DONOR DEFERRAL AND COMMON CAUSES: A CROSS-SECTIONAL STUDY AMONG PROSPECTIVE BLOOD DONORS AT THE LIMBE REGIONAL HOSPITAL BLOOD BANK, CAMEROON.

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Abstract

Background

The scarcity of blood donors has always been a major concern for blood banks globally. Lack of eligibility by potential blood donors to donate blood called blood donor deferral is associated with the unsustainable and inadequate amount of blood collected by blood banks worldwide. However, there is limited information on blood donor deferral rates and causes reported from the Limbe Regional Hospital blood bank. This study was aimed at determining the blood donor deferral rate and associated causes at Limbe Regional hospital's blood bank center.

Methods

A hospital-based cross-sectional study that included blood donors was carried out that lasted from January 2021 to July 2021 at Limbe Regional Hospital's blood bank. Blood donors' data were collected using structured questionnaires, and donors were screened following the National Policy for blood donor selection criteria in Cameroon. Data were entered into Excel version 2013 and transferred to SPSS version 20 for analysis. The level of significance alpha of 5% at a 95% confidence interval was considered.

Results

The blood donor deferral rate was 13.6% and no association was observed between type of donor and donor acceptance status as well as between type of donor and deferral status (P value>0.05). Hepatitis B surface antigen positive (66.7%), hypertension (22.2%), and diabetic (11.1%) were the causes of permanent deferrals whereas low haemoglobin concentration (71.4%), low weight (14.3%) and donation interval less than the specified periods (14.3%) were the causes of temporal deferrals.

Conclusion

The blood donor deferral rate is high at the Limbe Regional hospital blood bank and donor deferral is not dependent on the type of donor also donor type does not influence the deferral status. HBsAg positive was the leading cause of permanent deferrals and low haemoglobin concentration was the leading cause of temporal deferrals. Communities should be educated on the criteria for blood donor selection.

1. Introduction

Blood donation refers to the process of collecting, testing, preparing, and storing whole blood and blood components for transfusion [1]. Blood transfusion is the transfer of whole blood or blood components from one person (the donor) into the bloodstream of another person (recipient) through a vein and this activity is crucial for health care in a wide range of medical services to correct losses of anemia due to surgery, vitamin deficiency, malaria infections, or massive trauma, hematological malignancies, and pregnancy-related complications [2, 3]. The whole blood donated or blood components such as red blood cells, platelets, or plasma are usually transfused depending on the need of the patient, [4] but in Cameroon, whole blood is usually transfused to patients and this is due to lack of specialized machines that can separate the blood into the various blood components. Prior to blood donation, donors are screened following a well-defined national policy and can either be accepted or deferred donors can be categorized as voluntary, family, commercial, forced, apheresis, or autologous and WHO suggests that an adequate supply of safe blood can only be assured through regular, voluntary and unpaid donation [5].

Donor deferral is a situation whereby an individual is not eligible to donate blood based on the criteria used to protect the health and safety of both the donor and transfusion recipient [6]. Donors can be deferred for a variety of reasons including signs and symptoms of relevant transfusion-transmitted infections (TTIs), social behaviors that increase their risk of exposure to infectious diseases, travel to certain countries where the risk of exposure to a particular infectious disease of concern is high, being anemic, being under age or above the age limit, medical procedures, intake of certain or non-prescribed medications, diabetes, hypertension, and pregnancy [2]. Blood donor deferral is a painful and sad experience for the blood donor as well as the blood donor/transfusion center screening the donor most deferred donors never returned for blood donation again and some donors perceive deferral as social exclusion, which can cause social pain, decrease self-esteem, and lead to antisocial behavior. Donor deferral can either be temporal or permanent based on the cause for deferral. Both temporary and permanent deferrals are associated with a reduction in donor pools and inadequate blood and blood components available for transfusion [7].

Deferral rates vary globally among countries, from <1% to over 37%, with an average of 12% according to the presence or absence of donor selection criteria and different donor registration practices [7]. The blood donor deferral rate was reported to be 10.6% in India in 2020 [8]. The deferral rate was 11.7% reported in a hospital blood bank in the Kingdom of Saudi Arabia in 2020 [9]. In Nigeria, the deferral rate was reported to be 8.69% in 2019 [10] and in Tanzania, in 2019, the blood donor deferral rate was 12.7% [11]. Limited information on blood donor deferral rates is available in Cameroon and Limbe. Blood donor deferrals can be reduced by providing information on the frequency of blood donor deferrals and causes and educating the donors which will help in calling back donors deferred due to temporary reasons. Thus, there is a great need for this study in order to comprehend situations of decreasing donor turnout when there is a need for blood or blood products for transfusion through the study of the deferral rate and common causes within the study area and recommendable actions to reduce donor deferral.

2. Methods

2.1. *Study area and design*

This study was a hospital-based cross-sectional study carried out at the Limbe Regional Hospital between January 2021 to July 2021. The hospital is found in the South West Region of Cameroon, Fako Division and it is a 200-bed hospital, located exactly one mile away from the Atlantic Ocean

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and as of now is the principal referral hospital for the Region [12]. The Limbe Regional hospital is located in the zone two-health area of the Limbe Health District. The hospital offers units for radiology, surgery, gynecology and obstetrics, dental surgery, ophthalmology, Laboratory, pediatrics, maternity, and general medicines. The laboratory offers units for bacteriology, parasitology, biochemistry, Immuno-serology, hematology, and blood transfusion. The laboratory is supervised by a medicine biologist, headed by a laboratory major with categories of workers ranging from laboratory assistants, laboratory technicians, and laboratory scientists.

2.2. Ethical declaration

Ethical clearance for the study was obtained from the Institutional Review Board of the Faculty of Health Sciences, University of Buea [2021/1385-04/UB/SG/IRB/FHS] while administrative clearance was obtained from the Regional Delegation of Public Health for the South West Region, Cameroon [RII/MINSANTE/SWR/RDPH/PS/691/926].

2.3. Data collection

Prospective blood donors who came for blood donation at this blood bank were included in this study after they read the questionnaire answered it and signed the declaration and donors who self-deferred before the screening process were excluded. The donor's physical appearance and arms inspection were assessed by keen observation. Socio-demographic data such as age with eligible age range 18-55 years, gender, and donor's health assessment were assessed using a questionnaire. The weight (using a weighing balance) with cut off < 50kg, blood pressure (OMRON) accepted $\leq 120/80$ mmHg, and temperature (using a clinical thermometer) were also assessed. 3mL of venous blood was collected into a coded K2EDTA test tube and blood group and Rhesus factor was determined using the ABO blood grouping system (direct and reverse ABO blood grouping for blood group), haemoglobin concentration using a haemoglobnometer (HemoCue) and strips and a haematology analyzer (URIT

3000+) for donors with low HemoCue readings. FBS/RBS levels were assessed using a glucometer (OneTouch) and a thick blood smear prepared for malaria parasite microscopy observation. Donor's sample was screened for transfusion-transmitted infections which were syphilis by Venereal disease research laboratory (VDRL) test (Atlas Medical, UK), HIV/AIDS, hepatitis B surface antigens, and Hepatitis C virus using commercially available kits (HIGHTOP for hepatitis B surface antigen supplied by Qingdao Hightop Biotech Co., Ltd China, and Diaspot for hepatitis C supplied by Hubei Meibao Biotechnology Co., Ltd China). The HIV screening was performed using two kits; Determine HIV 1/2 (Alere Medical Co. Limited Japan) and Oraquick (BioSure Global Ltd, United Kingdom). The screening was done following strictly the manufacturers' instructions supplied with the product.

3. Data Analysis

The type of variables studied were discrete variables such as age, continuous variables such as haemoglobin levels, and nominal variables such as gender, type of donor, deferral type, and cause of deferral. Qualitative data were analyzed in frequency and percentages. Quantitative data were analyzed as mean, median, ranges, and standard deviation.

Categorical variables were analyzed using the Pearson Chi-square test. All analytical tests were two-tailed and $p < 0.05$ was considered significant at a confidence interval of 95%.

4. Results

The minimum age within the study population was 20 years and the maximum age was 50 years (the accepted age range was 18-55 years).

4.1. Socio-demographic description of study participants.

The majority of the participants 109 (92.4%) were males. Most of the study participants were between the age group of 31-41 years (44.1%). (Table 1).
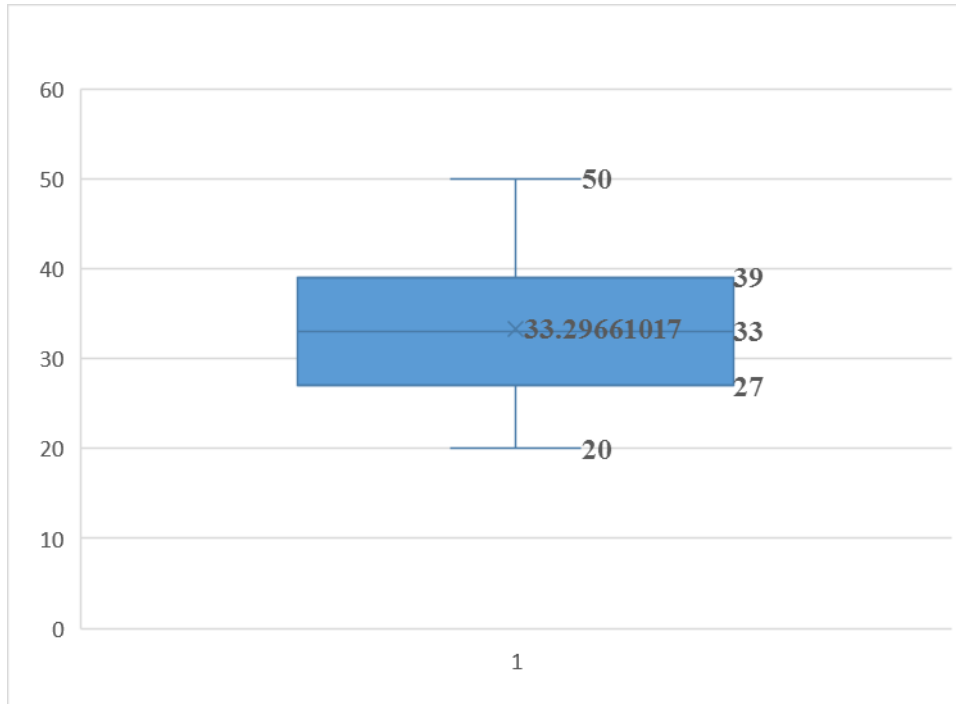
Figure 1: summary statistics of study participants

Table 1: Socio-demographic description of study population

Variable		Frequency (n)	Percentage (%)
Gender	Male	109	92.4
	Female	09	7.6
Age group/years	20-30	48	40.7
	31-41	52	44.1
	42-51	18	15.3

4.2. *Donor's deferral rate*

Out of the 118 blood donors examined 16 blood donors were deferred giving a deferral rate of 13.6%. Donor deferral was either on a temporal or permanent basis and out of the 16 total deferred cases, 09 (56.3%) of the cases were on permanent deferrals, and 07 (43.8%) deferred cases were on a temporal basis. 105 donors (89.0%) were Replacement /family donors while 13 (11.0%) were Voluntary non-remunerated blood donors. Also, more (15.4%) of the Voluntary non-remunerated blood donors were deferred when compared to 13.3% of Replacement /family donors. No association was observed between donor outcome and type of donor (p= 0.84) (Figure ii).

4.3. *Association between types of donors and donor's deferral status.*

No association between type of donor and type of deferrals was observed (p>0.05) (Table 2).

4.4. *Causes of deferrals*

The majority of the donors (37.5%) were deferred due to HBsAg Positive diagnosis followed by 31.3% deferred due to low haemoglobin concentration. Other causes of deferrals were; hypertension, low weight, recent blood donation not up to specified periods, and diabetic (Figure iii). As concerns type of deferral, HbsAg positive was the cause of the majority of the permanent deferrals (66.7%) and other causes were hypertension and diabetes. Low haemoglobin concentration was the
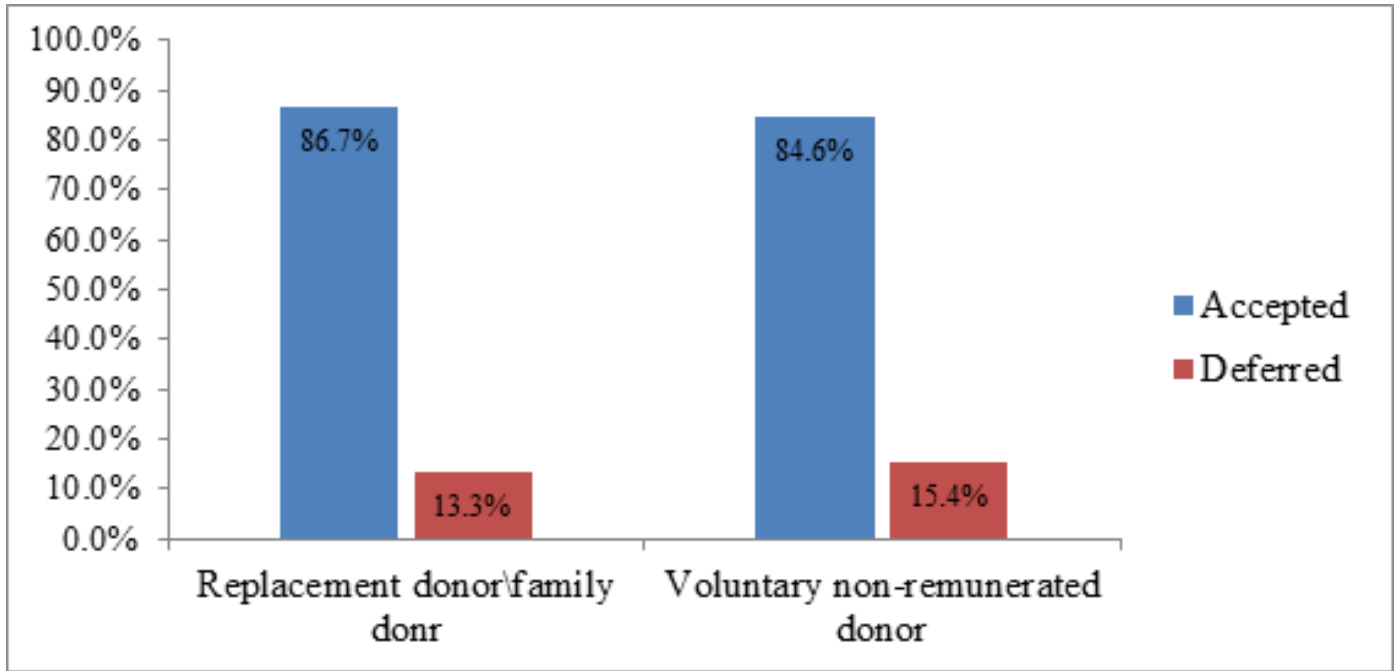
Figure 2: Association between types of donors and donor's acceptance status (donor outcome). X^2value:0.04; p-value: 0.84

Table 2: Association between types of donors and donor's deferral status

Deferral status	Donor type Replacement/family donor n(%)	Voluntary non-remunerated blood donor n(%)	X^2 value	p-value
Permanent deferral	07(43.8)	02(12.5)	1.7	0.18
Temporal deferral	07(43.8)	00(0.0)		

cause of the majority of the temporal deferrals (71.4%) and other causes of temporal deferrals were low weight and the last time of donation not up to specified periods.

5. Discussion:

Males constituted a larger portion (92.4%) of the donor population. This is attributed to the fact that females turn to have natural limitations towards blood donation such as pregnancy, breastfeeding, and owing to their monthly blood loss through menstruation.

Blood donor selection is very important in achieving safety in blood transfusion, as the desired aim is to protect and safeguard both the donor and the recipient. However, unnecessary deferral of blood donors may result in the loss of potential blood donors, especially in our setting where the culture of blood donation is still very poor. The blood donor deferral rate in this study was 13.70%. The finding of this study was consistent with the results of Dias et al., (2019) in Brazil who reported that the blood donor deferral rate was in the range of 12.1 to 15.7% [13] and also similar to the 13.58% blood donor deferral rate reported by Samina et al., (2013) in Pakistan [14]. Nevertheless, the findings of this
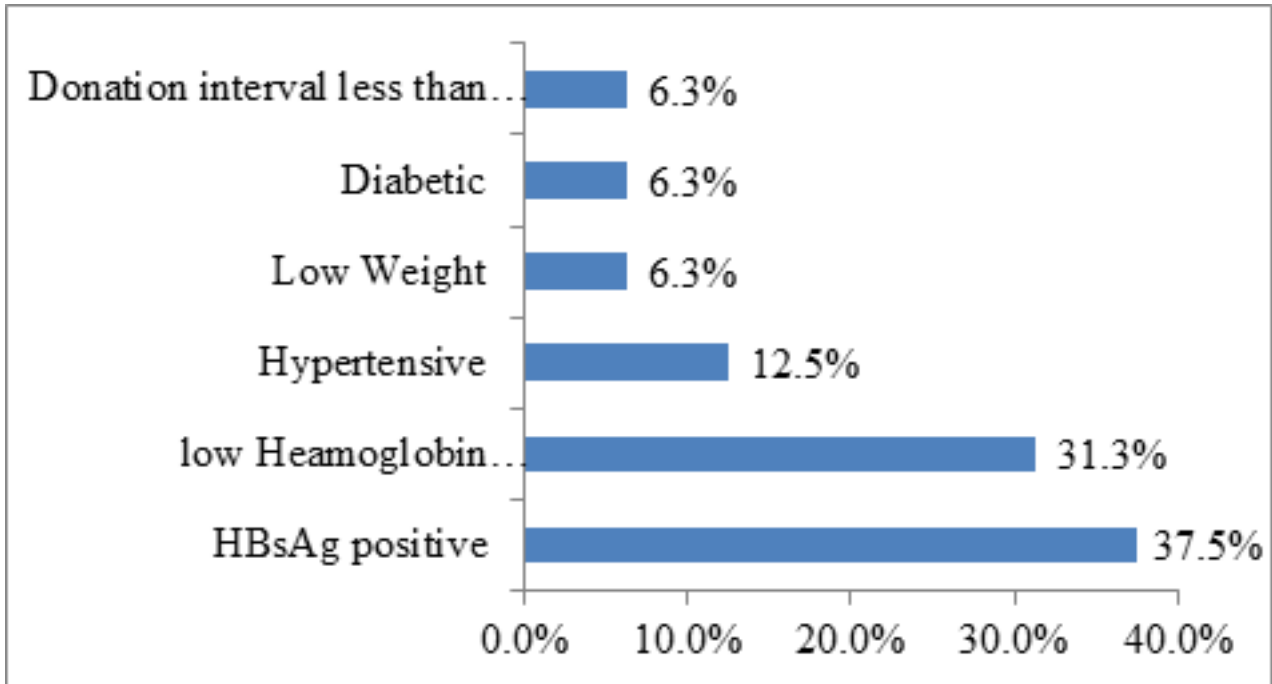
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Figure 3: Causes of deferrals(n=16)

study were higher than those reported by Mgabo M et al., (2019) in Tanzania, where they reported that the deferral rate in their study was 12.7% [11], those reported by Henshaw et al., (2019) in Nigeria, who reported that the deferral rate was 8.69% [10], and those reported by Yang in China in 2021 where he reported that the deferral rate was 9.6% [15]. However, the findings of this study were lower than the 30.9% deferral rate reported by Leila K et al., (2015) in Brazil [16]. The difference in the deferral rate as compared to those reported from different countries could be a result of the differences in the criteria used to select a blood donor as it may differ between countries, differences in the methods used for screening, and also differences in awareness in the criteria for selection of blood donors. Socio-economic differences among countries may also be the cause for variation in blood donor's deferral rate as high-income countries may have a lower prevalence of infectious diseases that can call for blood donor's deferral and well-balanced diet accounting for higher haemoglobin concentrations as opposed to low-income countries such as Cameroon. Depending on the underlying cause for deferral, a donor was either deferred temporar-

ily or permanently. It was found that most of the differed cases were permanent deferrals (56.3%) and 43.7% were temporal deferrals. This is in line with the results of Henshaw et al. (2019) in Nigeria, who reported that 68.90% of their deferrals were permanent deferrals [10]. Contrary to the observation of this study, Yang (2021) in China, reported 69.17% of the deferred cases in their study were temporal deferrals [15]. The difference might be due to differences in guidelines for temporal and permanent deferral as there are slight differences across different countries.

This study saw only two types of donors; voluntary non-remunerated blood donors and family/replacement blood donors. Majorities (89.0%) of the donors were family donors and only 11% were voluntary donors. This is in line with the reports of Mensah et al, (2015), who stated that most developing countries such as Cameroon turn to obtain most of their donations from family/replacement donors [17]. Similarly, popular myths surrounding blood donation were some Cameroonians believed that you take their blood and do "witchcraft" with it and so they can not voluntarily give their blood. In a similar way, a study carried out by Koster and Hasssall in

Bamenda Cameroon found that most Cameroonians believed that donating blood to a relative was considered much more acceptable compared with donating blood to an institution or a stranger who may be undeserving of the donor's family "good" blood [18] and this can be attributed to lack of knowledge on blood donation by Cameroonians. However, more (15.4%) voluntary donors were deferred as opposed to 13.3% of family donors that were deferred. Similarly, Khichariyal et al., (2020), reported in a study that more voluntary blood donors (72.2%) were deferred from donation as compared to the replacement donors (22.8%) [19]. In contrast to the findings of this study, Valerian et al., (2019) in a study in Tanzania, reported that replacement donors had a higher deferral rate (15.8%) as compared to voluntary non-remunerated blood donors who had 12.3% [20]. Nevertheless, no association was observed between the type of donor and donor acceptance status in our study (p-value= 0.84). This is in line with the conclusion of Charlse et al, who reported that the rate of deferral of voluntary donors was not significantly different from that for replacement donors (p=0.25) [21]. This indicates that being a particular type of donor does not significantly affect or conclude your acceptance status.

Out of the 09 permanent deferred cases noticed, 07(77.8%) were family donors and 02(22.2%) were voluntary donors. This is in line with a study carried out by Okafor et al, (2018) who reported that permanent deferrals were mostly seen in family donors (12.4%) as compared with 2.2% permanent deferral cases with voluntary donors [22]. Again it was noticed that all the 07 temporal deferred cases were family donors. As observed by this study, indicates that family donors are more likely to be permanently deferred from blood donation as compared with voluntary donors however, no association was observed between the type of blood donor and the donor deferral status with (p value=0.18). The results of the statistics could have been influenced by the low turnout of voluntary donors.

As concerns the causes for deferrals, Hepatitis B viral infection was the leading cause of ma-jorities (66.7%) of the permanent deferrals. This study points out that there is a prevailing prevalence of hepatitis B in the Limbe Municipality and this high prevalence of hepatitis B may be due to low awareness of the hepatitis B virus, and its modes of transmission by the population of the study area. The prevalence of hepatitis B in Cameroon has been reported to range from 6-16% [23, 24] and studies report the prevalence of hepatitis B among blood donors in hospital blood banks in Cameroon to be as high as 10.1% and 12% [25, 26]. The findings of this study agree with the study of Valerian et al, (2019) who reported that hepatitis B was the leading cause of permanent deferrals which contributed to a quarter (29.6%) of all deferrals [20]. In contrast, the findings of Iqbal et al, (2020) revealed that HCV (19.2%) was the leading cause of permanent deferrals in Multan [27]. Also, Bahadur et al (2009) reported in a study that hypertension was the leading (29.4%) cause of permanent deferrals [28]. Other causes of permanent deferrals noted in our study were hypertension (22.2%) and diabetic (11.1%). This is consistent with the results of Charlse et al and Manisha et al who also identified hypertension (17.5%) and diabetics (12.6%) as causes of permanent deferrals respectively [21, 29]. Our study also revealed that low haemoglobin level was responsible for the majority (74.4%) of the temporal deferrals. This report agrees with that of Valerian et al [20], Iqbal et al [27], Samina et al [30], Yang [15], and Okoroiwu et al [31] who all reported in their respective studies that low haemoglobin was the leading cause of temporal deferrals. Other causes of temporal deferrals observed in this study were; low weight (14.3%) and donation interval less than specified periods (14.3%). This is similar to the study of Manisha et al (2016) who also identified low weight (11.59%) and last month of the donation less than specified periods (8.17%) as causes of temporal deferrals [29].

6. Limitations of the study

The limitations encountered in this study are, only two types of donors were allowed to partic-

ipate in the study based on the national blood donation policy, and the Coronavirus pandemic scared away so many Cameroonians from voluntary blood donation activities.

7. Conclusions

The donor deferral rate in Limbe Regional hospital's blood bank is high (13.6%), with permanent deferrals (56.3%) higher than temporal. The majority (89.0%) of the donors were family replacement donors relative to voluntary non-remunerated blood donors (11%). Majorities (15.4%) of the voluntary donors were deferred relative to the family donors (13.3%) but donor type does not influence the donor acceptance status. Majorities (77.8%) of the family donors were permanently deferred and all differed voluntary donors were on a permanent basis but the type of donor does not influence the deferral status. Hepatitis B viral infection is the most (66.7%) commonest cause of permanent deferrals at this blood bank, followed by hypertension (22.2%) and diabetes (11.1%). Finally low haemoglobin level is the leading (71.4%) cause of temporal deferral in Limbe Regional hospital bank followed by low weight (14.3%) and donation interval less than specified periods (14.3%). Hepatitis B viral infection was high among the participants and this outcome poses a public health concern measures should be undertaken to curb the infection rate. Communities should be educated on voluntary blood donation activities through community education programs or through radio programs designed to educate the population on voluntary blood donation activities.

8. Authors Contribution

Not applicable

9. Conflict of interest

The authors declare that there is no conflict of interest regarding the publication of this work.

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