

The Dynamics of Blood Donation: A Comparative Study of Voluntary and Paid Models

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Abstract- Blood donation is an important component of modern healthcare, with millions of lives saved annually through transfusions. However, the sustainability of blood supplies remains a concern, particularly in developing countries. This study examines the dynamics of blood donation, focusing on the comparative effectiveness of voluntary and paid models. Questionnaires were administered to 430 respondents, sampled from the Enugu State civil servants, traders, and students' populations, all residing within Enugu metropolis. The questionnaire consisted of 21 questions, grouped into four, addressing the sociodemographic factors of participants, practice of blood donation, place of blood donation, and intents for future blood donation. The results generated were analysed using SPSS, and tables were used to show the distribution of data. Quantitative data were summarized using mean and standard deviation, chi-square as a statistical test of significance and multivariate analysis in form of regression were done to determine the associations between socio-demographic variables of respondents and practices of blood donation. Data were based on 384 respondents who answered the questionnaire. The results show that 79.9% of the respondents have not donated blood before. Of those that have donated, 20.1%, only 14.5% donated in Blood Transfusion Centre on voluntary basis. 72.4% donated to family member/friends, 1.3% donated upon payment of money, and 26.3% donated on charity. A significant relationship was identified between practice of blood donation with age, sex, and marital status of the respondents. These results show poor practice of blood donation among the respondents, with majority of them practicing paid/family replacement blood donation. It was recommended that government should better the lives of its citizenry, and as well, intensify blood donation campaign to students in higher institutions.

I. INTRODUCTION

Blood is an essential and irreplaceable bodily fluid, which underpins the success of numerous medical procedures. Such situations like emergency care, surgical interventions, cancer treatment, chronic disease management, and maternal/child healthcare all rely heavily on blood donations to achieve successes. Without access to blood transfusions, these procedures can deteriorate rapidly, leading to severe consequences, including increased morbidity, mortality, and other healthcare challenges. For instance, globally, postpartum haemorrhage is the leading cause of maternal mortality, accounting for 27% of all maternal deaths [1]. The human blood is a critical lifeline, with no artificial substitute [2], thus blood transfusion relies exclusively on human donors. To meet the growing demand for blood, it is very pertinent to encourage humans to donate blood and on regular bases. While blood transfusion can be lifesaving, they also carry risk of transmitting transfusion transmissible infections to blood recipients, which can lead to death or irreversible chronic and life-threatening infections. Therefore, ensuring blood safety is equally crucial as maintaining its availability, and the source of blood plays a pivotal role in determining its safety, thus emphasizing the importance of careful donor selection, screening, and testing to minimize transfusion-related risks [3].

Among the three major sources of blood donors, voluntary unpaid blood donors have been shown to have the lowest prevalence of transfusion-transmissible infections (TTIs) compared to family/replacement donors and paid donors. According to the World Health Organization (WHO), regular voluntary unpaid blood donors are the safest group of donors, with lower rates of bloodborne infections like HIV, Hepatitis B, Hepatitis C, and Syphilis [4] [5] [6]. Studies in sub-Saharan Africa,

including Nigeria, have consistently reported lower TTI prevalence among voluntary non-remunerated blood donors (VNRBDs) compared to family/replacement donors. For instance, a study in Malawi identified that VNRBDs had lower prevalence of HIV (1.9%), HBV (3.6%), HCV (1.0%), and syphilis (2.6%) compared to family replacement blood donors [7].

This study, which is aimed at assessing voluntary and paid blood donation practices in Enugu State, will furthermore, analyse their relationships with donors' demographics to identify trends and patterns. The insight gained, will guide efforts to promote safe blood donation and maintain sustainable supply of safe blood for healthcare services.

Study Area.

Enugu, which is the capital city of Enugu State is chosen as the study area for this research work. The state shares boundaries with Ebonyi State, Abia State, Imo State, Anambra State, and Benue State. The choice of Enugu metropolis for this research work is influenced by its diverse cultural, demographic and socio-economic representations, which are major factors that influence blood donations [8].

Study Population.

The population of this study included students from the Enugu State University of Science and Technology (ESUT), and Enugu State College of Education/Technical (ESCET), civil servants from Enugu State Ministries of Education and Lands, and traders from Ogbete and Timber shade markets, all within Enugu metropolis.

Inclusion Criteria.

Participants from the selected population, aged 18-54 years, and who gave their consents for participation in the study were included.

Exclusion Criteria.

Individuals excluded from this study were those who did not qualify for inclusion, or those who qualified for inclusion, but did not give their consent for participation.

Sample Size Determination

The sample size for this study was 384. This was determined using the Fisher's formula [9].

$$N = \frac{Z_{\alpha/2} P (1-P)}{D^2}$$

Where Z_{α} = significant level usually set at 95% confidence level.

Z_{α} is 1.96 for a two tailed test.

P = Prevalence of the attribute under study. P is 65% (0.65) from literature (10)

D = Margin of error tolerated. D is 5% (0.05)

N = minimum sample size.

$$N = \frac{Z_{\alpha/2} P (1-P)}{D^2}$$

Substituting in the formula,

$$N = \frac{1.962 \times 0.65 (1 - 0.65)}{(0.05)^2}$$

$$= 349.44$$

$$= 349 \text{ approximately.}$$

Allowing 10% non-responses,

$$N = \frac{10 \times 349}{100}$$

$$= 34.9 (35 \text{ approx.})$$

$$= 349 + 35$$

$$N = 384.$$

II. MATERIALS AND METHODS

Study Instrument

A well-structured questionnaire was used as the instrument for data collection as self or interviewer administered for the literate or illiterate respondents respectively. The questionnaire comprised 21 questions to investigate 4 specific areas;

1. Socio- demographic characteristics of respondents
2. Practice of blood donation
3. Place of blood donation
4. Intents for future blood donation

Measurement of Variables

Dependent Variables were measured using nominal scale and rates, whereas independent variables were measured using ordinary scale and rates.

Dependent Variables. They were practice of blood donation, place of blood donation, intents for future blood donation.

Independent Variables. They include, socio-demographic factors like; age, sex, institution/department/work place, tribe, religion, marital status, level of education, occupations, staff category and year of study.

Statistical Analysis

Data were collected and analysed using statistical package for Social Sciences (SPSS) version 20 [11]. Frequency and contingency table were used to show the distribution of data. Quantitative data was summarized using mean and standard deviation, chi-square as a statistical test of significance and multivariate analysis in form of regression was done to determine the associations between socio-demographic variables of respondents and practices of blood donation. The level of significance was at $p = 0.05$.

Ethical Considerations.

1. Ethical clearance for this study was obtained from the Enugu State Ministry of Health Ethical Committee on Research Projects.
2. Informed consent; Research details were made known to the respondents and their informed consent in the form of signature or thumb prints were obtained.
3. Confidentiality: Participants data were handled with utmost confidentiality.
4. Politeness: Members of my team were polite and respectful.

III. RESULTS

Result was on 384 people that responded correctly to the questionnaire though 432 respondents were studied. This gives a response rate of 88.9%.

Table 1: Characteristics of Respondents.

Variable	Frequency (N=384)	Per cent (%)
Age		
<25	188	49.0
25-39	156	40.6
40+	40	10.4
Sex		
Female	185	48.2
Male	199	51.8
Marital Status		
Single	300	78.1
Married	84	21.9
Tribe		
Igbo	378	98.4
Hausa	1	0.3
Yoruba	4	1.0
Others	1	0.3
Level of education		
Primary	8	2.1
Secondary	80	20.8
Post-secondary	242	63
Masters	28	7.3
PhD.	16	
None	10	2.6
Level of Education (regrouped)		
Less than post-secondary	98	25.5

Post-secondary & above	286	74.5
Occupation		
Student	225	58.6
Civil servant	94	24.5
Trader	65	16.9
Religion		
Christianity	382	99.5
Islam	2	0.5

Table 1.0 shows that the respondents were aged 18-54 years with mean age of 27.21 and standard deviation of 7.58. Age range of 18-25years constitutes the highest number of respondents (49%) whereas 40-54 years constitutes the least (10.4%). Males were slightly higher (51.8%) than females (48.2%). 78.1% of the respondents are single whereas 21.96% are married. 98.4% are Igbos, 0.3% are Hausas, and Yoruba is 1%. Up to 63% of them attended (or were attending) higher institution (post-secondary). 74.5% of them attended below post-secondary, 2.6% did not go to school at all. Students constitute the highest percentage in terms of occupation of respondents (58.6%) whereas traders constitute the least (16.9%). Most of the respondents are Christians (99.5%); only small fractions are Moslems (0.5%)

Table 2: Practice of Blood Donation Among Respondents

Variables	Frequency (N=76)	per cent
Have you donated blood before?		
Yes	76	20.3

No	299	79.7
If yes, how many times did you donate In the last one year?		
Once	56	73.7
Two times	12	15.8
Three times	3	3.9
Four times	5	6.6
Number of times donated in the last one year (regrouped)		
Less than three times	68	89.5
Three times and above	8	10.5
Where did you donate?		
Government hospital	42	55.3
Private hospital	23	30.3
NBTS	11	14.5
Why did you donate?		
To help a family member/friend	55	72.4
To get some money	1	1.3
To be kept in the blood bank for somebody who may need it	20	26.3
I will donate voluntarily	69	90.8
I will like to be paid money before I donate	7	9.2
If you will like to be paid money before	Frequency (N=7)	per cent

donating, what are your reasons?		
It will motivate me to donate	1	14.3
I need money to take care of my personal needs	5	71.4
I don't know	1	14.3
If you will like to donate voluntarily, what are your reasons?	Frequency (N=69)	per cent
I want to reduce the excess blood I have	1	1.4
I want to save life of someone	67	97.1
I don't know	1	1.4

Table 2.0 shows that majority of the respondents (79.7%) have not donated blood before, whereas 20.3% of the respondent has actually donated. 89.5% of the number who have donated, did that less than 3 times a year, whereas 10.5% donated up to 3 times and above. In terms of place of donation, table shows that 55.3% of the respondents donated in government hospital, 30.3% donated in private hospitals, and 14.5% in NBTs. In terms of purpose of donation, 72.4% donated because they wanted to help a family member/friend, 1.3% donated to get money, whereas 26.3% donated to be kept in blood banks for someone who may need it. 90.8% of the respondents agreed that in future, they will donate voluntarily, whereas 9.2% would want to be paid money before donating. 71.4% Of the respondents who donated upon payment of money said that their reason was that they needed money for their personal needs, 14.3% said that the reason was that money acted as a motivator to donate. The remaining 14.3% could not disclose their reason for embarking upon paid blood donation. For those that donated voluntarily, 97.1% of them did so because they wanted to save life, whereas 1.4% said that their reason was to reduce excess blood they have, and 1.4% did not disclose their reasons.

Table 3: Relationship between socio-demographic variables and blood donation.

Variable	Donated blood		Total	Chi-Square (P-value)
	No	Yes		
Age (grouped)				
< 25	150 (81.5)	34 (18.5)	184 (100)	9.689 (0.008)*
25 – 39	126 (82.4)	27 (17.6)	153 (100)	
40+	23 (60.5)	15 (39.5)	38 (100)	
Sex				
Female	156 (85.7)	26 (14.3)	182 (100)	7.828 (0.005)*
Male	143 (74.1)	50 (25.9)	193 (100)	
Marital Status				
Single	243 (83.2)	49 (16.8)	292 (100)	9.920 (0.002)*
Married	56 (67.5)	27 (32.5)	83 (100)	
Highest level of education (re-grouped)				
Less than post-secondary	68 (73.9)	24 (26.1)	92 (100)	2.556 (0.110)
Post-secondary & above	231 (81.6)	52 (18.4)	283 (100)	
Occupation				
Student	186 (83.8)	36 (16.2)	222 (100)	5.948 (0.051)
Civil servant	71 (75.5)	23 (24.5)	94 (100)	
Trader	42 (71.2)	17 (28.8)	59 (100)	

* = significantly related, *f* = Fisher's exact test

Table 3 shows that the following results; few of the respondents have donated blood before, with age range 40 – 54 years coming highest by percentage (39.5%). Males donated blood more (25.9%) than

females (14.3%). More donations also came from married (32.5%) then single respondents (16.8%). The less educated respondents also donated more (26.1%) than the more educated (18.4%). Traders were found to have donated by percentage (28.8%) more than other groups of respondents' occupation. Upon cross tabulation of variables, significant association was identified between respondents age ($X^2 = 9.689$, $p = 0.008$), sex ($X^2 = 7.828$, $p = 0.005$), and marital status ($X^2 = 9.920$, $p = 0.002$), with the test question. No significant association was identified with the respondent's level of education (p values > 0.05).

Table 4: Relationship between demographic variables and place of blood donation.

Variable	Place of donation		Total	Chi-Square (P-value)
	Hospitals	NBTS		
Age (grouped)				
< 25	27 (79.4)	7 (20.6)	34 (100)	2.030 (0.367)
25 – 39	25 (92.6)	2 ^f (7.4)	27 (100)	
40+	13 (86.7)	2 ^f (13.3)	15 (100)	
Sex				
Female	22 (84.6)	4 (15.4)	26 (100)	0.026 (1.000)
Male	43 (86.0)	7 (14.0)	50 (100)	
Marital Status				
Single	40 (81.6)	9 (18.4)	49 (100)	1.689 (0.309)
Married	25 (92.6)	2 ^f (7.4)	27 (100)	
Highest level of education (re-grouped)				
Less than post-secondary	20 (83.3)	4 ^f (16.7)	24 (100)	

Post-secondary & above	45 (86.5)	7 (13.5)	52 (100)	0.136 (0.734)
Student	29 (80.6)	7 (19.4)	36 (100)	
Civil servant	19 (82.6)	4 ^f (17.4)	23 (100)	
Trader	17 (100.0)	0 ^f (0.0)	17 (100)	3.981 (0.126)

* = significantly related, *f* = Fisher's exact test

Table 4 shows the following results; age range of 18-24 years, recorded the highest blood donations in NBTS (20.6%). Also, females recorded higher blood donation in NBTS (15.4%) than men (14.0%). Single respondents equally donated more in NBTS (18.4%) than the married (7.4%). In terms of level of education, the less educated respondents recorded higher blood donations in NBTS (16.7%) than the more educated. In terms of occupation, students recorded the highest number of blood donations than other groups of respondents. Traders have never donated blood in NBTS. Upon cross tabulation of the variables, no significant association was recorded between the socio-demographic variables with the test question (p values > 0.05).

Table 5: Relationship between demographic variables and intents for future blood donation.

	Intents for future blood donation		Total	Chi-Square (P-value)
	Donate voluntarily	Paid money before donation		
Age (grouped)				
< 25	165 (89.7)	19 (10.3)	184 (100)	2.803 (0.246)
25 – 39	135 (88.2)	18 (11.8)	153 (100)	
40+	37 (97.4)	1 ^f (2.6)	38 (100)	

Sex				
Female	161 (88.5)	21 (11.5)	182 (100)	
Male	176 (91.2)	17 (8.8)	193 (100)	0.767 (0.381)
Marital Status				
Single	256 (87.7)	36 (12.3)	292 (100)	
Married	81 (97.6)	2 ^f (2.4)	83 (100)	6.983 (0.006) *
Highest level of education (re-grouped)				
Less than post-secondary	78 (84.8)	14 (15.2)	92 (100)	
Post-secondary & above	259 (91.5)	24 (8.5)	283 (100)	3.460 (0.063)
Occupation				
Student	199 (89.6)	23 (10.4)	222 (100)	
Civil servant	88 (93.6)	6 (6.4)	94 (100)	
Trader	50 (84.7)	9 (15.3)	59 (100)	3.163 (0.206)

* = significantly related, f = Fisher's exact test

Table 5 shows the following results; age range of 40-54 years has the highest propensity by percentage to donate voluntarily (97.4%). Males have the highest intentions to donate voluntarily (91.2%), whereas females have the higher intentions to donate upon payment of money (11.5%). Singles have higher intentions to donate upon payment of money (12.3%), whereas the married have higher by percentage (97.6%) to donate voluntarily. The more educated respondents would like to donate voluntary (91.5%),

whereas the less educated would prefer to donate upon payment of money (15.2%). Civil servants would prefer to donate voluntarily (93.6%), more than other occupations whereas traders would like to donate upon payment of money, more than any other occupation (15.3%). Upon cross tabulation of the variables with the test question, significant association was identified between marital statuses of the respondents with the test question ($X^2 = 6.983$, $p = 0.006$). No such association was identified with age, sex level of education and occupation (p values > 0.05).

IV. DISCUSSION

The study indicates that majority of the respondents (79.79%) have not donated blood before. Only a small fraction of the respondents (20.39%) has actually donated blood. Of those that have donated, only 14.5% of them donated in the National Blood Transfusion Service (NBTS), while 72.4% of them donated blood to help a family member / friend (family replacement donation). 1.3% of the donations were done upon payment of money (paid blood donation). 26.3% of the donations were solely done so that the blood units could be kept in blood banks for people who may need them (voluntary blood donation).

In classifying these donations, it is very pertinent to state here, that there is no clear cut between family replacement blood donation and paid blood donation, as most paid donors are sponsored by payment of money, to donate for family replacement purpose. This is the form of blood donation practice most common in Nigerian teaching hospitals today [12] [13].

Therefore, 26.39% of the donated blood can be regarded as voluntary blood donation since it was not directed to anybody, and no money was committed. However, the remaining donations, 72.4% and 1.3% (73.7%), can be referred to as paid/family replacement blood donation.

Upon cross tabulation to identify the association between practice of blood donation and socio-demographic variables, it was observed that in respect to the question, *have you donated blood before*, there was a significant association between age and sex of respondents with the test question. This is in agreement with a report [14]. Also, in response to the

question, *which type of blood donation will you like to do in future; voluntary or paid*, it was identified that a significant association exist between marital statuses of the respondents with the test question. This is also in line with a report [15]

Among age ranges studied, age range 40-54 years, recorded the highest level of practice of blood donations (39.5%). However, on further analysis, it was observed that even though this age range recorded the highest level of blood donations, 86.9% of their donations were done in hospitals (a suggestion of family replacement donation), and 13.3% in NBTS (a suggestion of voluntary blood donation). This is unlike the age range of 18-24 years, whose hospital donations was 79.4% and NBTS's, 20.6%. This suggests that more young people donate voluntarily than older ones. These findings indicate that most voluntary blood donations are contributed by donors within the age range of 19-24 years. This is in agreement with the report of the data manager NBTS Enugu Centre, Dr Uche Ozalor, who affirmed that majority of their voluntary non-remunerated blood collections came from students in higher institutions. Also, WHO report [16] indicates that young people contribute greater part of voluntary blood pool in developing countries, unlike in developed countries where age range of 40-54 contributes the largest pool [16].

CONCLUSION

Majority of the respondents have not donated blood before and of those that have donated, majority was paid family/ replacement donation. It was also observed that young people donate voluntarily more than older ones, who were found to engage more in replacement donation.

RECOMMENDATIONS

1. Government should intensify blood donation campaign to our universities, polytechnics and colleges of educations, since the greatest number of voluntary blood donors are found there.
2. The government should endeavour to better the lives of its citizenry, more especially the younger generation, who have been identified as the major source of voluntary blood pool, so that the use of

paid blood donation as a source of income among them can be overlooked.

REFERENCES

- [1] Song KH, Choi ES, Kim HY, Ahn KH, Kim HJ. Patient blood management to minimize transfusions during the postpartum period. *Obstet Gynecol Sci.* 2023 Nov;66(6):484-497. doi: 10.5468/ogs.22288. Epub 2023 Aug 8. PMID: 37551109; PMCID: PMC10663398.
- [2] Lowek, K.C., Ferguson, E. Benefit and risk perceptions in transfusion medicine: Blood and blood substitutes. *Journal of internal medicine.* 2003;253(5): 498-507.
- [3] Howard, P.R. and Hicks, W., 2024. Basic & Applied Concepts of Blood Banking and Transfusion Practices-E-Book: Basic & Applied Concepts of Blood Banking and Transfusion Practices-E-Book. Elsevier Health Sciences.
- [4] Van Denakker, T.A., Al-Riyami, A.Z., Feghali, R., Gammon, R., So-Osman, C., Crowe, E.P., Goel, R., Rai, H., Tobian, A.A. and Bloch, E.M., 2023. Managing blood supplies during natural disasters, humanitarian emergencies, and pandemics: lessons learned from COVID-19. *Expert review of heamatology*, 16(7), pp.501-514.
- [5] This fact sheet is based on data obtained through the WHO Global Database on Blood Safety from 108 countries for the year 2018. To give a more complete overview of the global situation, data for the year 2017 have been used for 40 countries and data for the year 2015 have been used for 23 countries, where current data are not available. Overall, responses received from 171 countries cover 97.5 % of the world's population. Available at: <https://www.who.int/news-room/fact-sheets/detail/blood-safety-and-availability>, accessed October 4, 2025.
- [6] Gadji, M. (2024) "Seroprevalence of transfusion-transmissible infections among family replacement donors and voluntary non-remunerated blood donors during the COVID-19 pandemic in sub Saharan Africa: family replacement donors and voluntary non-remunerated blood donors in transfusion transmissible infections", *Mediterranean Journal*

- of Hematology and Infectious Diseases, 16(1), p. e2024008. doi: 10.4084/MJHID.2024.008.
- [7] M'baya B, Jumbe V, Samuel V, M'bwana R, Mangani C. Seroprevalence and trends in transfusion transmissible infections among voluntary non-remunerated blood donors at the Malawi Blood Transfusion Service-a time trend study. *Malawi Med J.* 2019 Jun;31(2):118-125. doi: 10.4314/mmj.v31i2.3. PMID: 31452844; PMCID: PMC6698631.
- [8] Umeora OU, Onuh SO, Unora MC, Socio-cultural barriers to Voluntary blood Donation for Obstetric Use in rural Nigeria Village. *African Journal of Reproductive Health*, 2005. (3), 72 - 6.
- [9] Fisher RA. The logic of inductive interference (with discussion). *Journal of Royal Statistical Society*, 1935:98:98-82.
- [10] Directorate General for Communication, Health and consumer, European commission; public opinion on blood donation and blood transfusion 2010; 72.3:333b, pg. 7.
- [11] Statistical package for social science. IBM Corporation. Available at www.ibm.com/software/analysis/spss accessed july 22, 2029.
- [12] Hossain, M.S., Siam, M.H.B., Hasan, M.N., Jahan, R. and Siddiquee, M.H., 2022. Knowledge, attitude, and practice towards blood donation among residential students and teachers of religious institutions in Bangladesh—A cross-sectional study. *Heliyon*, 8(10).
- [13] Nwogoh, B., Aigberadion, U. and Nwannadi, A.I., 2013. 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(1), p.797830.
- [14] Patel EU, Bloch EM, Grabowski MK, Goel R, Lokhandwala PM, Bruner PAR, White JL, Shaz B, Ness PM, Tobian AAR. Sociodemographic and behavioral characteristics associated with blood donation in the United States: a population-based study. *Transfusion.* 2019 Sep;59(9):2899-2907. doi: 10.1111/trf.15415. Epub 2019 Jun 20. PMID: 31222779; PMCID: PMC6779040.
- [15] Aljohani, D.S., 2024. The Association of Blood Donation Frequency with Demographic Characteristics (Master's thesis, Alfaisal University (Saudi Arabia)).
- [16] Veldhuizen IJ, Doggan CJ, Atsma F, De Korlet WL. Donor profile; Demographic factors and their influences on donor career. *Vox Sang.* 2009; 9: 129-38.