.001
Sample size	<400	13	4159	60.25 (51.20 to 69.31)	97.6	<0.001
	≥400	7	4179	49.84 (43.90 to 55.79)	93.5	<0.001

Other: Addis Ababa, Eastern Ethiopia.

Sensitivity analysis

As shown in table 4, all of the point's estimates are within the overall 95% CI, which confirms that omission of any of the studies included in this systematic review and meta-analysis does not affect the overall prevalence of the level of knowledge about blood donation.

Factors associated with knowledge about blood donation

In this study, participants' sex and level of education were significant factors associated with level of knowledge about

blood donation. The odds of level of knowledge were 1.81 times more likely among men than women (adjusted OR (AOR)=1.81; 95% CI 1.44 to 2.28) (figure 4). Similarly, the odds of level of knowledge were 3.12 times more likely among participants whose educational status was above secondary school than those who did not attend any formal education (AOR=3.12; 95% CI 2.34 to 4.16) (figure 5).

DISCUSSION

In this systematic review and meta-analysis, the pooled prevalence of good knowledge about blood donation is 56.57% (95% CI 50.30 to 62.84), which indicates that there is a lack of adequate knowledge about blood donation in the country. This might be due to the absence of regular blood donation programmes, less media coverage, limited campaign and limited educational access with regard to blood donation in the country.

The level of knowledge in this study is lower than the studies conducted in Malaysia (98%),² Barabanki, India (90%),³⁶ and Benin City, Nigeria (92.65 %).³⁷ This variation might be due to differences in study participants. In

Table 4 Sensitivity analysis of knowledge about blood donation and associated factors in Ethiopia

Study omitted	Estimated prevalence	95% CI
Misganaw <i>et al</i> ⁵	55.12	49.57 to 60.67
Teklu <i>et al</i> (2015) ³⁰	56.69	50.15 to 63.24
Nigatu and Demissie ⁴	57.42	51.04 to 63.80
Mulatu <i>et al</i> ³²	55.55	49.24 to 61.86
Gebresilase <i>et al</i> ²⁶	57.09	50.58 to 63.59
Abera <i>et al</i> ¹	55.58	49.27 to 61.90
Mekonnen and Melesse ²³	56.60	50.01 to 63.18
Addisu <i>et al</i> ²⁰	57.53	51.20 to 63.86
Malako <i>et al</i> ³¹	55.21	49.14 to 61.27
Beyene ²⁷	57.07	50.55 to 63.59
Mijena <i>et al</i> ²⁸	56.54	49.95 to 63.12
Jemberu <i>et al</i> ²²	56.57	49.84 to 63.31
Enawgaw <i>et al</i> ²⁵	57.69	51.48 to 63.90
Melku <i>et al</i> ¹²	56.56	49.83 to 63.29
Melku <i>et al</i> ²⁴	57.00	50.50 to 63.50
Arage <i>et al</i> ²¹	56.81	50.23 to 63.39
Urgesa <i>et al</i> ²⁹	57.27	50.82 to 63.72
Tadesse <i>et al</i> ³⁴	56.54	49.89 to 63.19
Tadesse <i>et al</i> ³⁵	56.71	50.14 to 62.28
Seid <i>et al</i> ³³	55.85	49.41 to 62.28
Overall	56.57	50.30 to 62.84

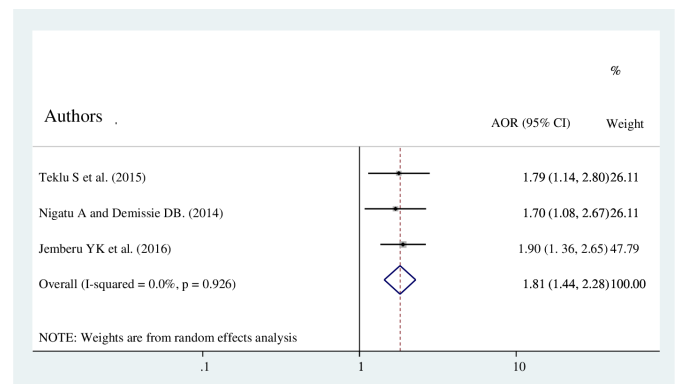


Figure 4 Overall pooled OR of the association between sex and level of knowledge about blood donation in Ethiopia. AOR, adjusted OR.

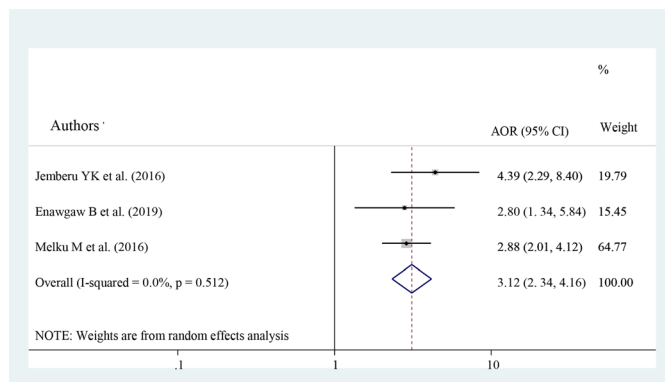


Figure 5 Overall pooled OR of the association between educational status and level of knowledge about blood donation in Ethiopia. AOR, adjusted OR.

Malaysia, the study participants were nursing students; in Benin City, Nigeria the study participants were healthcare workers; and in Barabanki, India the study participants were undergraduate medical students. In contrast, this study targeted all populations in the country. This variation might also be due to the status and level of media coverage and the educational status of people in Ethiopia; Ethiopia is one of the low-income countries with very limited education coverage and media accessibility. There is an almost similar finding with regard to knowledge about blood donation with a study done among students of a tertiary institution in Nigeria.⁹ However, the finding of this study is higher than the studies conducted in Kerala, India (35%)⁷ and in Nepal (32%),⁸ which may be due to time variations, where the previous studies were conducted before 7 and 5 years, respectively.

In the subgroup analysis, there was no significant variation with regard to the prevalence of knowledge about blood donation within the region where the studies were done. However, there were variations with regard to knowledge prevalence within study participants, study setting and sample size categories. Accordingly, the highest prevalence of knowledge was reported among healthcare workers. This is because healthcare workers have formal education on blood donation and know more about human physiology than others. Healthcare workers may also have experience with blood donation. This agreed with a study conducted in developing countries where regular donors had good knowledge compared with non-donors.¹³ Studies conducted in institutions (institution-based) showed a higher prevalence of knowledge than studies conducted in the community (community-based). This is due to the populations in institutions having more access to information.⁷

In this systematic review and meta-analysis, the odds of knowledge about blood donation were 1.81 times more likely among men than women. This might be due to women being more prone to different physiological conditions such as menstruation and bleeding during pregnancy and delivery, which deter them from donating blood. As a result they have poor blood donation practices

when compared with men. This poor practice may indirectly affect women's knowledge about blood donation.³ Educational status also had a significant association with knowledge about blood donation. The odds of knowledge about blood donation were 3.12 times more likely among participants who had a level of education above secondary school compared with illiterates.¹¹ This is because formal education is the cornerstone of acquiring knowledge. Therefore, participants who reached secondary school and above have more access to information than participants who did not have any formal education.

Limitations of the study

All studies included in this systematic review and meta-analysis were cross-sectional studies, which may limit the generation of a cause-effect link between independent and dependent variables.

CONCLUSION

More than half of the study participants were knowledgeable about blood donation. Sex and educational status were significantly associated with level of knowledge about blood donation in Ethiopia. Therefore, there is a need for education and dissemination of information about blood donation among the general population to build adequate knowledge and maintain regular blood supply.

Contributors AG and MB designed the study, as well as designed and run the literature search. AG, AW, MB, GG and AD acquired the data, screened the records, extracted the data and assessed the risk of bias. AG and AD did the statistical analyses and wrote the report. All authors provided critical conceptual input, analysed and interpreted the data, and critically revised the report. All authors read and approved the final manuscript.

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