

The pattern of blood donation and transfusion transmissible infections in the National Blood Transfusion Service in north central Nigeria

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Abstract

Background: Blood for transfusion in Nigeria is largely collected from family members or commercial blood donors who would rather conceal information that could disqualify them from blood donation. The blood service is expected to transform blood sources to voluntary, guided by altruism and self-risk assessment and deferral. We determined the of pattern of blood donors in North Central Nigeria and the crude prevalence of transfusion transmissible infections among blood donor types.

Methods: This retrospective study was carried out at the North Central Zonal Centre of the National Blood Transfusion Service in Jos. Records of blood donors from January 2009 to December 2013 were studied for type of donation and the pathogenic blood borne viruses.

Results: The age distribution of blood donors showed increasing successful recruitment of young people into the donor pool with 36.2% blood collection from those aged 18-25

and 34.8% from 26-35 years. 21,330 (70.5%) were males. 49.0%, 33.5%, 3.5%, (14.0%) and \leq 1% blood donors were first-time voluntary, regular voluntary, lapsed voluntary, family replacement and autologous blood donors respectively. 5612 (18.5%) donors, were reactive to transfusion transmissible infections with a lower prevalence of 9.1% among regular blood donors.

Conclusion: We conclude that the National Blood Transfusion Service has developed a growing voluntary blood donor base, mainly young adults in our region. Increasing the retention rate of our donors could reduce transfusion transmissible infections.

Keywords: National Blood Transfusion Service, Blood Donors, Transfusion Transmissible Infections

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Introduction

The task of blood sourcing has been the responsibility of relatives of patients requiring transfusion in Nigeria and many other countries particularly within the African continent. Therefore blood for transfusion in Nigeria is largely collected from family members or commercial blood donors who would rather conceal information that could disqualify them from blood donation. A study on blood donation and patterns of use in south east Nigeria showed 98 percent replacement donation as their main source of blood with only 5% from the female donors.¹ A similar pattern was reported by Alao et al² in North Central Nigeria, where 98% of blood donations were replacement. Nwogoh and colleagues³ while analyzing the standard of donated blood in Benin city of Nigeria, found that 74.4% of their samples were from paid

donors. Ahmed and co-workers⁴ studying blood donor types in Maiduguri, Nigeria, between 1994 and 2004, reported a decline in voluntary and replacement blood donors from 31% to 5% and 49% to 23% respectively and increased in commercial donors from 20% to 63%.

The ages of persons donating whole blood at the American Red cross in the United States, show a substantial contribution from those 16 to 19 years.^{5,6} A study in Atlanta Georgia, however showed that donors aged forty to 49 years donated the highest percentage of blood units (26.8%).⁷

The attendant risks of collecting blood contaminated by agents transmissible through blood and blood component transfusion has been a major setback in transfusion practice particularly where blood donors are scarce, in addition to substandard health care and poor testing facilities. Pathak et al⁸ reported 0.2% to 7.06% sero-prevalence of markers of transfusion transmissible pathogens among blood donors in a tertiary care hospital in New Delhi India. Romano and co-workers⁹ studying hepatitis B virus infection among Italian donors with 12% voluntary donation found 0.32% positivity to HBsAg and HBe antibody. At the provincial hospital of Tete, Mozambique, where 50.5% of blood donors were voluntary, Stokx and others¹⁰

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reported an 18.7% crude TTIs prevalence with the crude TTIs prevalence being lower (15.2%) among voluntary than observed among the replacement donors (22.4%). A study in Ethiopia conducted in 2010 among 6361 blood donors, showed that 9.5% had serological evidence of infection.¹¹ The National Blood Transfusion Service (NBTS) was set up to centralize blood transfusion services by sourcing for blood from low-risk groups of the healthy population at the least risk of transmitting transfusion transmissible infections through donating their blood. Advocating for voluntary blood donation is often unpopular and recruitment of persons into the blood donor pool is made difficult by cultural beliefs and practices, mistrust and lack of accurate information. The North Central Zonal Centre of the National Blood Transfusion Service has embarked on blood donation awareness, donor education, blood donation drives and constant communication with donors. We undertook this study to determine the impact of the National Blood Service on the pattern of blood donors in North Central Nigeria. We also sought to determine the crude TTIs prevalence among blood donor types.

Materials and Methods

This retrospective study was carried out at the North Central Zonal Centre of the National Blood Transfusion Service in Jos. The centre is the only one equipped with enzyme immunoassay technology for TTIs testing of blood for transfusion in Plateau and the neighbouring states of Nasarawa, Benue, and Bauchi. All donations from donors who responded to the donor questionnaire requiring prospective donors to provide information on personal data, risk of contracting and transmitting TTIs and consent to participate in research were included. Records of blood donors from January 2009 to December 2013 were studied for age, gender, type of donation and the crude pathogenic blood borne viruses (hepatitis B and C and Human Immunodeficiency Virus) and syphilis. The blood donor recruitment activities such as advocacy visits, donor sensitization and recruitment were also reviewed. Results are presented in tables and charts. Epi Info version 7 and Microsoft Excel 2007 statistical packages were used for data analysis. P value less than 0.05 was significant.

Ethical clearance was obtained from the Jos Centre of the National Blood Transfusion Service.

Results

Thirty thousand two hundred and sixty four persons donated blood to the North Central Zonal Centre of the National Blood Transfusion Service, in Jos, between January 2009 and December 2013. The age distribution of blood donors showed increasing successful recruitment of young people into the donor pool (Figure 1). Donor's age distribution showed a 36.2% blood

collection from those aged 18-25 years and 34.8% from 26-35 years. There is a decreasing donation at aged 26-35 years from 38% in 2009 to 32% and 33% in 2011 and 2012 respectively. This trend however reversed in 2013 to about 35%. Donors aged 18-25 years increasingly contributed to total annual blood collection from 34% in 2010 to 38% in 2012 and decreased to 36% in 2013 (Figure 1).

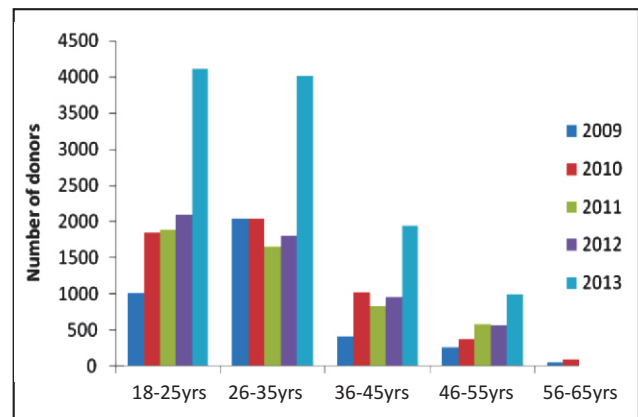


Figure 1. Age distribution of blood donors

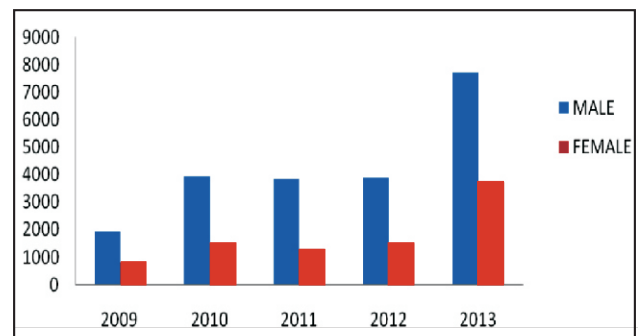
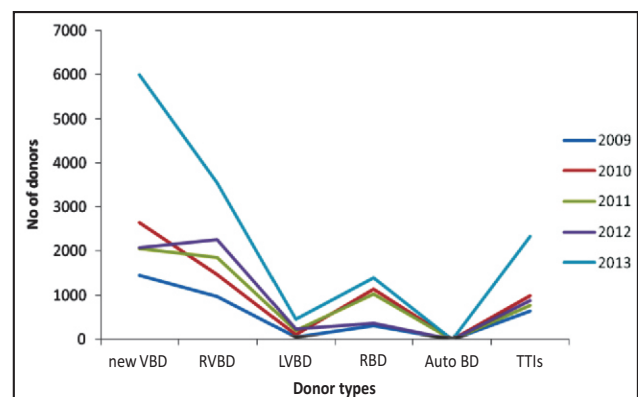
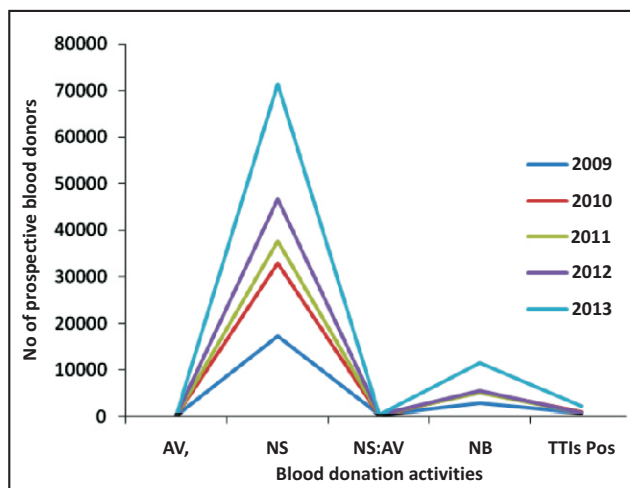


Figure 2. Sex distribution of blood donors 2009-2013



Legend: RV: regular voluntary, LV: lapsed voluntary, R: replacement, BD: blood donors, TTIs: transfusion transmissible infections

Figure 3: Graphic distribution of blood donor types and crude TTIs from 2009 to 2013



Legend: AV: advocacy visits, NS: number sensitized, NS/AV: number sensitized per advocacy visit, NB: number bled, TTIs: transfusion transmissible infections

Figure 4: Graphic distribution of donor recruitment activities and crude TTIs from 2009 to 2013

Table 1: Crude TTIs prevalence among blood donor types

| Type of Donors | No (%) | Crude TTIs (%) | P value |
|----------------|--------------|----------------|---------|
| Regular VBD | 10130 (33.5) | 791 (7.8) | 0.0001 |
| New VBD | 14830 (49.0) | 3312 (22.3) | |
| Replacement BD | 4244 (14.0) | 1324 (31.2) | |
| Lapsed VBD | 1068 (3.5) | 185 (10.1) | |

Key: VBD; voluntary blood donors, BD; blood donors

Twenty one thousand three hundred and thirty (70.5%) and 8, 944 (29.5%) donors were males and females respectively. The annual blood collection from male donors within the study period was consistently higher than from their female counterpart. The rate of female donation was highest in 2013 (32.7%) and lowest; 25.4% in 2011 (Figure 2).

Fourteen thousand eight hundred and thirty (49.0%), 10130 (33.5%), 1068 (3.5%), 4244 (14.0%) and 2 (0.007%) blood donors were first-time voluntary, regular voluntary, lapsed voluntary, family replacement and autologous blood donors respectively (Figure 3). The pattern of blood donation between 2009 and 2013 did not show consistent progression. Replacement blood donation was highest in 2010 (21.3%) and lowest in 2012 (6.5%) while new voluntary donor recruits was lowest (40.1%) in 2011 and highest (52.6%) in 2013. Regular voluntary blood donation peaked at 36.7% in 2011 with a decline to 31.1% in 2013. Lapsed donation was 4.3% in 2012 and least (2.1%) in 2010 (Figure 3).

Five thousand six hundred and twelve (18.5%) donors, had transfusion transmissible infections. The highest crude TTIs rates of 22.9% and 20.4% were

recorded among those who donated in 2009 and 2013 respectively lacking any consistent pattern. The crude TTIs rates were however lowest (15.0% and 15.8%) in 2011 and 2012 respectively. The higher the number of advocacy visits and prospective donors sensitized yearly, the higher the blood units collected and the crude TTIs rate (Figure 4). This observation was however not statistically significant (Pearson Correlation coefficient, $r \leq 0.889$; $p \leq 0.05$). The crude TTIs rate was least (7.8%) among regular VBD compared to all other allogeneic blood donor types, $p \leq 0.0001$ (Table 1).

Discussion

The ages of our blood donors ranged between 18 and 65 years. This age bracket is the recommended age for blood donation to allow for donor consent and eliminate the risk of collecting blood from individuals with diminishing organ functions or developing chronic clonal haematopoietic disorders common above the age of 65 years. The largest proportion (36.2%) of our donors over the study period was aged 18 to 25 years. The annual blood collected from this age group remained higher than from 26-35 years (34.8%) as well as other older blood donors. This showed that our donors were mainly (71.0%) from ages 18-35 years. The ages of our donors differs from that of the American Red Cross, where their blood givers are largely below 20 years.^{5,6} A study in Atlanta Georgia is at variance with ours as it reported a 26.8% blood donation from donors aged 40 to 49 years.⁷ Male accounted for the majority of donors over the period under review as female donors contributed 29.5% to blood collection over the study period. Similar findings have been reported from South East and North Central Nigeria, where female donors contributed only 5% and 6.7% blood donations in hospital blood banks respectively.^{1,2} The higher proportion of female donors (29.5%) in our study than 27.8% we earlier reported,¹² suggests a positive impact of continued prospective blood donor education, provided by the National Blood Transfusion Service, on the enrolment of females into voluntary blood donor pool. There is need to intensify donor awareness creation and encouraging more females into blood donation and engage committed ones as change agents of the blood service.

Voluntary blood donors in our study accounted for 86% blood donations and replacement donor making about 14%. This pattern differs from 98% replacement and paid donors reported in South East and North Central Nigeria.^{1,2} We found a higher frequency of voluntary blood donors than 26.4% reported by Nwogo³ in Benin City of Nigeria. Voluntary blood donors in their study is also higher than 31% reported among donors in a hospital blood bank in Maiduguri, North East Nigeria, where paid and autologous donations were 63% and 9% respectively.⁴ The differences in the patterns may be due

to the manner of recruitment where our centre takes donor awareness, recruitment and donation to the people outdoor as well as indoor, in addition to maintaining contacts with recruited donors for subsequent donation reminder. To further increase voluntary blood donation, the blood service should attract the attention of the social media, where most young adults interact, to deepen awareness creation on safe life style and commitment to voluntary blood donation.

The documented increase in autologous blood donors in the Maiduguri study was not confirmed in our work.⁴ This is likely because the National Blood Transfusion Service is not a hospital based blood bank where patients could donate readily for self. The policy of deferring all prospective donors who are not in satisfactory health at the time of donation or had major illness or surgical procedure in the previous twelve months might have contributed to low autologous blood donation in our study since hospitals would not collect from such.¹³ This finding calls for closer collaboration between the blood service centre and hospital blood banks to develop a program for autologous blood donation. This, if properly managed could lead to conversion of such donors to voluntary after full recovery from the index illness that necessitated blood donation.

Commitment to donate blood was recorded in 33.5% of donors who returned to donate at least once within twelve months of last donation, over the study period. Donor retention in our study was least (27.4%) in 2010 but highest (41.6%) in 2012. Donor retention in our study is lower than reported from a study in an Iranian blood service, where 51.7% of first-time donors returned to donate again during the three years after first donation with their return rate directly correlating with the number of donations in the first year.⁹ The volunteer blood donor return rate of 33.5% in our centre is below the 40% retention rate documented among their counterpart at the blood centre of Redeiro Preto.¹⁴ However, the commitment to donate blood in our centre is an improvement over that documented in an earlier report (22.4%).¹² The increased donor retention recorded in our study might be due to constant reminder contacts with successfully recruited safe blood donors through the global system mobile network. Donor retention in our report might have been enhanced by prospective new voluntary donors who were also persuaded into commitment. There is need to intensify efforts on donor retention to built safer blood donor group reliably committed to long term safe lifestyles than new voluntary donors. Efforts should also be made to retain any lapsed voluntary blood donors through education, reassurance and confidence building.

Fourteen percent of blood donations in our study were from replacement donors. This might be due to urgent need for fresh whole blood as it is frequently

required for treatment of bleeding disorders in the absence of blood components in resource poor settings like ours. The advancement of the blood service to automation and blood components preparation will reduce turn-around time and discourage replacement donations to meet urgent transfusion needs.

The crude TTIs rate of 18.5% among our donors is similar to 18.7% reported by Stokx among donors in Mozambique.¹⁰ TTIs prevalence in our study is however higher than 9.5% documented among Ethiopian donors.¹¹ The TTIs rate among repeat voluntary blood donors in our work is significantly lower than among other donor types. This further supports the need to retain all TTIs negative donors with repeated counseling aimed at maintaining safe lifestyles and be agents of change for voluntary blood donation in the society. The high rate of infectious agents among blood donors calls for concerted efforts at discovering the therapeutic agents for HBV, HIV, and HCV and potent vaccine against HCV and HIV which would reduce further depletion of suitable donors. There is also need to introduce pathogens inactivation to eliminate these and other unknown blood borne infectious agents.¹⁵ This could also reduce blood discards as HIV, HCV and HBV, all susceptible to inactivation, are prevalent among our blood donors.

The increased annual advocacy visits to source for blood donation drives resulted in increasing number of people sensitized. Further studies may identify the motivational factors that propel personnel into higher donor recruitment. Staff appreciation whenever blood collection target was exceeded may be a motivation. The ratio of the number of people sensitized to advocacy visits was related to none significant higher blood collection and crude TTIs prevalence in our study. Awareness creation on blood donation through prospective blood donor sensitization, one of the motivational tools used to improve voluntary blood donation in our centre may be key to new donor enrollment.¹⁵ The benefits of the reduction in replacement blood donors might have been reduced by increased first time voluntary donors who might have passed donor selection criteria, due to probably weak application by personnel, who needed to meet target. There is therefore need to focus target setting on the retention of safe donors already committed to blood donation. This will reduced the crude TTIs rate and the risk of cross contamination during testing, save resources, minimizes wear and tear of equipments and personnel fatigue while sustaining rewards.

The study had certain limitations. It was a retrospective study and as such we had incomplete data on some donors. This may restrict the generalization of our findings.

We conclude from this study that mainly young adults commit to repeat donations. Additionally, increasing the retention rate of our donors could reduce the risk of transmitting transfusion transmissible infections. It is recommended that the advancement of the blood service to automation; blood components preparation and pathogens inactivation would improve the quality of the operations of this service.

Conflict of Interest

None declared in this work.

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