BLOOD DONATION PRACTICES OF TERTIARY LEVEL STUDENTS IN SOUTH EASTERN NIGERIA: PREVALENCE AND DETERMINANTS.

Abstract

Introduction: Safe and adequate blood donation is critical in saving millions of lives annually. In many developing including Nigeria, there is paucity of blood donors.

Aim: In this study, we assessed the blood donation practices of tertiary level students in Imo State, South East Nigeria as well as its prevalence and determinants.

Methodology: Multistage sampling technique was used. Stage one involved the stratification of the institutions into universities and non-universities. In stage two, one university and one non - university was selected using simple random method. Stage three involved the selection of study participants from the student registry using systematic sampling method. Self-administered questionnaire was the study instrument. Data analysis was with Statistical Package for Social Sciences (IBM – SPSS) version 20.

Results: Six hundred (600) undergraduates participated in the study. The mean age of the respondents was 21.3 ± 5.0 years. The one year prevalence of blood donation in this study was 13.8% and 63.1% of the non-donors were willing to donate. Respondents aged 15 – 29 years more willing to donate blood compared to those aged 30 – 44 years (OR = 3.03, p = 0.0003), those that were single were 4 times more willing to donate in comparison to those that were married/divorced (OR = 4.02, p < 0.0001). Respondents that were of Catholic faith were also more willing to donate compared to those that were of Pentecostal/Orthodox denomination (OR = 2.72, p = <0.0001). Class distribution and residence were not independent predictors of willingness to donate blood.

Conclusion: From the findings in this study, it was obvious that the willingness to donate blood is far greater than the actual act of donating blood. There is need to continue to reach out to those willing to donate but do not know how to go about it.

Keywords: Perception, Determinants, Blood donation, Students, Tertiary Institutions, Nigeria.

Introduction

Blood being a specialised body fluid in humans and other animals helps in the delivery of important substances such as nutrients and oxygen to the cells and also help in removing waste products from these cells[1]. Despite several promising works, researchers are yet to find a true substitute for blood and blood components[2]. Hence, blood donation remains the major source for

blood and blood components as at now. The importance of blood and its components in resuscitating the sick and energizing the elderly as well as in the treatment of various illnesses has long been recognised by ancient Egyptians[3].

Doctor Karl Landsteiner distinguished the main blood groups in 1901 and identified with Dr Alexander Wiener, the Rhesus factor in 1937 thus enabling blood to be transfused without putting the patient in danger[4]. The use of stored blood started during World War I (1914 – 1918) but it took till 1937 for the first large scale blood bank to become operational[5]. Major Robertson L.B, a Canadian surgeon with the Canadian Army Medical Corps introduced the act of blood transfusion for war casualties to the British Army during the First World War. Before the end of the war, blood transfusion has generally been accepted as the main stay of management in cases of severe blood loss[6]. In improving health and preventing the spread of infectious diseases, one cannot take for granted, the importance of safe blood transfusion. The WHO recommended that donated blood should routinely be tested for hepatitis B and C, HIV as well as syphilis[7].

Classes of blood donors include; voluntary donors, family replacement donors, remunerated donors and autologous donors. Those who donate voluntarily purely out of altruism are usually the safest donor[8,9]. Remunerated donors more often than not constitute the highest risk with respect to transfusion transmissible diseases. Someone donating blood in exchange for money is more likely to conceal his/her true state of health[10,11].

In Nigeria and other developing countries, most blood donations come from family replacement and paid donors.[10,12,13] Voluntary or altruistic donors account for less than 5% of blood stored in most blood banks in Nigeria.[10] The WHO encourages member states to establish national blood transfusion services that will have voluntary, non-remunerable donors as its fulcrum.[14] Despite establishing National Blood Transfusion Service (NBTS) in 2006, Nigeria is still unable to provide sufficient blood for her citizens in need.

Salaudeen and Odeh in their study to assess the knowledge and attitude to voluntary blood donation among students of tertiary institutions in Nigeria revealed that despite a good level of knowledge (61%), only 15% of the study participants had ever donated blood of which a miserly 3% donated voluntarily. The study also found slightly more males (57%) donating compared to their female counterpart. Lack of opportunity to donate (45%), tight lecture schedule (24%) and

inadequate knowledge about blood donation (24%) were some of the reasons given by some respondents for not having ever donated blood before.[15] A study carried out in Cross River State, Nigeria revealed that 60% of study participants had fears and misconceptions about blood donation. Twelve percent (12%) expressed fear of fainting during donation, 65% were concerned about the possibility of contracting HIV infection during blood donation; 10% thought they could be initiated into witchcraft during the process of donating blood while 7% gave religious constraint as reason for not donating.[16] A Tanzanian study involving 1141 respondents revealed that of the 26.4% that donated blood within 10 years preceding the study, only 3.8% donated voluntarily.[17] In Bangladesh, a study involving students of University of Dhaka revealed that 82% of the students had positive attitude towards blood donation. Remarkably, 60% of the respondents in this study had actually donated blood voluntarily and most (93%) frown at paid blood donation.[18] In Lithuania, researchers reported that paid donors constitute 89.9% and whereas 93% of the paid donors donated on a regular basis, only 20.6% of the non-remunerated donors donate on regular basis. A good proportion (78.3%) of the paid donors see remuneration as a necessity to encourage blood donation compared to 35.3% of the altruistic donors. While most of the paid donors (92%) think they deserve monetary compensation for donating, 55.9% of the non-remunerated donors would be satisfied with mere appreciation. The study also found that while 28.4% of the respondents will continue to donate, 12.3% said they would quit blood donation completely.[19]

A study involving undergraduates in Greece revealed that only 16.6% had ever donated blood. This relatively low proportion could be as a result of poor knowledge as 83.4% of the study participants do not know the condition and criteria applying to blood donation in general.[20] In Sweden, a study carried out at Blood Centre of Umee University Hospital, found no statistically significant difference between male and female donors as it concerns the general reasons and motives for donating blood. Influence from a friend (47.2%) and request from the media (23.5%) were the main reasons for donating blood. Commonly reported motives for donating blood include general altruism (40.3%), social obligation (19.7%) and peer influence (17.9%). The study also identified general altruism (68.4%) and social responsibility (16.0%) as the reasons donors will continue to donate. Laziness (19.1%) and fear of needle pricks were the main obstacles to becoming regular donors.[21] In a Thailand University study, of the 80% of the respondents who knew about blood donation, only 11% had ever donated voluntarily. Fear of

contracting infection was identified as the commonest inhibiting factor among non-donors.[22] A good proportion (81.2%) of study participants in a Trinidad and Tobago study had also never donated blood and of the 18.8% who had previously donated, donating for a family member (86.9%) was the overwhelming reason. Another study conducted in South Eastern Nigeria had saving a family member or a friend's life as the commonest motivating factor while fear of infections was cited as the commonest reason for refusal to donate.[24]

Nigeria has a very young population with median age of 18.4 years in 2017[25]. Therefore, to reduce the gap between demand and supply of blood, there is need to encourage our healthy young population to donate blood voluntarily. In this study, we explored those factors that motivate and inhibit young and educated sector of our society from donating blood and assess the level of willingness to donate blood among them so as to help concerned agencies, both private and government, to plan accordingly and increase the proportion of voluntary donation in our blood supplies.

Methodology

Imo state is one of the 5 states in South Eastern Nigeria. It has 27 local government areas distributed within its 3 senatorial zones. The state's population density varies from 230 to 1400 persons per square kilometre inhabiting a land mass of 5100 square kilometre.[26] There are several government owned institutions of higher learning in the state which includes: Imo State University, Owerri; Federal University of Technology, Owerri; Federal Polytechnic, Nekede; Eastern Palm University, Ogboko; Imo State Polytechnic, Umuagwo; Alvan Ikoku College of Education, Owerri; Imo State Technological Skills Acquisition Institute, Orlu; College of Health Science and Technology, Amaigbo, Nwangele; School of Nursing, Amaimo and Imo State College of Nursing and Health Sciences, Orlu.

A cross – sectional descriptive study was carried out among full time undergraduates of Imo State University Owerri and Alvan Ikoku Federal College of Education, Owerri.

Sample size was calculated using the Cochran formula for single proportion in study populations greater than 10,000;[15].

$$n = Z^2 P (1 - P) / d^2,$$

Where n is the minimum sample size, Z is the standard normal deviate at 95% confidence interval (1.96), P is the proportion of undergraduates that had ever donated blood from a previous study (0.60)[24] and d is the level of precision required, set at 0.05. The calculated minimum sample size was 369. Considering a potential non-response rate of 10%, the minimum sample size required for this study was 406; however, 600 students were enrolled in this study.

A multi-stage sampling technique was employed in selecting the participants for this study. The first stage involved stratification of schools into universities and non-universities higher institutions using list of higher institutions in Imo State as sampling frame. The second involved the selection of Imo State University from the university institutions and Alvan Ikoku College of Education from the non-university higher institutions using simple random sampling by balloting. In the third stage, study participants were proportionately allocated to the two institutions using the information obtained from their student affairs departments. The number of respondents in each institution was proportionately allocated to the departments and to the study levels of the students using the sampling frame obtained from Heads of departments. Systematic sampling technique was then used to select respondents. The respondents that were not available during the survey were replaced by the next person in the sampling frame.

A pretested, self-administered structured questionnaire was used to collect data from study participants between first week of August and last week of October 2017. The questionnaire comprised 4 sections containing the demographic characteristics, awareness and knowledge regarding blood donation; attitude towards blood donation and factors affecting willingness to donate blood.

Ethical approval for this study was obtained from Imo State University Teaching Hospital (IMSUTH) Ethical Committee. The study was done in line with ethical procedures as outlined in Helsinki declaration of 1964.

Results

Sociodemographic characteristics of respondents

Six hundred (600) questionnaires were distributed for this study and all were duly filled and returned. Female respondents were 416 (69.3%). The mean age of the respondents was 21.3 ± 5.0 years with 318(53.0%) being within 20 – 24 years age bracket.

Majority of the study participants 538(89.1%) were single and a higher proportion 231(38.5%) were in their second year of study. Social sciences, humanities and education contributed 421(70.2%) respondents and Catholics 359(59.8%) and Pentecostals 131(21.8%) were the dominant religious denomination. Majority of the study participants 336(56.0%) live off campus and belong to a religious organisation 395(65.8%).

Table 1: Sociodemographic characteristics of respondents

Variable	Frequency (n = 600)	Percent
Gender		
Female	416	69.3
Male	184	30.7
Age group (years)		
15 – 19	108	18.0
20 – 24	318	53.0
25 – 29	114	19.0
30 – 34	37	6.1
35 – 39	15	2.5
40 – 44	8	1.3
Mean ± SD	21.3 ± 5.0	

Marital status		
Single	538	89.7
Married	60	10.0
Divorced	2	0.3
Level of study		
100 level	51	8.5
200 level	231	38.5
300 level	133	22.2
≥400 level	185	30.8
Faculty		
Social sciences	156	26.0
Humanities	138	23.0
Education	127	21.2
Medical science	97	16.1
Pure science	82	13.7
Religious denomination		
Catholic	359	59.8
Pentecostal	131	21.8
Orthodox	94	15.7
Jehovah witness	10	1.7
Traditionalist	5	0.8

Islam	1	0.2
Tribe		
Igbo	556	92.7
Yoruba	29	4.8
Hausa	5	0.8
Others*	10	1.7
Residence		
Hostel	183	30.5
Off campus	336	56.0
Living with family	81	13.5
Membership of religious organisation		
Yes	395	65.8
No	205	34.2

*****Ikwerre, Urhobo, Efiks, Ijaw.

Awareness of respondents about blood donation

Most of the respondents 549(91.5%) were aware of blood donation and of these, 517(94.2%) knew about voluntary blood donation. Major sources of information on blood donation were electronic media 404(73.6%), school colleagues and lecturers 395(71.9%), health workers 348(63.4%) and the print media 337(61.4%).

Almost all the respondents knew about their blood group 558(93.0%) and the commonest blood group was O+ve 298(42.3%), closely followed by A+ve 217(38.9%).

Table 2: Awareness of respondents about blood donation

Variable	Frequency	Percent
Aware of blood donation (n = 600)		
Yes	549	91.5
No	51	8.5
Types of blood donor known (n = 549)**		
Voluntary donors	517	94.2
Non-voluntary/paid donors	150	27.3
Family replacement donors	33	6.0
Source of information (n = 549)**		
Electronic media	404	73.6
School mates/lecturers	395	71.9
Health workers	348	63.4
Print media	337	61.4
Parents/relatives	154	28.1
Internet	106	19.3
Blood group awareness (n = 600)		
Yes	558	93.0
No	42	7.0
Blood group of respondents (n = 558)		
A^+	217	38.9
B^+	51	9.1

AB	15	2.7
O^+	298	42.3
O^-	35	6.3
Others (A^- , B^-)	4	0.7

** Multiple responses applicable.

Prevalence and reasons for blood donation among respondents

Only 83(13.8%) respondents donated blood in the one year period preceding the study with 40 of them (48.2%) donating to a family member. The main reason given by respondents for donating blood was to save live in an emergency situation (62.7%) while lack of opportunity to donate (35.4%) was the commonest reason given by those who have not donated in the past one year. However, 326(63.1%) of these set of respondents are positively inclined to blood donation.

Table 3: Prevalence and reasons for blood donation among respondents

Variable	**Frequency**	**Percent**
Donated blood in the last one year (n=600)		
Yes	83	13.8
No	517	86.2
Recipient of blood (n = 83)		
Family member	40	48.2
Unknown persons	23	27.7
Friends	20	24.1
Main reason for donating blood (n = 83)		

Emergency situation to save live	52	62.7
Free will donation	23	27.7
Organizational activity	6	7.2
Due to incentive given	2	2.4
Main reason for not donating (n = 517)		
Lack of opportunity to donate blood	183	35.4
No reason	138	26.7
Anxiety	64	12.4
Ignorance	45	8.7
Fear of contacting infection	38	7.4
Fear of needle	27	5.2
Religious/Cultural beliefs	22	4.3
Willingness to donate blood (n = 517)		
Yes	326	63.1
No	120	23.2
Not sure	71	13.7

Association between sociodemographic variables of respondents and having donated blood in the last one year.

No sociodemographic variable was found to be significantly associated with blood donation in the last one year. However, slightly higher proportion of males (16.8%) donated compared to the

females (12.5%). Also, respondents within the age group 25 – 29 years had the highest proportion of blood donation (18.4%) in comparison to the other age groups.

Table 4: Association between sociodemographic variables of respondents and having donated blood in the last one year.

Variable	Donated blood in the last one year		χ^2	p-value
	Yes (%)	**No (%)**		
	n = 83	**n = 517**		
Gender				
Female	52 (12.5)	364 (87.5)	2.02	0.155
Male	31 (16.8)	153 (83.2)		
Age group (years)				
15 – 19	14 (13.0)	94 (87.0)	3.13	0.680
20 – 24	42 (13.3)	276 (86.8)		
25 – 29	21 (18.4)	93 (81.6)		
30 – 34	4 (10.8)	33 (89.2)		
35 – 39	1 (6.7)	14 (93.3)		
40 – 44	1 (12.5)	7 (87.5)		
Marital status				
Single	79 (14.7)	459 (85.3)	4.05	0.256
Married	4 (6.7)	56 (93.3)		
Divorced	0 (0.0)	2 (100.0)		
Class distribution				

100 level	9 (17.6)	42 (82.4)	1.30	0.728
200 level	28 (12.1)	203 (87.9)		
300 level	19 (14.3)	114 (88.7)		
≥ 400 level	27 (14.6)	158 (85.4)		
Faculty				
Social science	17 (10.9)	139 (89.1)	8.62	0.071
Humanities	13 (9.4)	125 (90.6)		
Education	23 (18.1)	104 (81.9)		
Medical sciences	13 (13.4)	84 (86.6)		
Pure science	17 (20.7)	65 (79.3)		
Religious denomination				
Catholic	53 (14.8)	306 (85.2)	4.72	0.451
Pentecostal	14 (10.7)	117 (89.3)		
Orthodox	16 (17.0)	78 (83.0)		
Jehovah witness	0 (0.0)	10 (100.0)		
Traditionalist	0 (0.0)	5 (100.0)		
Islam	0 (0.0)	1 (100.0)		
Tribe				
Igbo	73 (13.1)	483 (86.9)	5.24	0.155
Yoruba	8 (27.6)	21 (72.4)		
Hausa	1 (20.0)	4 (80.0)		

Others	2 (20.0)	8 (80.0)			
Residence					
Hostel	22 (12.0)	161 (88.0)	4.14	0.126	
Off campus	44 (13.1)	292 (86.9)			
Living with family	17 (21.0)	64 (79.0)			
Membership of religious organizations					
Yes	61 (15.4)	334 (84.6)	2.51	0.113	
No	22 (10.7)	183 (89.3)	\		

Association between sociodemographic characteristics and willingness to donate blood

Age group (χ^2 = 23.4, p = 0.009), marital status (χ^2 = 25.7, p = 0.000), class distribution (χ^2 = 30.6, p = 0.000), religious denomination (χ^2 = 65.5, p = 0.000), and residence (χ^2 = 33.6, p = 0.000) were significantly associated with willingness to donate blood.

Respondents aged 25 – 29 years were the most willing (72.8%) to donate blood followed by those in the age group 20 – 24 years. Likewise, those that were single (66.9%) were more willing to donate compared to the others. Study participants in 100 level (22.9%) were less willing to donate blood compared to those in 200 level and above. Also, those living within the campus were more willing to donate blood (70.6%) compared to those staying off campus (65.2%).

Table 5: Association between sociodemographic characteristics and willingness to donate blood

Variable	**Willingness to donate blood**			**χ^2**	**p-value**
	Yes (%)	**No (%)**	**Unsure (%)**		
	n = 326	**n = 120**	**n = 71**		

Gender						
Female	238 (65.7)	76 (21.0)	48 (13.3)	4.14	0.126
Male	88 (56.8)	44 (28.4)	23 (14.8)		
Age group (years)						
15 – 19	56 (60.2)	25 (26.9)	12 (12.9)	23.4	0.009
20 – 24	169 (64.5)	50 (19.1)	43 (16.4)		
25 – 29	75 (72.8)	20 (19.4)	8 (7.8)		
30 – 34	17 (50.0)	13 (38.2)	4 (11.8)		
35 – 39	6 (37.5)	8 (50.0)	2 (12.5)		
40 – 44	3 (33.3)	4 (44.4)	2 (22.2)		
Marital status						
Single	301(66.9)	92 (20.4)	57 (12.7)	25.7	0.000
Married	24(37.5)	27 (42.2)	13(20.3)		
Divorced	1(33.3)	1(33.3)	1(33.3)		
Class distribution						
100 level	12 (27.9)	22 (51.2)	9 (20.9)	30.6	0.000
200 level	150 (70.1)	42 (19.6)	22 (10.3)		
300 level	66 (60.6)	25 (22.9)	18 (16.5)		
≥ 400 level	98 (64.9)	31(20.5)	22 (14.6)		
Faculty						
Social sciences	96 (67.1)	30 (21.0)	17 (11.9)	5.39	0.715

Humanities	75 (62.5)	29 (24.2)	16 (13.3)			
Education	63 (61.2)	23 (22.3)	17 (16.5)			
Medical sciences	47 (55.3)	23 (27.1)	15 (17.4)			
Natural sciences	45 (68.2)	15 (22.7)	6 (9.1)			
Religious denomination						
Catholic	237 (71.4)	53 (16.0)	42 (12.7)		65.5	0.000
Pentecostal	51(58.0)	20 (22.7)	17 (19.3)			
Orthodox	37 (46.8)	34 (43.0)	8 (10.1)			
Jehovah witness	0 (0.0)	9 (81.8)	2 (18.2)			
Traditionalist	0 (0.0)	4 (66.7)	2 (33.3)			
Islam	1(100.0)	0 (0.0)	0 (0.0)			
Residence						
Hostel	125 (70.6)	43 (24.3)	9 (5.1)		33.6	0.000
Off campus	161(65.2)	50 (20.2)	36 (14.6)			
Living with family	40 (43.0)	27 (29.0)	26 (28.0)			
Membership of religious organizations						
Yes	213 (61.9)	77 (22.4)	54 (15.7)		3.40	0.182
No	113 (65.3)	43 (24.9)	17 (9.8)			

Predictors of willingness to donate blood among the respondents

On bivariate analysis, respondents aged 15 – 29 years where about 3 times more willing to donate blood compared to those aged 30 – 44 years (OR = 3.03, p = 0.0003). With respect to marital status, single respondents were 4 times more willing to donate blood in comparison to married/divorced respondents (OR = 4.02, p < 0.0001). The study also revealed that undergraduates that were of the Catholic faith were more willing to donate blood when compared to their counterparts that were of Pentecostal/Orthodox denomination (OR = 2.72, p < 0.0001). Level of study and nature of residence were not independent predictors of willingness to donate blood. Table 6.

Table 6: Predictors of willingness to donate blood among the respondents

Variable	OR (estimate)	95% (CI)	p-value
Age group			
15 – 29	3.03	1.67 – 5.51	0.0003
30 – 44	1.00		
Marital status			
Single	4.02	2.18 – 7.39	<0.0001
Married/Divorced	1.00		
Class distribution			
≤ 200 level	1.00		
≥ 300 level	1.16	0.76 – 1.76	0.496
Religious denomination			
Catholic	2.72	1.75 – 4.31	<0.0001
Pentecostal/Orthodox	1.00		
Residence			

Hostel	1.00			
Off campus	0.90		0.58 – 1.39	0.628

Respondents that were unsure of their willingness to donate blood were excluded from this analysis.

Discussion

The mean age of undergraduates in this study was 21.3 ± 5 years. This is similar to that observed by Duru et al (22.5 years) and Onofa et al (23.9 years) in their publications on psychoactive substance use among students of tertiary institutions[27,28]. According to the World Health Organisation (WHO), the age profile of blood donors shows that proportionally more young people donate blood in low and middle income countries such as Nigeria than in high income countries[29]. Though, there are more female respondents in this study (69.3%) in keeping with the trend in many institutions of higher learning in Nigeria[30], data about the gender profile of blood donors show that globally, 70% of blood donation are given by men[29]. Demographic information of blood donors is important for formulating and monitoring recruitment strategies.

On the awareness and knowledge about blood donation, most of the respondents (91.5%) knew about blood donation. This is in consonance with 95.6% and 93.2% reported among medical and pharmacy students respectively in a study by Nwabueze et al at Nnamdi Azikiwe University, Awka in Anambra state, South Eastern Nigeria[24]. The observation that electronic media is the most prominent way people gather information about blood donation was consistent with results from a study conducted in India on knowledge, attitude and practices of people towards voluntary blood donation in Uttarakhand, India[31]. Using the social media to disseminate information on the importance and benefit of blood donation may yield better dividends given its popularity among young people.

In the index study, 93.0% of the respondents knew their blood group. This is similar to the 93.9% reported among health workers in Benin, Edo State[32] and 95.2% observed among pharmacy students in Awka, Anambra State[24]. A lower figure of 69.5% was reported by Amatya in Nepal[33]. The commonest blood group of respondents in this study is O+ve (42.3%) followed by A+ve (38.9%). This is similar to what was reported by Nwagoh et al, in Benin city, Nigeria.

The proportion of O+ve and A+ve in Nwogoh's study was 45.4% and 15.3% respectively, though they reported a high non response rate of 21.5%[32]. The public health importance of this finding is that majority of the populace are universal donors and this fact should be made known to the general public.

The knowledge and attitude of respondents towards blood donation in this study was satisfactory. However, this contradicts the actual practice of blood donation as only 13.8% of the respondents had donated blood in the last one year and most times, the donation is for a family member in an emergency situation. Other workers have reported that good knowledge and attitude do not usually translate to the actual practice of blood donation[24,32].

Surprisingly, majority of respondents (35.4%) in the index study gave lack of opportunity to donate blood as their main reason for not donating. Likewise, a study in Benin city, Nigeria reported that the commonest reason given by respondents for not donating blood was because no one had ever approached them to donate[32]. Other studies reported fear of infection as the commonest reason for refusing to donate blood[16,24]. Among non-donors in this study, 63.1% were willing to donate. This buttressed the fact stated earlier that attitude towards blood donation is positive.

No sociodemographic variable was significantly associated with blood donation by the respondents in the last one year. However, predictors of willingness to donate include age of the respondents, their marital status and their religious inclination. Researchers in Benin City, Edo State in their study on health care workers reported a statistically significant difference between male and female donors. However, they found no association between the workers level of education and their staff category (junior and senior staff)[32]. Workers at the blood centre of Umee University, Sweden also found no statistically significance difference between male and female donors[21].

Conclusion and Recommendation

This study has demonstrated that more young people are willing to donate blood if only they have the opportunity. In the light of these findings, we recommend that: Relevant government agencies and religious organizations should intensify effort at educating the populace on the importance and benefits of voluntary blood donation. Given that the media and health workers

are major sources of information on blood donation, those who work in these establishments should make deliberate effort to promote voluntary blood donation as part of their corporate social responsibility. The student union governments and other organizations in tertiary institutions should include voluntary blood donation campaign as part of their activities.

Authors' Contribution: All authors participated in the conduct of this study.

Conflicting Interest: The authors hereby declare no conflict of interest

References

1. The Franklin Institute Incorporation. Blood: The Human Heart. 2004. http://www.fi.edu/learn/heart/blood.blood.html. Accessed 15th September 2017.
2. Lowe K.C., Ferguson E. Benefit and risk perceptions in transfusion medicine: Blood and blood substitutes. Journal of Internal Medicine 2003; 253: 498 – 507.
3. Loukas M, Hanna M, Alsaiegh N, Shoja M.M., Tubbs R.S. Clinical anatomy as practiced by ancient Egyptians. Clin Anat. 2011; 24(14): 409 – 415.
4. Landsteiner K. Weiner A.S. An agglutinable factor in human blood recognised by immunosera in rhesus blood. The Society for Experimental Biology 1940; 42: 223.
5. Schneider W.H. Blood transfusion between the wars. J Hist Med. 2003; 58(2):187 – 224.
6. Pinkerton P.H. Canadian surgeon and the introduction of blood transfusion in war surgery. Transfusion Medicine Reviews 2008; 22: 77 – 86.
7. American Association of Blood Banks. Donor Screening and Testing. 2014. www.aabb.org/resources/governmentregulatory//donoreligibility. Accessed 20th September 2017.
8. Buyx A.M. Blood donation, payment and non-cash incentives: Classical questions drawing renewed interest. Transfusion Medicine and Hemotherapy 2009; 36(5): 329 – 339.
9. World Health Organisation: Voluntary blood donation. http://www.who.int. Accessed 29th September 2017.

10. Nwogoh B., Ikponwen D., Isoa M.E. Donor blood procurement and the risk of transfusion transmissible viral infections in a tertiary health facility in South-South Nigeria. Nigeria Medical Journal 2011; 52(4): 227 – 229.
11. Ejele O.A., Erhabor O., Nwauche C.A. The risk of transfusion transmissible viral infections in the Niger – Delta area of Nigeria. Sahel Medical Journal 2005; 8(1):16–19.
12. Jeremiah Z.A., Koate B.B. Anaemia, iron deficiency and iron deficiency anaemia among blood donors in Port Harcourt, Nigeria. Blood transfusion 2010; 8(2): 113 – 117.
13. Ahmed S.G., Ibrahim U.A., Hassan A.W. Adequacy and pattern of blood donation in North Eastern Nigeria: The implication for blood safety. Annals of Tropical Medicine and Parasitology 2007; 101(8): 725 – 731.
14. The Melbourne Declaration on 100% Voluntary Non-remunerable Donation of Blood and Blood Components. Composed at World Blood Donor Day. Melbourne, Australia, 2009. http.//www.who.int/worldblooddonorday/MelbourneDeclarationWBDD09.pdf. Accessed October 4th 2017.
15. Salaudeen A.G., Odeh E. Knowledge and behaviour towards voluntary blood donation among students of tertiary institutions in Nigeria. Nigerian Journal of Clinical Practice 2011; 14: 303 – 307.
16. Offiong J.G., Asuquo E.E., Olaniran N.S. Community mobilization for blood donation, Cross River State, Nigeria. International Journal of Obstetrics and Gynaecology 1997; 59: 119 – 125.
17. Jacobs B., Berege Z.A. Attitude and beliefs about blood donation among adults in Mwanza Region, Tanzania. East African Medical Journal 1995; 72: 345 – 348.
18. Hosain G.M., Anisuzzaman M., Begum A. Knowledge and attitude towards voluntary blood donation among Dhaka University students in Bangladesh. East African Medical Journal 1997; 74: 549 – 553.
19. Buciuniene I., Laimute S., Aurelija B. Blood donors: Motivation and attitude to non-remunerated blood donation in Lithuania. Biomed Central Public Health 2006; 6: 166.
20. Androulaki Z., Merkouri A., Tsouras C., Androulakis M. Knowledge and attitude towards voluntary blood donation among a sample of students in TEI of Crete, Greece. Nurses Web Journal 2005; 23: 1 – 9.

21. Sojka B.N., Sojka P. The blood donation experience: Self – reported motives for and obstacles to donating blood. Vox Sanguinis 2008; 94: 56 – 63.
22. Wanitkit V. Knowledge about blood donation among a sample of Thai University students. The International Journal of Transfusion Medicine 2002; 83: 97 – 99.
23. Sampath S., Ramsaran V., Parasram S. Attitude towards blood donation in Trinidad and Tobago. Transfusion Medicine 2007; 17: 97 – 99.
24. Nwabueze S.A., Nnebue C.C., Azuike E.C., Ezenyeaku C.A., Aniagboso C.C., Ezemonye O.E., Azuike E.D. Perception of blood donation among medical and pharmaceutical science students of Nnamdi Azikiwe University, Awka. Open Journal of Preventive Medicine 2014; 4: 515 – 522. http://dx.doi.org/10.4236/ojpm.2014.47061.
25. Median Age – The World Factbook – Central Intelligence Agency. https://www.cia.gov/library/publication/the-world-factbook/fields/2177.html. Accessed 3rd July 2018.
26. Government of Imo State. Statistical Year Book: Imo State Planning and Economic Development Commission, Owerri; 2006.
27. Duru C.B., Oluoha R.U., Okafor C.C., Diwe K.C., Iwu A.C., Aguocha C.M., Ohale I., Nwaigbo E. Socio-demographic determinants of psychoactive substance use among students of tertiary institutions in Imo State, Nigeria. Journal of Addiction Research and Therapy 2017; 8(5): 1 – 9.
28. Onofa L.U., Adamson T., Ighoroje M., Majekodunmi M. Prevalence and patterns of drug abuse among students of tertiary institutions in Abeokuta, Ogun State, Nigeria. International Journal of Psychiatry. 2016; 1(1): 1 – 6.
29. Blood Safety and Availability – World Health Organization. http://www.who.int/news-room/fact-sheets/detail-safety-and-availability. Accessed 3rd July 2018.
30. Adeyemi K., Akpotu N. Gender analysis of students' enrolment in Nigerian universities. Higher Education. 2004; 48: 361 – 378.
31. Agrawal A., Tiwari A.K., Ahuja A., Kahra R. Knowledge, attitude and practices of people towards voluntary blood donation in Uttarakhand. Asian Journal of Transfussion Science 2013; 7(1): 59 – 62.
32. Nwogoh B., Aigberadion U., Nwannadi A.I. Knowledge, attitude and practice of voluntary blood donation among healthcare workers at the University of Benin Teaching

Hospital, Benin City, Nigeria. Journal of Blood Transfusion 2013. Article ID: 797830. http://dx.doi.org/10.1155/2013/797830.

33. Amatya M. Study on knowledge, attitude and practice of blood donation among students of different colleges of Kathmandu, Nepal. International Journal of Pharmaceutical and Biological Archives 2013; 4: 424 – 428.