Blood Donation Practice and its associated Factors among Civil Servants in Chiro Town, Western Hararghe, Oromia Region, Ethiopia

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Abstract

Background: Although blood transfusion has been evident for the past 200 years, it is challenging to get safe blood and blood product for those in need. In Ethiopia, the need for safe blood and blood product is increasing, but the donation practice is still insignificant. This study aimed to assess blood donation practice and its associated factors among civil servants working in west Hararghe zone offices, Chiro town, Oromia region, Ethiopia.

Methods: A cross-sectional study was conducted among 383 civil servants from March 1 to April 20, 2018. Study participants were selected using a simple random sampling technique. Data were collected using a pre-tested self-administered questionnaire and analysed by Statistical Package for Social Science Version 20. Logistic regression analyses was done to identify factors associated with blood donation practice. The level of statistical significance was declared at p-value < 0.05.

Results: The blood donation practice among the civil servants was 43.6% (95% CI: 38.3, 49.3). Willingness to donate blood (AOR=2.54; 95% CI: 1.39, 4.65), good knowledge about blood donation (AOR=3.32; 95% CI: 2.02, 5.46), and following mass media (AOR=1.83; 95% CI: 1.01, 3.35) were the factors significantly associated with the blood donation practice.

Conclusion: The civil servants' practice of blood donation was low. Willingness to donate, having good knowledge about blood donation, and following mass media were the factors associated with the blood donation practice. Therefore, it is very important to increase the civil servants' awareness about blood donation practice using mass media.

Keywords: *Blood donation; Chiro town; Civil Servants; Ethiopia; Practice*

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Introduction

Blood and its product remain an entity that has not been made artificially. It is a life-saving scheme in either routine and emergencies to replace lost blood cells or blood components due to serious accidents, obstetric hemorrhage or any other cause of anemia such as medical or surgical conditions (Gurney & Spinella, 2018; Lockhart *et al*., 2014; Shander & Goodnough, 2018). It has an important role in regulating the body system and maintaining homeostasis (Seifried *et al*., 2011). It is a valuable and life-sustaining fluid which can be transferred from a donor to a recipient's circulatory system through the process of blood transfusion (Harmening *et al.*, 2018;Mulcahy *et al.*, 2016; Nwabueze *et al*., 2014).

There is a huge imbalance between the demand for and supply of blood and blood products. The demand has increased because of increased life expectancy, increase in accidents, and chronic non-communicable disease. Thus, ensuring the availability of safe blood and blood product should be a global priority (Greinacher *et al*., 2017).

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Globally, over 81 million units of blood are collected annually. There is a significant difference in blood donation practice between countries. Median blood donation rate in high-income, lower-middle-income and low-income countries have been 326, 8.1, and 4.4 donations per 1000 people, respectively (WHO, 2017). This indicates that there is higher blood donation rate in high-income countries than lower-middle-income and low-income countries.

The reported magnitude of blood donation practice varies across different countries: in India (47.7%-49%) (Manikandan *et al*., 2013), Nepal (18.1%) (Amatya *et al*., 2013), Nigeria (39.8%) (Olubiyi *et al*., 2014), Democratic Republic of Congo (54.9%) (Kabinda *et al*., 2014), and Ethiopia (22.6%-32.6%) (Destaw *et al*., 2014; Kebadnew *et al*.,2015; Urgesa *et al*., 2017).

Studies conducted in low-income countries including Ethiopia have revealed that socio-demographic characteristics including being male, age more than 25 years, married, long years of work experience and other factors such as willingness to donate, positive attitude, not expecting any post-donation reward and having good knowledge over blood donation practice have been reported as factors significantly associated with blood donation practice. But, this factors were not generalized to all blood-donors in different parts of the world (Addisu *et al*., 2017;Arage *et al*., 2017;Destaw *et al*., 2014;Elias *et al*., 2016;Melku *et al*., 2016).

In Ethiopia, the lack of an integrated strategy for blood donation and recruiting a sufficient number of safe blood donors are major problems. The current blood supply is far less compared to the demand (Girma *et al*., 2020). Our country has planned to collect 10,000 units of blood annually but managed to collect only 43% of the plan (WHO, 2014).

The magnitude of blood donation practice and its associated factors has been reported variably from different studies in Ethiopia (Addisu *et al*., 2017; Arage *et al*., 2017; Gebresilase *et al*., 2017; Jemberu *et al*., 2016). Understanding the practice of blood donation and its associated factors better may help to design measures that can solve the problem. However, to the best of our knowledge and extensive literature search, there are limited data in Ethiopia and none in the study area in particular. Therefore, this study aimed to assess blood donation practice and its associated factors among civil servants working in west Hararghe zone offices, Chiro town, Oromia Region, Ethiopia.

Material and methods

Study setting and period

The study was conducted in Chiro town, west Hararghe zone, Oromia Regional State from March 1 to April 20, 2018. Chiro town is located at 317 km from Addis Ababa, the capital city of Ethiopia. About 2.5 million people live in the zone. The zone had three hospitals (Chiro, Gelemso, and Asebot) and 81 health centers. It had only one blood bank that provides blood to the hospitals and gives blood collection service (Ethiopian Red Cross society West Hararghe branch, unpublished data, 2018). According to the 2018 west Hararghe zone report, there are 31 zonal level sector organizations in the town, with a total number of 1001 civil servants, (692 male) (West Hararghe zone administration, human resource, unpublished data, 2018).

Study design and population

An institutional-based cross-sectional study was conducted among civil servants in the age group of 18-65 years and non-pregnant women working at west Hararghe zone offices in Chiro town during the study period.

Sample size determination and sampling procedure

Single population proportion formula was used to determine the sample size with the assumptions of 95% confidence level, 5% margin of error, the proportion of those with overall blood donation practice, p=52.2% (Jemberu *et al*., 2016*)*; and by adding 5% non-response rate, the final sample size was 403.

Initially, 12 sector offices were selected from 31 offices by a simple random sampling technique. The list of employees that we obtained from each selected sector office's human resource management office was;health office=50, irrigation authority =40, zone administration=34, transport authority =64, trade and market office=36, water and energy office=56, revenue authority=74, urban development office=35,

finance office=78, justice office=31, public service office=47, and agriculture office= 62.

The final sample size was proportionally allocated to the selected offices, based on their respective number of employees. Accordingly, we allocated 33 for health office, 27 for irrigation authority, 23 for zone administration, 42 for transport authority, 24 for trade and market office, 37 for water and energy office, 49 for revenue authority, 23 for urban development office, 52 for finance office, 21 for justice office, 31 for public service office, and 41 for agriculture office. The study participants were finally selected by simple random sampling technique using lottery method.

Data collection method

Data were collected using a structured self-administered questionnaire by four trained first-degree nurses and supervised by two masters of public health (MPH) holders. The questionnaire was given to each study participant at the office and collected the next day in the morning. The questionnaire was prepared by reviewing relevant literature (Elias *et al*., 2016; Gebresilase *et al*., 2017; Jemberu *et al*., 2016; Melku *et al*., 2018; Mohammed & Essel, 2018). The questionnaire consisted of information about the study participant's socio-demographic characteristics, knowledge, attitude, practice, sources of information, and factors related to blood donation practices. Nine questions with a scoring system of 1 for correct response and 0 for incorrect/ don't know the response was used to measure the participants' knowledge about blood donation while eight questions with Likert scale questions as strongly disagree, disagree, agree, and strongly agree were used to measure attitude towards blood donation. The blood donation practice was measured by yes or no question coded as 1 for "yes" and 0 for 'no" response.

Data quality control

The questionnaire was prepared in English language and translated into local languages (Afaan Oromoo and Amharic) by language experts. The questionnaire was translated back to English language by another expert to check for consistency. It was pre-tested on 21 (5% of final sample size) civil servants in East Hararghe zone office. Based on the test, necessary amendments were made on it. Training was given for four data collectors (first-degree nurses) and two supervisors (masters of public health). The supervisors and the investigators followed the data collection process closely on daily basis. Necessary corrections were made immediately during the data collection.

Operational definitions

Blood donation practice: Means, whether a particular participant had ever donated blood or not in his or her life time (Devi *et al*., 2012).

Knowledge about blood donation: Participants who scored greater than the mean for knowledge questions were considered as having a good knowledge otherwise considered as having poor knowledge (Mohammad *et al*., 2011).

Attitude towards blood donation: Participants who scored greater than the mean for attitude questions were considered as having a positive attitude, otherwise considered as having a negative attitude (Devi *et al*., 2012; Urgesa *et al.*, 2017).

Social media: Websites and applications that enable users to create and share content or to participate in social networking like, Face book, and Twitter (Panagiotou *et al*., 2016).

Mass media: A technology and means of communication intended to reach mass audiences. It includes; television, radio, magazines, and newspaper (Hiebert and Gibbons, 2017).

Data analysis

The collected data were cleaned and checked for completeness, coded and entered into the EpiData Version-3.1, and exported to SPSS Version 20 for analysis. Descriptive analysis was carried out to compute frequencies, percentage, mean, and standard deviation. Logistic regression analyses were carried out to identify the factors associated with the blood donation practice. Those variables with P-value $\leq$ 0.25 in the bivariable analysis were included in the multivariable analysis. Those variables with $p < 0.05$ at 95 % confidence interval (CI) in multivariable analysis were considered as factors significantly associated with blood donation practice.

Ethical Considerations

Ethical approval was obtained from the Institutional Health Research Ethical Review Committee (IHRERC) of Haramaya University, College of Health

and Medical Sciences. Permission letter was obtained from the Zonal administration's office and sent to all the selected sector offices and permission was obtained from them. A clear description of the objectives, rights of participants, potential risks and benefits of the study was given to the study participants before an informed written and signed consent was obtained from each participant. Confidentiality of the study participants was maintained by removing the personal identifier from the questionnaire.

Results

Socio-demographic characteristics of the participants

A total of 383 study participants were included in this study, yielding a 95% response rate. The median and SD of the age of study participants were 33 (±9SD) years. One hundred ninety six (51.2%) participants were in the age group of 26-35 years. Many of the study participants were male (71.5%), Oromo by ethnicity (74.9%), married (65.5%), bachelor degree (72.2%), expert working position (79.9%), and greater than 3000 birrs monthly income (91.7%) (Table 1).

Knowledge, attitude and source of information for blood donation practice

More than half, 219 (57.8%) of the study participants, were knowledgeable about blood donation and 234 (61.1%) had a positive attitude towards it. Majority (77%) of the study participants were willing to donate blood in the future. About three fourth (74.4%) of the study participants reported that they had heard about blood donation on mass media (Table 2).

Blood donation practice

In this study, 167 (43.6%) (95% CI=38.3-49.3) participants had donated blood. Of them, 133 (79.8%) had done it voluntarily, 106 (63.5%) had done it once, 61 (36.5%) had done it more than two times, and 21 (27.3%) had been doing it regularly. Of those who had donated blood, 86.2% reported that they followed mass media advocacy about blood donation.

Table 1: Socio-demographic characteristics of civil servants working in west Hararghe zone offices in Chiro town, Oromia region, Ethiopia, 2018 (n=383).

Characteristics	Category	Frequency	Percentage (%)
Age in years	18-25	39	10.2
	26-35	196	51.2
	36-45	118	30.8
	>45	30	7.8
Sex	Male	274	71.5
	Female	109	28.5
Ethnicity	Oromo	287	74.9
	Amhara	77	20.1
	Gurage	19	5.0
Marital status	Married	251	65.5
	Single	87	22.7
	Divorced	28	7.3
	Widowed	17	4.4
Religion	Muslim	161	42.0
	Orthodox	152	39.7
	Protestant	70	18.3
Educational status	Secondary school	15	3.9
	Diploma level	51	13.3
	Bachelor degree	276	72.2
	Master's degree	41	10.7
Working position	Leader	40	10.4
	Expertise	306	79.9
	Supportive staff	37	9.7
Current monthly salary (in ETB)	<3000	31	8.1
	>=3000	352	91.7

ETB- Ethiopian Birr

Factors associated with blood donation practice

In the bivariable analysis, willingness to donate blood, knowledge, and attitude towards blood donation, using any social media and following advocacy about blood donation on mass media, working position, and religion were significantly associated with blood donation practice. In the multivariable logistic regression analysis, the odds of donating blood increased by 2.5 times among those study participants having a willingness to donate blood compared to their counterparts (AOR=2.54; 95% CI: 1.39,4.65). Those civil-servants who had good knowledge about blood donation were more than 3 times more likely to donate blood than their counterparts (AOR=3.32; 95% CI: 2.02, 5.46).The odds of blood donation was 1.83 times higher among civil servants who heard blood donation advocacy on mass media compared to their counterparts (AOR=1.83; 95% CI: 1.01, 3.35) (Table 3).

Table 2: Knowledge and attitude towards blood donation among civil servants working in west Hararghe zone offices in Chiro town, Oromia region, Ethiopia, 2018 (n=383).

Characteristics	Category	Frequency	Percentage (%)
Knowledge status	Good knowledge	219	57.2
	Poor knowledge	164	42.8
Attitude	Positive	234	61.1
	Negative	149	38.9
Blood donation willingness	Yes	295	77.0
	No	88	23.0
Sources of information for donors	Mass media	144	86.2
	Previous donors	13	7.8
	Posters and Leaflets	10	6.0

Table 3: Factors associated with blood donation practice among civil servants working in west Hararghe zone offices, Chiro town, Oromia region, Ethiopia, 2018 (n=383).

characteristics		Blood donation practice		COR (95% CI)	AOR (95% CI)
		Yes (%)	No (%)		
Religion	Muslim	58(36)	103(64)	0.56(0.319,0.99)	0.79(0.42,1.49)
	Orthodox	74(48.7)	78(51.3)	0.95(0.54,1.67)	1.32 (0.69.2.48)
	Protestant	35(50)	35(50)	1	1
Working position	Leader	10(27)	27(73)	2.00(0.77,5.21)	0.63(0.21,1.85)
	Expert	140(45.8)	166(54.2)	2.28(1.07,4.87)	1.33(0.63,2.81)
	Supportive	17(42.5)	23(57.5)	1	1
Monthly salary(ETB)	<=3000	10(32.3)	21(67.7)	1.69(0.74, 3.69)	1.23(0.46,3.32)
	>3000	157(44.6)	195(55.4)	1	1
Willingness to donate	Yes	147(49.8)	148(50.2)	3.38(1.95,5.80)	2.54 (1.39,4.65)**
	No	20(22.7)	68(77.3)	1	1
Knowledge	Good	128(58.4)	91(41.6)	2.53(4.51,7.06)	3.32(2.02,5.46)***
	Poor	39(23.8)	125(76.2)	1	1
Attitude	Positive	127(54.3)	107(45.7)	3.23(2.07,5.04)	1.61(0.97,2.69)
	Negative	40(26.8)	109(73.2)	1	1
Using social media	Yes	65(64.4)	36(35.6)	3.19(1.98, 5.12)	1.61(0.934,2.78)
	No	102(36.2)	180(63.8)	1	1
Following mass media	Yes	144(50.5)	141(49.5)	3.33(1.98, 5.61)	1.83 (1.01, 3.35)*
	No	23(23.5)	75(76.5)	1	1

*Significant at P<0.001=***, p < 0.01=** and P<0.05=*, AOR=Adjusted Odd Ratio, COR=Crude Odd Ratio and CI= Confidence Interval*

Discussion

The magnitude of blood donation practice among the civil servants in west Hararghe zone office, Chiro town, Ethiopia was 43.6% (95% CI: 38.3, 49.3). Having willingness to donate blood, having good knowledge of blood donation, and following advocacy about blood donation on mass media were the factors associated with blood donation practice of civil servant at Chrio town.

The magnitude of blood donation practice among the civil servants working in west Hararghe zone office, Chiro town, Ethiopia, was 43.6%. This is consistent with the findings from Mumbai, India (47.7%) (Sahoo *et al*., 2017) and Vellore District, South India (49%) (Manikandan *et al.,* 2013). In contrast, this finding is higher than the results of other studies conducted in different cities of Ethiopia: Addis Ababa (32.6%), Harar (22.6%), and Aman (26.4%) (Destaw *et al*., 2014; Kebadnew *et al*.,2015; Urgesa *et al*., 2017). The possible reason for this discrepancy could be attributed to the variation in the characteristics like educational status, knowledge level, and previous experience of blood donation practice, behaviour, culture, study period, and population (Melku *et al*., 2016).

In the current study, 63.5% of the study participants donated blood once in their lifetime. This finding is similar to the one reported from the northern region of Ghana (64.5%) (Mohammed & Essel, 2018), but it is higher than the study findings from Birbir town, southern Ethiopia (6.4%) (Addisu *et al*., 2017). This difference might be due to the different socio-demographic characteristics of the study participants. For instance, most of the study participants in a study conducted in Birbir town, southern Ethiopia, were non-government employees and had an educational status of less than 12 grade (Addisu *et al*., 2017). However, in current study, the civil servants were educated, three out of four had bachelor degrees and might have better information concerning blood donation.

In this study, 79.8 % of the donors were voluntary. This finding is higher than reports from similar studies conducted in Aman (27.3%), southern Ethiopia (26.4%), and Addis Ababa (15.6%), central Ethiopia (Destaw *et al.,* 2014; Kebadnew *et al*., 2015). This difference might be due to improved access to information and the number of regular donors who are more likely to be a volunteer (Burzynski *et al.*, 2016).

In this study, civil servants who had willingness were more likely to donate blood as compared to their counterparts. This is similar to the finding from a study conducted in Nairobi, Kenya, where lack of willingness was a significant reason for not donating blood (Njuguna *et al.,* 2012). Intention to donate blood was reported accompanying the practice (Elias *et al.*, 2016).

Knowledge about blood donation was positive associated with blood donation practice. In the current study, those study participants who had good knowledge about blood donation were more likely to donate blood than their counterparts. This is in line with the finding of a study conducted in Debre Markos town, northwest Ethiopia. This is because they might know that donating blood does not harm the donors and saves the lives of others (Jemberu *et al*., 2016).

In this study, the study participants who followed mass media were more likely to donate blood as compared to their counterparts. This is similar to the finding of a study conducted in Harar town, eastern Ethiopia, where mass media was the source of information for most of the blood donor participants in the study. Access to information had been reported to improve blood donation practice (Urgesa *et al.,* 2017).

The use of standardized tools and procedures for data collection and analysis is the main strength of the study. But, since our study design was cross-sectional, it could only identify associated factors and not the determinant factors. In addition, social desirability bias might have occurred as respondents could choose those responses that are viewed favorably by others.

Conclusion

In this study, the practice of blood donation was low, as compared to the World Health Organization's recommendation. Willingness to donate blood, having good knowledge about blood donation, and following mass media were statistically significant variables with the practice of blood donation. Therefore, promotion and information dissemination through mass media are very important to increase the civil servants' awareness about blood donation. We recommend future researchers to conduct high levels of analytical studies to assess the blood donation practice.

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Competing interests

The authors declare that they have no competing interests.

Authors' contributions

SN participated in the inception of the idea, proposal development, data collection, analysis, and final write up. TG, HM, and HA have participated in the amendment of the proposal, statistical analysis, and the write up of the final result. GF and SGF have participated in the final research write up and preparation of the manuscript. All authors read and approved the final manuscript.

References

Addisu, A., Sultan, H., Deginet, T., Addishiwot, Z., Samuel, T., Bereket, A., & Afewerki, G. 2017. Assessment of Knowledge, Attitude, and Practice of Voluntary Blood Donation and Associated Factors among Residents of Birbir Town. *Journal of Community Medicine & Health Education,* 7 (1): 1- 8. Doi: 10.4172/2161-0711.1000504

Amatya, M. 2013. Study on knowledge, attitude, and practice of blood donation among students of different colleges of Kathmandu, Nepal. *International Journal of Pharmaceutical and Biological Archives,* 4 (3): 424-428.

Arage, G., Ibrahim, S., & Adimasu, E. 2017. Blood donation practice and its associated factors among health professionals of the University of Gondar Hospital, Northwest Ethiopia: a cross-sectional study. *BMC Research Notes, 10* (1): 1-6. DOI: 10.1186/s13104-017-2618-5.

Burzynski, E., Nam, S., & Le Voir, R. 2016. Barriers and motivations to voluntary blood donation in sub-Saharan African settings: a literature review. *International Society of Blood Transfusion,* 11 (2): 73-81.

Destaw, B. 2014. Knowledge, Attitude, and Practice of Voluntary Blood Donation and Associated Factors among Health Care Providers in Addis Ababa health Facilities, Ethiopia. *Occupational Medicine & Health Affairs,*3(4):1-17. Doi: 10.4172/2329-6879.1000209

Devi, H., Laishram, J., Shantibala, K., & Elangbam, V. 2012. Knowledge, Attitude, and Practice (KAP) of blood safety and donation.*Indian Medical Gazette,* 145 (1): 1-5.

Elias, E., Mauka, W., Philemon, R. N., Damian, D. J., Mahande, M. J., & Msuya, S. E. 2016. Knowledge, Attitudes, Practices, and Factors Associated with Voluntary Blood Donation among University Students in Kilimanjaro, Tanzania. *Journal of Blood Transfusion,* 7(1): 504. Doi: 10.4172/2161-0711.1000504 P

Gebresilase, H.W., Fite, R.O., & Abeya, S.G. 2017. Knowledge, attitude, and practice of students towards blood donation in Arsi University and Adama science and technology university: a comparative cross-sectional study. *BMC Hematology*, 17(20): 1-10. DOI: 10.1186/s12878-017-0092-x

Girma, A. 2020. Voluntary Blood Donation Knowledge, Attitudes, and Practices in Central Ethiopia. *International Journal of General Medicine,* 13, 67-76. DOI: https://doi.org/10.2147/IJGM.S246138

Greinacher, A., Weitmann, K., Schönborn, L., Alpen, U., Gloger, D., Stangenberg, W., Hoffmann, W. 2017. A population-based longitudinal study on the implication of demographic

changes on blood donation and transfusion demand. *Blood advances,* 1 (14): 867-874.

Gurney, J. & Spinella, P. 2018. Blood transfusion management in the severely bleeding military patient. *Current opinion in anesthesiology,* 31(2): 207-214.

Harmening, D. M. 2018. Modern blood banking & transfusion practices,6th Edition. FA Davis, Philadelphia, USA.

Hiebert, R. A. & Gibbons, S. 2017. Exploring mass media for a changing world, 1st edition. Routledge publishing, Philadelphia, USA

Jemberu, Y. A., Esmael, A., & Ahmed, K. Y. 2016. Knowledge, attitude, and practice towards blood donation and associated factors among adults in Debre Markos town, Northwest Ethiopia. *BMC Hematology, 16*(1), 1-8. DOI: 10.1186/s12878-016-0062-8

Kabinda, J. M., Miyanga, S. A., Ramazani, S. Y., & Dramaix, M. W. 2014. Assessment of knowledge, attitude, and practice of the general population of Bukavu in the Democratic Republic of Congo on blood donation and blood transfusion. *Health, 6* (18): 25-34.

Kebadnew M, Tamiru H, Addisu Y, & T., B. 2015. Assessment of Knowledge, Attitude, and Practice on Blood Donation in Aman Sub City Residents, South West, Ethiopia. *Health science journal,* 11 (1): 1-6.

Lockhart, E. 2014. Transfusion management of obstetric hemorrhage. *The Global Library of Women'sMedicine*,32(4):249-255. DOI: 10.1016/j.tmrv.2018.05.003

Manikandan, S., Srikumar, R., & Ruvanthika, P. (2013). A study on knowledge, attitude, and practice on blood donation among health professional students in Chennai, Tamil Nadu, South India. *International Journal of Scientific and Research Publications*, 3(3): 1-4.

Melku, M., Asrie, F., Shiferaw, E., Woldu, B., Yihunew, Y., Asmelash, D., & Enawgaw, B. 2018. Knowledge, Attitude, and Practice Regarding Blood Donation among Graduating Undergraduate Health Science Students at the University of Gondar, Northwest Ethiopia. *Ethiopian Journal of Health Science,* 28 (5):571-582. Doi: 10.4314/ejhs.v28i5.8.

Melku, M., Terefe, B., Asrie, F., Enawgaw, B., Melak, T., Tsegay, Y. G., Shiferaw, E. 2016. Knowledge, Attitude, and Practice of Adult Population towards Blood Donation in Gondar Town, Northwest Ethiopia: A Community Based Cross-Sectional Study. *Journal of Blood Transfusion, 2016 (7949862):10.* https://doi.org/10.1155/2016/7949862

Mohammad, F., Ashfaq, T., Nanji, K., Anjum, Q., & Lohar, M. 2011. Knowledge and attitudes towards voluntary blood donation among students of a private medical college. *Infectious Diseases of Pakistan,* 20 (1): 1-8

Mohammed, S., & Essel, H. B. 2018. Motivational factors for blood donation, potential barriers, and knowledge about blood donation in first-time and repeat blood donors. *BMC Hematology*, 18, 36. DOI: 10.1186/s12878-018-0130-3

Mulcahy, A. W., Kapinos, K. A., Briscombe, B., Uscher-Pines, L., Chaturvedi, R., Case, S. R., Miller, B. M. 2016. Toward a sustainable blood supply in the United States: an analysis of the current system and alternatives for the future,1st edition, Published by the RAND Corporation, Santa Monica, Calif, california, USA

Njuguna, N. 2012. Factor influencing blood donation at selected sites in Nairobi, Kenya-Public health, Jemo Kenyatta University of Agriculture and technology Masters. unpublished source. https://pdfs.semanticscholar.org/c6f2/7c67ced05519b40fe87d1d3f74b5f74ef6dd.pdf

Nwabueze, S., Nnebue, C., Azuike, E., Ezenyeaku, C., Aniagboso, C., Ezemonye, O., & Azuike, E. 2014. Perception of blood donation among medical and pharmaceutical science students of Nnamdi Azikiwe University, Awka. *Open Journal of Preventive Medicine.* 4(7), 515-522. DOI: 10.4236/ojpm.2014.47061

Olubiyi, S., Babalola, F., Olubiyi, M., Umar, N. J., & Ibraheem, M. 2014. Knowledge, attitudes, and practices of blood donation among adults in Ado-Ekiti, Nigeria. *Sky Journal of*

Medicine and Medical Sciences, 2 (7): 052-057.

Panagiotou, N., Katakis, I., & Gunopulos, D. 2016. Detecting events in online social networks: Definitions, trends, and challenges. *Solving Large Scale Learning Tasks, Challenges, and Algorithms*, 42-84, DOI: 10.1007/978-3-319-41706-6 2.

Sahoo, D. P., Patil, C., & Dehmubed, A. 2017. A study of knowledge, attitude, and practice of voluntary blood donation among interns of a municipal medical college. *International Journal of Community Medical Public Health,* 4(4): 1166-1170.

Seifried, E., Klueter, H., Weidmann, C., Staudenmaier, T., Schrezenmeier, H., Henschler, R., Mueller, M. 2011. How much blood is needed? *Vox Sang,* 100(1):10-21.

Shander, A., & Goodnough, L. T. 2018. Management of anemia in patients who decline blood transfusion. *American journal of hematology,* 93(9): 1183-1191.

Urgesa. K, Hassen. N, & Seyoum. A. (2017). Knowledge, attitude, and practice regarding voluntary blood donation among adult residents of Harar town, Eastern Ethiopia: a community-based study. *Journal of Blood Medicine,* 18, 13-20. Doi: 10.2147/jbm.s121460

WHO. 2014. Status of Blood Safety in the WHO African Region: Report of the Survey.

WHO. 2017. The 2016 global status report on blood safety and availability.