Original Article

Pattern and Prevalence of Donor Deferral at Federal Medical Centre Nguru: A 5-Year Retrospective Review

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Article History
Submitted: 07/03/2026, Accepted: 11/03/2026, Published: 19/03/2026

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ABSTRACT

Blood donation entails the collection, screening, processing, and storage of blood for transfusion, essential for obstetric emergencies, childhood anaemia, trauma, chronic haematologic disorders, and major surgeries. The global blood supply remains insufficient, particularly in sub-Saharan Africa. In Northeastern Nigeria, high anaemia prevalence and transfusion-transmissible infections (TTIs) worsen shortages, while donor deferrals further shrink the eligible pool. This study evaluated the pattern and prevalence of donor deferral at Federal Medical Centre (FMC) Nguru over five years. A retrospective cross-sectional review of donor records from January 2019 to December 2023 was conducted. All prospective donors with complete records were included through total enumeration. Data extracted from donor registers and deferral forms were analysed using IBM SPSS Statistics to summarize donor demographics and patterns of deferral. Ethical approval was obtained. Of the 6,790 screened donors, 998 (14.70%) were deferred; however, 101 lacked documented age (recorded only as "adult"), and thus 897 (13.21%) deferred donors were included in the final analysis. Deferred donors were predominantly young males, with a mean age of 29.4 ± 7.7 years and a male-to-female ratio of 298:1, and the majority were family-replacement donors (95%). Permanent deferrals (85.6%) were chiefly due to HBV (51.4%), followed by HCV (18.7%), VDRL (11.3%), and HIV (4.2%). Temporary deferrals (14.4%) were mostly due to low PCV (9.6%). Age and occupation were significantly associated with deferral (p = 0.0001). Preventable deferrals underscore the importance of voluntary donor recruitment, nutritional support, hepatitis B vaccination, and targeted education to enhance donor retention and blood safety.

Keywords: Blood Safety, Donor Deferral, Pattern, Permanent,Temporary

INTRODUCTION

Blood donation is a voluntary act in which a healthy person donates blood that is subsequently collected, screened, processed into components such as red cells, plasma, and platelets, stored, and later used for medical transfusions when needed. [1,2] It involves pre-donation screening (to ensure donor safety and assess suitability), blood collection, testing for infectious agents, and storage under proper conditions.[3] Blood donation is essential for healthcare, providing life-saving transfusions in emergencies, maternal and child care, management of chronic haematologic disorders, and complex surgeries.[1,4] A safe and adequate blood supply underpins universal health coverage and strengthens health system resilience.

A regional report found an average donor deferral rate of about 8.8% across 28 African countries, with common causes including low haemoglobin, underweight, pregnancy/lactation, hypertension, and current medications affecting eligibility.5 Studies conducted in India and Cameroon reported donor deferral prevalence rates of 14.64% and 13.6%, respectively, while Nigerian studies documented rates ranging from 17% to 18%.[6,8]

Retrospective and facility-based studies from Northeastern Nigeria, including ATBUTH, Bauchi and FMC Nguru, show that anaemia and transfusion-transmissible infections, such as hepatitis B, are the leading causes of donor deferral.–9,10 Recent multi-centre studies (2023–2024) show that low haemoglobin is the leading cause of temporary donor deferral, often associated with modifiable factors such as poor nutrition, recent illness, or travel history, whereas permanent deferrals were mainly due to lifelong risk conditions including HIV and hepatitis B or C.[3,11]

Article Access

Website: www.wjmbs.org
doi: 10.5281/zenodo.19219472

How to cite this article
Idi HT, Babadoko AA, Ali BZ, Atiku GM, Garba NA. *Pattern and Prevalence of Donor Deferral at Federal Medical Centre Nguru: A 5-Year Retrospective Review, West J Med & Biomed Sci. 2026;7(1):142-147. DOI:10.5281/zenodo.19219472.*

High deferral rates reduce the pool of eligible donors, may discourage first-time donors, and vary regionally from 8.7% in South-East Nigeria to 24.2% in Lagos, highlighting the need for improved documentation, follow-up, and local multi-year audits.[12,13]

Given the high prevalence of anaemia and other health risk factors in Northeastern Nigeria, alongside substantial blood supply shortfalls and incompletely characterised donor deferral rates, a detailed retrospective 5-year study of deferral patterns at FMC Nguru is both relevant and necessary.[9,14,15] Such a study would address regional knowledge gaps, guide strategies to reduce avoidable deferrals, enhance donor recruitment and retention, and ultimately strengthen transfusion safety and blood availability in the region. The study determined the pattern and prevalence of donor deferral at FMC Nguru over a five (5) year period.

MATERIALS AND METHODS

Study Design

The study was a retrospective cross-sectional study.

Study Area

Federal Medical Centre (FMC) Nguru is a tertiary health facility located in Nguru town, Yobe State, in northeastern Nigeria. The centre provides a range of clinical and diagnostic services to the surrounding local government areas and acts as a referral hospital for the Northeastern region.

FMC Nguru operates a blood transfusion service (blood bank) that supplies blood for clinical needs within the hospital and for emergency referrals. The centre has also participated in multicentre evaluations of blood donation practices and blood component utilization in Nigerian tertiary hospitals, demonstrating its active role in national transfusion medicine research and surveillance initiatives.[16]

Study Population

All prospective blood donors who presented for screening at FMC Nguru between January 2019 and December 2023.

Inclusion and Exclusion Criteria

Inclusion: all blood donors with complete demographic and screening data.

Exclusion: Donor records with incomplete information on eligibility assessment or deferral reason.

Records of autologous donations or therapeutic phlebotomy, where applicable.

Sample Size Determination

All eligible records within the 5-year period (census method).

Sampling Technique

Total enumeration of all blood donor records available.

Data Collection Tools and Donor Screening Procedure

Prospective donors were screened using standard pre-donation procedures in accordance with national blood transfusion guidelines. The screening process included:

1. Donor registration and collection of demographic information, including age, sex, occupation, and donor type.
2. Medical history assessment, including previous illnesses, medication use, recent infections, pregnancy or lactation status, and high-risk behaviours.
3. Physical examination, including measurement of:
   - o Blood pressure
   - o Body weight
   - o Body temperature
   - o Pulse rate
4. Haemoglobin estimation, performed using the facility's routine screening method (haematocrit centrifuge).
5. Laboratory screening for transfusion-transmissible infections, including:
   - o HIV
   - o Hepatitis B surface antigen (HBsAg)
   - o Hepatitis C virus (HCV)
   - o Syphilis

Donors who failed to meet the eligibility criteria were deferred from donation.

Definition and Classification of Donor Deferral

Donor deferral was defined as the exclusion of a prospective donor from blood donation following pre-donation screening due to failure to meet eligibility criteria.

Deferrals were classified as:

Temporary deferral:

Donors excluded for a defined period due to reversible conditions, such as:

- Low haemoglobin
- Recent illness or infection
- Recent medication use
- Pregnancy or lactation
- Recent travel to endemic areas

Permanent deferral:

Donors excluded indefinitely due to conditions posing long-term transfusion risk, including:

- Positive screening tests for HIV, hepatitis B, or hepatitis C and VDRL
- Chronic medical conditions that contraindicate safe blood donation.

Data Collection

Data were extracted from blood donor registers and deferral records maintained in the blood bank. Information collected included:

- Age
- Sex
- Type of donor (voluntary, replacement, commercial)
- Eligibility status (accepted or deferred)
- Reason for deferral
- Type of deferral (temporary or permanent)

A standardized data extraction sheet was used to ensure consistency.

Data Management and Analysis

Data entry into SPSS version 22.0 (Chicago IL USA) Qualitative variables were summarized using frequencies, percentages, means and proportions.

Prevalence of donor deferral was calculated as:

$$\text{Deferral prevalence} = \frac{\text{Number of deferred donors}}{\text{Total number of prospective donors}} \times 100$$

Cross-tabulations of gender vs deferral, age group vs deferral, blood donor type vs deferral reason and occupation vs deferral. Inferential analysis was performed using the Chi-square test, with statistical significance set at $p < 0.05$.

Ethical Considerations/confidentiality

Ethical approval for this study was granted by the FMC Nguru Health Research Ethics Committee (HREC) on 19th January 2026, reference number 24/11/2025-15/10/2026. Since the study involved a retrospective review of existing records, individual informed consent was waived. No personal identifiers were recorded, and confidentiality was maintained.

RESULTS

Over the five-year period from 2019 to 2023, a total of 6,790 blood donors were screened at the blood bank of Federal Medical Centre Nguru. Of the total donors, 5,792 (85.3%) successfully donated, while 998 (14.7%) were deferred. However, complete records were available for only 897 donors (13.21%), as the remaining 101 had undocumented age, recorded simply as 'adult'. The mean age of deferred blood donors was 29.4 ± 7.7 years, with a predominance of males (894) compared to 3 females, resulting in a male-to-female ratio of 298:1. Family replacement donors accounted for the majority, 897 (94.9%), and the least were voluntary blood donors (1.0%), as illustrated in Figure 1.

The occupational distribution of deferred donors is shown in Figure 2, where students accounted for the highest proportion, 214 (23.9%), while farmers represented the lowest, 74 (8.4%). The overall prevalence of blood donor deferral was 13.4%.

Table 1 shows the reasons for donor deferral, with high blood pressure accounting for the lowest proportion, 8 (0.9%), while hepatitis B virus infection was the most common cause of deferral, 461 (51.4%).

Table 2 displays the associations between donor characteristics and the causes of temporary deferral, and age and occupation were significantly associated with temporary deferral (p = 0.0001).

Table 3 highlights the associations between donor characteristics and the causes of permanent deferral, with the strongest associations observed for age group and occupation (p = 0.0001)

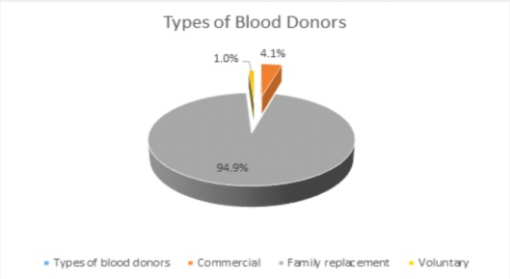

Figure 1: Blood donor type of deferred blood donors

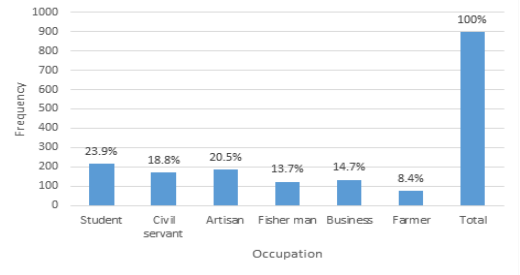

Figure 2: Occupation of deferred blood donors

Table 1: Reason for blood donor deferral

Type of deferral	Reason for deferral	Number n (%)
Temporary	Low PCV	86 (9.6)
	Underweight	35 (3.9)
	High blood pressure	8 (0.9)
Permanent	Hepatitis B Virus	461 (51.4)
	Hepatitis C virus	168 (18.7)
	HIV	38 (4.2)
	VDRL	101 (11.3)
	Total	897 (100)

Table 2: Association Between Donor Characteristics and Reasons for Temporary Deferral

Characteristics	Category	Low PCV n(%)	Underweight n(%)	High BP n(%)	Total n(%)	P-value
Gender	Male	84 (9.4)	35(3.9)	7(0.8)	126 (14.1)	0.05
	Female	3 (0.3)			3 (0.3)	
	Total	**87 (9.7)**	**35 (3.9)**	**7 (0.8)**	**129 (14.4)**	
Age group	<20	0	7 (0.8)	0	7 (0.8)	
	20-29	36 (4.0)	27 (3.0)	0	63 (7.0)	
	30-39	31 (3.5)	1 (0.1)	1 (0.1)	33 (3.7)	0.0001
	40-49	14 (1.5)	0	1 (0.1)	15 (1.6)	
	...	6 (0.7)	0	5 (0.6)	11 (1.3)	
	Total	**87 (9.7)**	**35 (3.9)**	**7 (0.8)**	**129 (14.4)**	
Donor type	Commercial	4 (0.5)	1 (0.1)		5 (0.6)	
	Family replacement	82 (9.1)	34 (3.8)	7 (0.8)	123 (13.7)	0.996
	Voluntary	1 (0.1)			1 (0.1)	
	Total	**87 (9.7)**	**35 (3.9)**	**7 (0.8)**	**129 (14.4)**	
Occupation	Student	17 (1.9)	26 (2.9)		43 (4.8)	
	Artisan	23 (2.6)	6 (0.7)		29 (3.3)	
	Fisherman	12 (1.3)	1 (0.1)		13 (1.4)	
	Business	12 (1.3)		1 (0.2)	13 (1.5)	0.0001
	Farmer	7(0.8)	1 (0.1)	3 (0.3)	11 (1.2)	
	Civil servant	16 (1.8)	1 (0.1)	3 (0.3)	20 (2.2)	
	Total	**87 (9.7)**	**35 (3.9)**	**7 (0.8)**	**129 (14.4)**	

Table 3: Association Between Donor Characteristics and Reasons for permanaent Deferral

Characteristics	Category	VDRL n(%)	HBV n(%)	HCV n(%)	HIV n(%)	Total	P-value
Gender	Male	101 (11.3)	461 (51.4)	168 (18.7)	38 (4.2)	768 (85.6)	0.05
	Female						
	Total	**101 (11.3)**	**461 (51.4)**	**168 (18.7)**	**38 (4.2)**	**768 (85.6)**	
Age group	<20	1 (0.1)	3 (0.3)	2 (0.2)	0	6 (0.6)	
	20-29	35 (4.0)	259 (29.0)	90 (10.0)	21 (2.3)	405 (45.3)	
	30-39	53 (5.9)	152 (16.9)	55 (6.1)	9 (1.0)	269 (29.9)	
	40-49	9(1.0)	45 (5.0)	19 (2.2)	8 (0.9)	81 (9.1)	0.0001
	≥50	3 (0.3)	2 (0.2)	2 (0.2)	0	7 (0.7)	
	Total	**101 (11.3)**	**461 (51.4)**	**168 (18.7)**	**38 (4.2)**	**768 (85.6)**	
Donor type	Commercial	5 (0.6)	20 (2.2)	6 (0.7)	1 (0.1)	32 (3.6)	
	Family replacement	95 (10.6)	435 (48.5)	161 (17.9)	37(4.1)	728 (81.1)	0.996
	Voluntary	1 (0.1)	6 (0.7)	1 (0.1)	0	8 (0.9)	
	Total	**101 (11.3)**	**461 (51.4)**	**168 (18.7)**	**38 (4.2)**	**768 (85.6)**	
Occupation	Student	15 (1.7)	111(12.4)	35 (4.0)	10 (1.1)	171 (19.2)	
	Artisan	17 (1.9)	102 (11.4)	31 (3.5)	5 (0.6)	155 (17.4)	
	Fisherman	18 (2.0)	66 (7.4)	22 (2.4)	4 (0.4)	110 (12.2)	
	Business	19 (2.1)	68 (7.5)	25 (2.7)	7 (0.8)	119 (13.1)	0.0001
	Farmer	8 (0.9)	37 (4.1)	18 (2.0)	1 (0.1)	64 (7.1)	
	Civil servant	24 (2.7)	77 (8.6)	37 (4.1)	11 (1.2)	149 (16.6)	
	Total	**101 (11.3)**	**461 (51.5)**	**168 (18.7)**	**38 (4.2)**	**768 (85.6)**	

DISCUSSION

The mean age of deferred donors indicates that most deferrals occurred among young adults, consistent with reports that donor deferrals frequently cluster within late-teen to early-thirties age groups.[17] The high representation of students among deferred donors may reflect their participation as family-replacement donors responding to relatives' transfusion needs, but failing screening due to factors such as low body weight or haemoglobin, suggesting that willingness to donate does not always translate into physiological eligibility. This observation aligns with findings from Northwestern Nigeria, where students constituted a large proportion of donors.[18]

The marked male predominance among deferred donors reflects the male-dominated donor pool commonly reported in many low- and middle-income settings.[19,20] Nevertheless, certain Nigerian studies, including a large analysis from Lagos, reported higher deferral rates among female donors, primarily attributed to low haemoglobin levels8 The predominance of family-replacement donors observed in this study mirrors patterns widely reported across sub-Saharan Africa, highlighting continued dependence on replacement donation systems rather than voluntary non-remunerated donation.[19,21] Similar patterns have been documented in Jos, reinforcing concerns that

reliance on family-replacement donors reflects donation driven by immediate patient needs and may pose challenges for blood safety and sustainability.[22]

Low packed cell volume (PCV) was the leading cause of temporary deferral, followed by underweight and elevated blood pressure. This observation aligns with recent studies that have identified low haemoglobin as the leading cause of temporary donor deferral.[23]

Significant associations between temporary deferral and gender, age, and occupation suggest that physiological and socioeconomic factors influence donor eligibility. Younger adults, particularly those aged 20–29 years, accounted for the highest proportion of temporary deferrals, often due to modifiable factors such as anaemia and low body mass, parallel with reports from Kenya and other sub-Saharan African settings.[11,24]

The relatively high proportion of low PCV and underweight deferrals among students further suggests that nutritional and lifestyle factors may contribute to reduced eligibility within this demographic.[11,25] In contrast, donor type was not significantly associated with temporary deferral, indicating that these health-related exclusion criteria occur across donor categories.[23]

Permanent deferrals were predominantly due to transfusion-transmissible infections, particularly hepatitis B virus (HBV), consistent with findings from other Northern Nigerian centres.[26] Age showed a strong association with TTI-related deferral, reflecting broader evidence that younger and middle-aged adults often exhibit a higher prevalence of infections such as HBV and syphilis.[19,26,27] Although gender was associated with total permanent deferrals, with all TTI-positive donors being male, similar gender disparities in infection prevalence have been reported in Nigerian donor populations and are often linked to behavioural risk factors.[26] Donor type was not significantly associated with permanent deferral, suggesting that TTI prevalence in this cohort did not differ substantially among commercial, replacement, and voluntary donors, a pattern also reported in other Nigerian studies.[19,28]

Occupation also demonstrated significant associations with TTI-related deferral, supporting evidence that socioeconomic and occupational groups have differing exposure risks and levels of health awareness.[19,27,29] Some studies have reported higher infection markers among students and young working adults, similar to the occupational distribution observed in this cohort.[30]

The relatively lower frequency of HIV among permanent deferrals aligns with broader regional trends showing declining or stable HIV prevalence among blood donors, likely reflecting the impact of public health interventions and expanded testing programmes.[27,30]

LIMITATIONS

The findings from the present study should be accepted in the midst of the following limitations:

1. Retrospective nature: Limits ability to establish causal relationships; relies on completeness and accuracy of existing records, which may have missing or incomplete data.
2. Missing or inconsistent records: Incomplete demographic or laboratory data could bias prevalence estimates or associations.
3. Single-centre scope: Findings from one hospital in Nguru may not be representative of other regions or national patterns in Nigeria or sub-Saharan Africa.
4. Behavioural/clinical data: The register may not have captured detailed information on risk behaviours (e.g., sexual activity, alcohol consumption, prior medical history) that could affect the risk of TTIs and donor deferral.
5. Underweight/PCV cutoffs: Use of general cutoffs without local population calibration may misclassify some donors with borderline physiological status.
6. No temporal trend analysis beyond prevalence: The study may not account for changes in screening policies or local disease epidemiology over the 5-year period.
7. Confounding Factors: Unmeasured confounders: educational associations could be influenced by unmeasured socioeconomic or lifestyle factors.
8. Selection bias: The donor pool may be skewed toward family-replacement donors, limiting insights into voluntary donor dynamics.
9. No longitudinal follow-up: Deferred donors' subsequent eligibility, health outcomes, or recurrence of deferral reasons were not tracked.

CONCLUSION

This 5-year retrospective review at the Federal Medical Centre Nguru findings indicate that donor deferral patterns are shaped by demographic and socioeconomic factors, with temporary deferrals largely driven by modifiable physiological conditions and permanent deferrals predominantly associated with HBV infection. These patterns highlight the need for targeted interventions, including nutritional education for young donors, strengthened hepatitis B vaccination and screening strategies, and improved donor recruitment approaches to enhance both blood safety and donor retention.

RECOMMENDATIONS

1. Promote Voluntary Donation and Donor Retention: Strengthen voluntary non-remunerated donor recruitment and implement follow-up systems for temporarily deferred donors to enhance retention and blood safety.
2. Address Modifiable Deferral Causes: Implement nutritional support and targeted education, particularly for young and student donors, to reduce temporary deferrals related to low haemoglobin and underweight.
3. Enhance Screening, Vaccination, and Documentation: Scale up hepatitis B vaccination, ensure rigorous pre-donation screening, and maintain complete donor records to minimize TTI-related permanent deferrals.
4. Periodic Deferral Audits and Policy Integration: Conduct regular multi-year audits of donor deferrals

to guide recruitment strategies and inform regional transfusion policies for a safer and sufficient blood supply.

Acknowledgements

We appreciated all the healthcare workers of blood bank, Federal Medical Centre, Nguru who assisted us one way or the other during data entry.

Financial support and sponsorship

Nil

Conflict of interest

There are no conflicts of interest

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