

Original Research Article

Sociodemographic profile and characteristics of whole blood donors in a multispecialist health centre in North Central Nigeria

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ABSTRACT

Background: Blood donation is one of humanity's most noble contributions to medical services, providing invaluable and lifesaving benefits. Mobilising blood donors towards making blood and blood products readily available hinges on understanding the profile and characteristics of blood donors, the reason for this study.

Methods: The study was a cross-sectional study carried out between January 2024 and December 2024 involving 3,980 whole Blood donors recruited as walk-in donors in the Jos University Teaching Hospital blood bank or voluntary blood donors during the hospital's external donor drives. Donor recruitment forms were administered to potential blood donors, while the packed cell volume (PCV) was checked before donor blood collection was carried out.

Results: Three thousand, four hundred and fifty-nine (86.91%) males dominated the donor population, with the age group 26-35 accounting for 36.71%. There were more married individuals, 2,210 (55.53%), donating, while self-employed donors were the least. Donors who had previously donated were 2,668 (67.03%), while 1,312 (32.96%) were first-time donors. A history of high blood pressure was reported by 230 (5.78%). Breastfeeding mothers accounted for 0.90% of the donor population. Mean systolic and diastolic blood pressure were 121.73 ± 15.81 and 78.11 ± 9.77 mmHg, respectively, with a mean PCV of 42.98 ± 3.16 percent.

Conclusions: The donor population showed some level of awareness by the profile and characteristics recorded. However, further advocacy and public awareness targeted at women, professionals, and the elderly, among other groups, will go a long way in improving donor recruitment, donor retention and availability of safe blood.

Keywords: Blood donation, Blood donors, Clinical profile, Sociodemography, Whole blood

INTRODUCTION

Blood is a dynamic and important fluid serving as a transport medium with regulatory functions in all living tissues and organs. Blood is the carrier of life, made up of certain cells that are required for the transport of oxygen,

body defence against foreign body attack and regulators of the balance between clotting and bleeding.¹ The blood is also an important regulator of body heat, among several other transport functions, without which there would be no life. Blood cannot be produced in vitro but only sourced from the living for the living, and hence, it is a scarce commodity. The World Health Organization (WHO) set a

benchmark for minimum donation in a population at 1% of the population.² It has been estimated that for every 1000 people, the blood donation rate is 31.5 donations in high-income countries, 16.4 donations in upper-middle-income countries, 6.6 donations in lower-middle-income countries and 5.0 donations in low-income countries, including Nigeria. The global blood collection between 2008 and 2018 was estimated to be 118.5 million, with 40% of this collection coming from the high-income countries, home to 16% of the world's population.^{2,3} According to the WHO regions, several low- or middle-income countries that include thirty-four countries in the African Region, four in the Americas Region, four in the Eastern Mediterranean region, four in the European Region, five in the South-Eastern Asia Region, and nine in the Western Pacific Region reported collections fewer than 10 donations per 1000 people.^{2,3}

Global gender profile of blood donors indicated that young male donors dominate the blood donation rates, with women contributing just about 33% of blood donations at variable ranges.^{2,3} Reports from 15 reporting countries documented less than 10% donations by females. The donor age profile from low and middle-income countries reveals that young individuals in these countries donate more, compared to their counterparts in the high-income countries, often linked to young adults and students' high engagement in voluntary donation campaigns.^{2,3} As regards marital status, studies have shown that married individuals constitute a large percentage of blood donors compared to singles, ranging from 49.6% to 62.9% or more, while divorced and widowed individuals had less than 2%-3% combined.^{4,5}

The annual blood requirement in Nigeria is 1.8 million units. However, actual collection is approximately 500,000 to 1.2 million units.⁶ Studies in Nigeria and India have indicated that 80-90% of donors are male, with most donors being between 30-40 years old, while Students often account for the largest professional group, seconded by private sector employees.^{7,9}

Blood transfusion is known to save lives, reducing morbidity and mortality amongst patients with medical and surgical disorders, but many patients' requiring transfusion in a setting like ours do not have timely access to safe blood. The provision of adequate and safe blood ought to be an integral part of every health care centre, and hence this study aimed at identifying our most willing and readily available blood donation population for targeted advocacy and public awareness towards formulating and monitoring recruitment strategies for a better and more robust safe blood transfusion service.

METHODS

Study setting

This was a cross-sectional study conducted at the blood bank unit of the Department of Haematology and Blood

Transfusion, Jos University Teaching Hospital, Jos, Plateau State, Nigeria and at several external donor drive venues within Jos metropolis and its environs.

Study design

Prospective blood donors who presented at the hospital blood donation unit and venues of our external blood drives and had met the inclusion criteria for the study were recruited. This study was carried out from January 2024 to December 2024.

Data collection and study procedure

The blood donors were recruited using the non-probability convenience sampling technique. Potential blood donors are counselled and issued a consent form and blood donation recruitment forms to fill out and sign. Interpreters were available where necessary. Blood pressure, pulse rate, and weight were measured. Thereafter, a predonation blood sample in an ethylenediamine tetracetic acid (EDTA) sample bottle is collected for PCV measurement by centrifuging the anticoagulated blood in a sealed capillary tube at 10,000-15,000 revolutions per minute (rpm) for about 5 minutes in a Hawksley haematocrit centrifuge, where red blood cells settle at the bottom with plasma remaining at the top, proportion of red blood cells to the total blood volume is measured as a percentage. Demographic information about sex, age, marital status and occupation was extracted from the administered donor recruitment forms, while laboratory and clinical findings were documented appropriately.

Inclusion criteria

Consenting blood donors who presented to the blood donation centre within the study period and were between 18 and 65 years were recruited for this study. The study included voluntary, family replacement and other categories of donors who met all routine eligibility requirements for blood donation. Criteria for inclusion for this study include all donors with complete sociodemographic and donation records available for analysis.

Exclusion criteria

Potential blood donors were excluded if they were less than 18 years or older than 65 years, and if they declined consent, or if they got deferred due to ineligibility. Individuals who donated only blood components, or had previously been captured, or had incomplete demographic documentation, were also excluded.

Data analysis and presentation

Information from the donor forms that includes demographic information, clinical findings and laboratory investigation done was recorded on a Microsoft excel sheet and analysed using Epi Info Version 7.2.5.0 software. For

the descriptive statistics, frequencies and percentages were used to describe the categorical variables, while mean and standard deviation were used to describe the continuous variables.

Ethical approval

Ethical approval was obtained from the health research ethics committee of the Jos University Teaching Hospital, while informed consent was obtained from all participating blood donors.

RESULTS

The total number of blood donors during the study period was 3,980, with males accounting for 3,459 (86.91%), while the female donors made up 521 (13.09%). Most of the donors were within the age range of 26-35, 1,461 (36.71%). Donors older than 56 to 65 years contributed only an abysmally low number of 87 (2.19%) of all the donors. Of the 3,980 prospective donors during the study period, 2,210 (55.53%) were married (Table 1). Single donors were 1,758 (44.17%), while divorcees and widows were the least, with 6 (0.15%) each. More businessmen and traders were donating, followed by students and civil/public servants, accounting for 959 (24.09%), 796 (20.00%), and 771 (19.37%), respectively (Table 1).

The 3993 (98.57) of the donors alluded to being in good health, while 2,668 (67.04%) had a previous history of blood donation compared to 1,312 (32.96%) who had no prior history of donating. Previous transfusion history was elicited in 112 (2.81%) of the blood donors involved in this study. History of sex with unknown individuals, tattoo, needle stick injury and self-injection were found in 201 (5.05%), 100 (2.51%), 124 (3.12%) and 39 (0.98%) of blood donors, respectively. There were 2,858 (71.81%) of the donors who had a meal or snacks before presenting themselves for this noble task of blood donation, where 349 (8.77%), 89 (2.24%), and 72 (1.81%) agreed to have been on NSAIDs and other routine medications or had received a vaccine. Those with a history of high BP, DM and other chronic diseases accounted for 11.42% of donor pool. Menstruating women, breastfeeding and pregnant women were 48 (1.21%), 10 (0.25%) and 4 (0.10%) respectively, while a donor population of 3,520-3,522 were not involved either because they are males or because they are amongst non-reproductive females (Table 2).

Mean systolic and diastolic blood pressure were 121.73±15.81 and 78.11±9.77 millimeters of mercury (mmHg), respectively, while the donor's mean pulse rate was 74±9.25 beats per minute (bpm). Mean body weight in kilograms (Kg) was 71.05±10.60, while the donor pools' mean PCV was 42.98±3.16 percent (Table 3).

Table 1: Socio-demographic characteristics of blood donors.

Variables	Category	N	Percentage (%)
Sex	Male	3459	86.91
	Female	521	13.09
Age group (in years)	18-25	797	20.02
	26-35	1461	36.71
	36-45	1257	31.58
	46-55	378	9.50
	56-65	87	2.19
Marital status	Married	2210	55.53
	Single	1758	44.17
	Divorce	6	0.15
	Widow	6	0.15
Occupation	Civil/public servants	771	19.37
	Professionals	328	8.25
	Students	796	20.00
	Artisans	339	8.52
	Business/trader	959	24.09
	Farming	277	6.96
	Self employed	123	3.09
	Applicant	387	9.72

Table 2: Clinical history profile.

Variables	Yes, N (%)	No, N (%)	Not applicable, N (%)
Good health	3,923 (98.57)	57 (1.43)	
Previous donation	2,668 (67.03)	1,312 (32.96)	
Rejection as donor	168 (4.22)	3,812 (95.78)	
Previous deferral	36 (0.90)	3,944 (99.10)	
Previous transfusion	112 (2.81)	3,868 (97.19)	

Continued.

Variables	Yes, N (%)	No, N (%)	Not applicable, N (%)
Unknown Sex partner	201 (5.05)	3,779 (94.95)	
Tattooed	100 (2.51)	3,880 (97.49)	
Needle stick injury	124 (3.12)	3,856 (96.88)	
Self-injection	39 (0.98)	3,941 (99.02)	
Meal or snacks	2,858 (71.81)	1,122 (28.19)	
NSAID use	349 (8.77)	3,631 (91.23)	
Routine medication	89 (2.24)	3,891 (97.76)	
Vaccination	72 (1.81)	3,908 (98.19)	
High blood pressure	230 (5.78)	3,750 (94.22)	
Diabetes mellitus	36 (0.90)	3,944 (99.10)	
Jaundice/CLD	77 (1.93)	3,903 (98.07)	
Asthma/allergy	74 (1.86)	3,906 (98.14)	
Other chronic diseases	38 (0.95)	3,942 (99.05)	
Menstruating	48 (1.21)	412 (10.35)	3520 (88.44)
Breast feeding	10 (0.25)	448 (11.26)	3,522 (88.49)
Pregnancy	4 (0.10)	456 (11.46)	3,520 (88.44)

*n-Frequency, %-Percentage, NSAID-Non-steroidal anti-inflammatory drug, CLD-Chronic liver disease

Table 3: Clinical and laboratory indices.

Variables	Mean	SD
Clinical	Systolic blood pressure (*mmHg)	121.73
	Diastolic blood pressure (*mmHg)	78.11
	Pulse rate (beats per minute)	74.07
	Weight (Kilogram-Kg)	71.05
Laboratory	PCV (%)	42.98
		3.16

*mmHg-millimetres of mercury

DISCUSSION

Blood donation is a major component of medical services globally, necessitating a WHO global target of 1% donation per population.¹⁰ It is a special form of altruism that transcends race, religion and ethnic origin. Rates of blood donation vary by country, with the highest donation rates in high-income countries compared to low-income countries.¹⁰ A WHO report states that developing countries collect only 39% of the world's blood supply despite being home to 82% of the global population. African countries collect only 5.2 units per 1,000, falling below the WHO-recommended levels.¹¹ In a bid to meet the WHO target for standard blood transfusion practices, the Nigerian policy provisions were established through the National Health Act (NHA) in 2014.¹² Despite the national legal framework, the provision of safe and adequate blood units has eluded Nigeria and several African nations, with adverse effects on our health indices. While Nigeria is far behind in meeting the set standard for safe blood supply, concerted efforts are still on course to enable us to meet the target. Understanding donors' characteristics and demography is one important step towards gaining an accurate donor structure, which in turn will serve as a guide for developing strategies for reliable donor recruitment and retention. In this study, males dominated the donor pool, which agrees with other studies where males were adjudged to have higher donor rates.^{13,14} This indicates a gender discrepancy that could be attributed to

fear of needles, fear of blood and fear of developing anaemia, coupled with the feminine monthly menstrual flows and other taxing responsibilities related to pregnancy, childbirth, and breastfeeding.¹⁵ Some studies indicated females are the highest donors, linked to the fact that men donate more frequently compared to their female counterparts and possibly due to their compassionate disposition when compared to the male counterparts.^{15,16} The age group with the highest donation rate in this study was the younger age group, 26-35 years, also aligning with several other studies that demonstrated that blood donations are at a higher rate among younger age groups, attributed to their agility and literacy levels.¹⁷⁻¹⁹ On the contrary, a German study reported some situations where older age groups donated much more than the younger donors.²⁰ There were more married individuals donating blood compared to single donors. This finding is similar to what was reported in a study in another North Central city of Nigeria and also in faraway Jeddah, Saudi Arabia.^{21,22} However, several other studies have reported a contrary finding.^{23,24} While some of these study populations were among students who are mostly single, others were among special population groups, in contrast to the population pool in this study, which cuts across different groups that walk in to donate and external blood donation drives mostly in places of worship and schools with mixed populations. It has also been attributed to better social network connections found amongst married individuals, serving as a motivation to donate and do well to others.²⁵

Paradoxically, in this study, more businessmen and women who should be engrossed in their businesses were willing to donate compared to other professions, followed by students who were mostly recruited during donor drives in tertiary institutions. In a previous study in Jos, Orkuma et al, reported self-employed individuals or those in one form of business or trading as the highest blood donors, similar to the finding in this study, but in contrast to an Indian report where students were the highest donors.^{26,27} This could be attributed to varying degrees of altruism and also the predominant donor population recruited in any particular study.

Looking at the clinical histories related to blood donation documented in this study, one can infer the level of awareness and education regarding blood donation from the positive responses received. Almost all individuals who presented themselves to donate blood, either as family replacements or as voluntary donors, confirmed they were in good health, except for a few. This might be a result of their prior knowledge that only healthy individuals can donate blood.²⁸ The majority of the donors considered in this study had donated blood at one time or another, with first-time donors only accounting for about half of the donor pool in this study. A similar finding was reported in Kano and Calabar, two major historic cities from the North-West and Southern Nigeria, respectively, where the majority of the donors in these studies had a prior history of blood donation.^{29,30} This report may not be unconnected to the observation that repeat donors are more altruistic, without fear of donating blood despite a higher risk of donation-induced iron deficiency (DIID), probably due to their experience. It is also believed that blood safety is more guaranteed among repeat donors, whereas first-time donors are said to have higher rates of adverse reactions than repeat donors.³¹ Guidelines for blood donor deferral are meant to protect the donors and the recipients by screening for health risks and transfusion-transmissible infections. Reasons for deferral can be either temporary, like travel, some infections or permanent, like in cases of chronic diseases and some high-risk behaviour. Low haemoglobin concentration, recent vaccinations, tattoos/piercings, or travel to endemic areas are other common reasons for temporary deferrals lasting 3-12 months.³² Very few of the blood donors in this study had a history of donor deferral, mostly temporarily, having represented themselves to donate, owing to the general awareness they have displayed, as evidenced by the frequencies recorded on some of the blood donation criteria. This differs from a study in Lagos, Nigeria and in a tertiary care teaching institute in Northeastern Malaysia, where deferral rates were respectively 24.2% and 18.84% compared to 0.9% in this study.^{33,34} A larger study population and the fact that reasons for permanent deferral were also considered in those studies might be responsible for the difference. Blood donor history regarding several other factors, ranging from lifestyle, infections and medical procedures, was explored to identify suitable and qualified donors.³⁵ Respondents on the history of previous blood transfusion in this study were a little lower owing to

sample size variation when compared with a report from Ilorin, another city in the North-Central part of Nigeria.³⁶ A few of the female donors were pregnant or breastfeeding at presentation as potential donors, and this accorded an opportunity for further education as to the ideal period these women can be allowed to donate, as many months as the duration of the pregnancy and at least 9 months after childbirth and 3 months after a child is weaned from breast feeding. Following the medical history findings, a simple check for vital signs like blood pressure, pulse rate, weight and PCV was done, and it generally indicated values that were within acceptable ranges. Guidelines for blood donation indicate that systolic blood pressure between 90-180 mmHg and diastolic blood pressure between 50-100 mmHg are acceptable limits for blood donation, while a pulse rate of 50-100 bpm is the minimum, except for self-reported athletes, where a pulse rate of less than 50bpm may be accepted.³⁷ This implies that the donor population in this study had blood pressures and pulse rates well within the acceptable range, as demonstrated by the mean systolic, mean diastolic blood pressure and the mean pulse rate. While a study by Housekeeper et al implies that many blood donors are hypertensive, documented findings on mean systolic and diastolic blood pressures in certain age groups correspond to this finding.³⁸ The minimum body weight expected in a blood donor should be at least 50 kg, with some countries allowing a minimum of 45 kg for a volume of 350 millilitres $\pm$ 10%.^{39,40} The mean weight of the donors considered in this study was within an acceptable limit. PCV or haematocrit, which is a measure of the proportion of red blood cells in a donor's blood, varies from Country to Country and among males and females, with a minimum acceptable level of 38-40%.⁴⁰ Mean PCV determination, done before donor blood collection in this study, can be compared with a study conducted in Benin by Benedict et al and it falls within acceptable minimum range for this environment.⁴¹ This target aims to ensure the potential donor is not anemic and can comfortably spare a unit of blood.

Limitations

Factors that would have assessed the degree of knowledge of these blood donors on blood donation practice were not explored, nor were other identifiable social groups, to enlarge the horizon of targeted donors. Further studies will be targeted at more groups in the society.

CONCLUSION

Blood donation is a priceless, noble and sacrificial service to humanity. It brings an unfathomable sense of satisfaction to have saved a life or lives. Its scarcity globally and worst in resource-limited regions like ours calls for concerted effort to be able to secure such a commodity for the use of mankind to reduce morbidity and mortality amongst the people. Understanding and knowing the characteristics of the likely group with the highest yield from an intuitive sense is essential in an attempt to close the gap between the demand for blood and its availability.

The donor population in this study demonstrated a high sense of awareness of requirements for blood donation by their disposition and their obvious clinical findings. The young people, males, the married, business men/women, students and civil/public servants have been identified as that population with the capability to bridge the gap and hence call for more advocacy to these groups and indeed all other groups that seemingly are not amongst the high performers.

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