

Factor Analysis of Motivational Factors among Experienced Blood Donors: A Case of High Schools in Manicaland Province Zimbabwe

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ABSTRACT

Background: Blood is a non-pharmaceutical product obtained through voluntary donations. Donations in Zimbabwe are inadequate to meet the insatiable appetite from patients in need of transfusion for various therapies and procedures. The adequacy of blood products is attributable to a profound donor recruitment and retention strategy that is largely influenced by the motives driving the blood donors. Understanding the motivations, preferred incentives and potential barriers to donation among high school aged blood donors may prove to be critical in the success of National Blood Service Zimbabwe (NBSZ).

Methods: A cross sectional study of experienced high school donors was conducted in the Manicaland province of Zimbabwe consisting of a sample of 215 student donors irrespective of gender. A self-administered questionnaire requested donors to rate importance of: motivational factors, potential deterrents that may influence future decisions to donate blood and the appeal of various incentives offered by NBSZ.

Results: Factor analysis with oblique rotation revealed a three factor solution of blood donor motivation. The Understanding factor explained 57.3% of the total variation, Enhancement and value factor explained 22.3% and the social factor explained 12.7% hence the three factors explained 92.3% of the total variation in the data. 83% of the respondents were also motivated by helping their respective schools donate more than any other. None of the deterrents were rated as important. Three incentives (coffee mugs, T-shirts and Key holders) received a high level of support from majority of the respondents. The ratings were 79%, 74% and 67% respectively.

Conclusion: The findings of the study provide empirical evidence for the utilization of the Voluntary Functions Inventory (VFI) in the Zimbabwean context and high school aged donors were motivated mainly by the Understanding factor. Young donors are more attracted to concrete items as incentives and males have a greater desire to donate than females.

Keywords: Factor analysis; Blood; Donate; Incentive; Deterrents

INTRODUCTION

Blood donation is a symbol of giving life [1], it's far an act of a healthy individual giving blood so that it will be used by some other individual in transfusion therapy and considering the fact that it's far a non-pharmaceutical product it has to come directly from an individual *via* blood donation. Globally, almost 108 million products of blood are gathered each 12 months and half of those collections are from developed nations which are only one-fifth of overall world populace [1]. WHO recommends that every ten humans per thousand populace in any given nation need to be regular voluntary blood donors for that nation to have

sufficient stocks of blood all the time [2]. However Zimbabwe has not managed to surpass six humans donating blood per one thousand populace. This has provided extreme blood and blood products shortages within the country with some cases resulting in undesirable fatalities [3]. WHO recommends that all nations should be self-sufficient in all blood products and that all blood donations should be voluntary, anonymous and non-remunerated. To reap this intention, authorities, blood banks and volunteers have to work together, and a big investment for recruiting and preserving regular voluntary blood donors has to be secured [4].

With an ever growing demand on blood supplies internationally, there's a tremendous desire to ensure a secure and sufficient

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supply of blood products. However, recruiting and maintaining blood donors stays a key undertaking for blood organizations internationally. Researchers have studied multiple elements that have an effect on the behaviour of volunteers and one of the most studied variables is volunteer motivation. The preceding researches discovered the unique relevance of motivation as the key element in both the initiation and duration of volunteer service [5].

Blood donor motivations were substantially studied within the closing decade in lots of settings, however little or no scientific evidence exists in particular within the Zimbabwean context. In Zimbabwe high school blood drives are held at various points of the academic school calendar year, and blood donations from these drives account for a mean of 70% of the entire collections throughout this time, the remainder is donated by the pledge 25 club members with a significantly small percent coming from adults [3]. Regardless of the abundance of this age group in Zimbabwe’s donor pool, very little information is known about what factors have an effect on their donation behaviour. This age group is specifically essential to recruit as initial and repeat donors for several reasons.

In a cross sectional study that was conducted in America among high school aged blood donors, it became determined that respondents had been diverse in their blood donation with barely over 50% reporting being first-time donors and almost a fourth having donated twice or greater. The participants highly rated motives that pondered pro-social beliefs as extremely important motivators in their decision to participate in the blood drive and these findings were consistent with several reports of blood donor motivation. Other studies have revealed that the altruistic motivational factor is relatively high amongst women, there by leading to a greater response to altruistic messages by women [6]. Hence more efforts must be made to attract female donors since they have more altruistic motivation and that their proportion was significantly lower than their male counterparts in Iran; [7]. Investigating the motivational factors and potential deterrents among high school aged blood donors is very important as it helps bring solutions to blood shortages at local level. Donating blood is the only solution available to save millions of lives worldwide [8]. The WHO cites this development as the first line of defence against transmission

of diseases through the transfusion route. Such diseases are known as transfusion transmissible infections (TTIs) [9]. In Zimbabwe all donations are strictly from voluntary non remunerated blood donors and are routinely tested for TTIs, which are HIV, hepatitis B virus, hepatitis C virus and syphilis [2].

Researchers have identified that about 234 million major operations are performed worldwide every year; 63 million people undergo surgery for traumatic injuries, 31 million for treating cancers, and another 10 million for pregnancy-related complications, where blood transfusion is mandatory [10]. Moreover, the demand of blood for patient management has been growing dramatically, yet its supply is on the decline [11]. The need for blood transfusions in Sub-Saharan African countries, is high due to maternal morbidity, malnutrition, and a heavy burden of infectious diseases such as malaria [12].

The method each country adopts to attract blood donors and to cover its needs in blood supplies varies as a function of its socio-economic structure [13]. To mention a few adequate supply of safe blood could prevent up to one quarter of reported maternal deaths every year in sub Saharan Africa [14]. National blood service Zimbabwe is comprised of 5 branches distributed within the country’s major provinces. For the past five years collections generally decreased subject to blood donors behaviour, economic status within the country and the fluctuating demand for blood and blood products as illustrated in Figure 1 [3].

A recent survey has shown that few researchers have cross-analysed socio demographic characteristics with deterrents for donating blood [15]. Motivation was revealed as the key factor in both the initiation and duration of volunteer service [5]. Therefore it is crucial that efforts be made to understand the motivational factors and potential deterrents among young donors at local level, given that successful recruitment and retention strategies can be designed thereby addressing the issue of blood shortages in the country.

According to the standards set by WHO, to ensure an adequate supply of safe blood every 10 people per 1000 population must be regular VBDs for that country. [2], however as of 2013 Zimbabwe had less than 6 donors per 1000 population [16]. This immense shortage of blood products and increased demand for blood

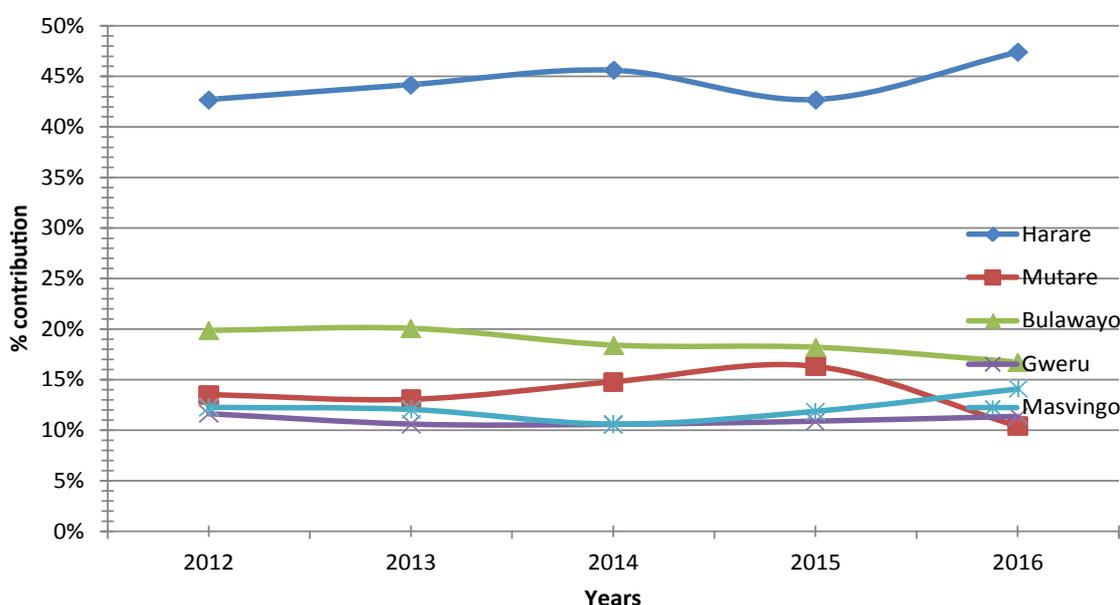


Figure 1: Percentage contribution of blood collections by branch.

therefore becomes an important health issue. Donor recruitment and donor retention particularly, pose a significant problem for blood collection agencies around the world and in Zimbabwe. It is a requirement that all organizations involved in encouraging blood donation should have adequate information regarding the motivational factors among their donors. Furthermore the blood donation literature has very little information pertaining to high school aged blood donors, specifically in Zimbabwe. In response to these gaps in the literature, this study seeks to investigate the motivational factors and potential deterrents among high school aged blood donors in Manicaland province Zimbabwe.

The aim of this study is to investigate the motivations and potential deterrents to blood donation among high school aged blood donors in Manicaland province Zimbabwe, by first identifying the motivational factors and deterrents that affect blood donation. Donor's incentive preferences and the relationship between socio demographic factors and motivations/ potential deterrents and frequency of donations will be established.

The findings of this study will be used in the formulation of strategies and policies that will keep the youngsters motivated, thus creating a sound pool of long term blood donors. Furthermore the study will provide new empirical evidence which can influence interventions to inform policy on national blood mobilization and collection strategies to ensure adequacy in the country. This can also enhance and improve the adult donor pool through input from motivated high school donors that continue to donate even after completing high school. This study can also trigger paradigm shifts in blood supply strategies for the country, hence using scarce financial resources in a cost-effective manner and ultimately making blood and blood products affordable to the general population.

METHODS

The purpose of this cross sectional study was to investigate the motivational factors and potential deterrents among blood donors which could eventually contribute to new educational and strategic interventions aimed at improving blood donor motivation and help appease blood shortages within the country. Self-administered questionnaires were used to gather the students' information based on the voluntary functions inventory (VFI). The variables of interest were: motivational factors, potential deterrents, demographics and incentive preferences for high school aged blood donors.

Target population and sample size

Only high school aged blood donors with previous donation experience among the visited high schools in Manicaland province were considered. Teachers, first time donors and those that did not consent were excluded from the study. Sample size was estimated using the Fischer's formula at 95% level of significance and assumed prevalence of 50% due to the lack of published information on motivational factors and potential deterrents in Zimbabwe.

$$n = \left(\frac{z}{\Delta}\right)^2 p(1-p) \dots \dots \dots (1)$$

n is the minimum sample size required.

Δ is the absolute precision (5%)

z is the standard normal deviate corresponding to 95% confidence interval (1.96).

p is the assumed proportion of the population that donates blood (this is assumed to be 50%).

Therefore using equation, (1), the required sample size is:
 $n = \left(\frac{1.96}{0.05}\right)^2 0.5(1 - 0.5) = 385$

The general rule of an 18% allowance for spoilt or incomplete questionnaires [17] was then included hence adjusting the figure to 455.

Data collection

Experienced blood donor students who showed interest in participating in the study and gave their consent were given questionnaires to complete regardless of their participation in the blood drive. Measures of central tendency and dispersion were used to test for skewness and kurtosis.

Multivariate analysis

Factor analysis is a data reduction method which was employed to uncover the latent structure of motives driving blood donation. Factors were extracted using the principal axis factoring solution and the number of retained factors was decided using the latent root (Eigen value) criterion and a scree plot on the un-rotated factor matrix. Those factors with eigen value greater than one were included. The factor matrix was then rotated by oblique rotation to obtain a simple factor pattern and only correlations (factor loadings) greater than ± 0.40 were considered. The factors' reliability was then tested using the Cronbach's alpha test which is a coefficient of reliability (consistency), in other words it is a measure of internal consistency.

Ordinal logistic regression analysis

Stepwise ordinal logistic regression was conducted on responses to statements on motivational factors and potential deterrents. The combined influence of gender, number of donations and age was evaluated on each of the ordinal outcomes. P values were considered significant if less than 0.05.

RESULTS

Data presentation

Seventeen blood drives were conducted at the different schools in Manicaland province and among those, 215 completed questionnaires were collected from respondents aged between 16 and 20 years. Of these respondents, 121(56.3%) were female and 94(43.7%) were male; experienced males donors were outnumbered by female counterparts. The level of education ranged from Form three to Form six.

Males have a greater desire to donate than females regardless of being outnumbered in the study sample. Only males had the highest number of donations as shown on the box plots. The difference in numbers may be due to the reason that men generally have higher iron levels than women, so they are less likely to be deferred from donating due to low haemoglobin as highlighted by Mast et al. (Figure 2) [18].

Factor analysis

Factor analysis was conducted to uncover the latent structure of motives. Factors were extracted using the common factor (principal axis factoring) method. Three factors met the Kaiser's rule (Eigen value >1 criterion), with the first factor having the largest Eigen value of 5.3. A scree plot of the Eigen values was computed to confirm whether there was a break in the plot with the remaining

factors explaining considerably less variation. From the scree plot only three factors were significant Figure 3.

The factor analysis shows that 80% of the participants are in support of the statement “My friends donate blood” and rated either strongly agree or very strongly agree. About 63% of the participants are in support of the statement “People I know share an interest in donating blood”. These two statements correspond to the social factor and the responses suggest that most of the donors became blood donors due to social influence from friends and close relatives or colleagues. The statements B, F, J, M and N correspond to the value factor; A, C, E, K and O correspond to the social factor; G, I, L, P, T correspond to the understanding factor; D, H, Q, R and S correspond to the enhancement factor and statements U up to Z were designed to cover reasons that were not covered by the volunteer functions inventory (VFI). The first factor accounted for 57.3% of the total variance, factor 2 accounted for 22.3% and factor 3 accounting for the least amount of the total variance (12.7%). Collectively the three retained factors explained 92.3% of the total variance.

The factor loadings pattern matrix was rotated using the oblique rotation method which permits factors to be correlated with each other thus representing clustering of variables more accurately and therefore very much suited to uncover the latent structure of motives. Factor loadings greater than 0.4 were considered important.

Factor 1

The first extracted factor was produced by the correlation between variables S, P, T, Z, V, G and Y. Variables P, T and G correspond to the understanding factor of the VFI. Variable S corresponds to the enhancement factor and the variables V, Z and Y were clearly related to the understanding factor. Factor 1 explained the largest proportion of the total variation (57.3%) and the factor was labelled the Understanding factor.

Factor 2

The second factor was composed of the variables M, Q, R, B, D, N, H and I. Variables M, B and N correspond to the Value factor of

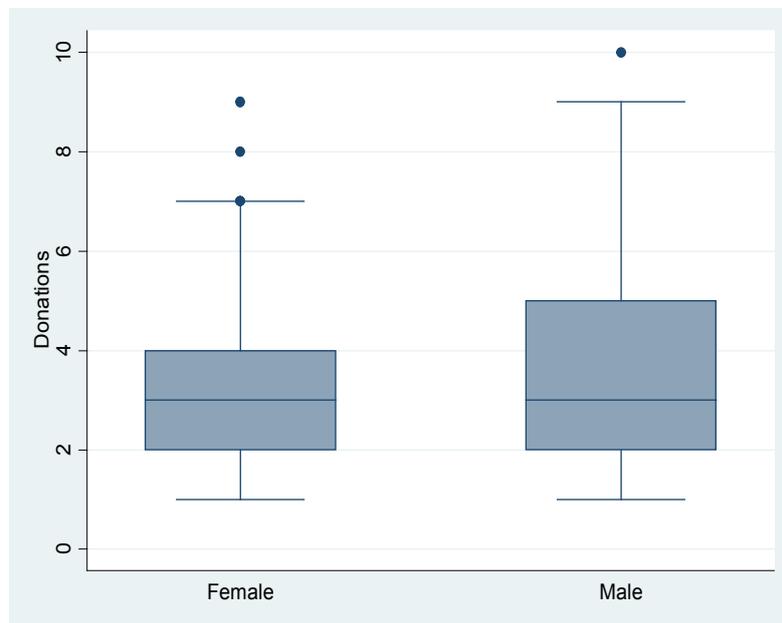


Figure 2: Box plot showing frequency of donations by gender.

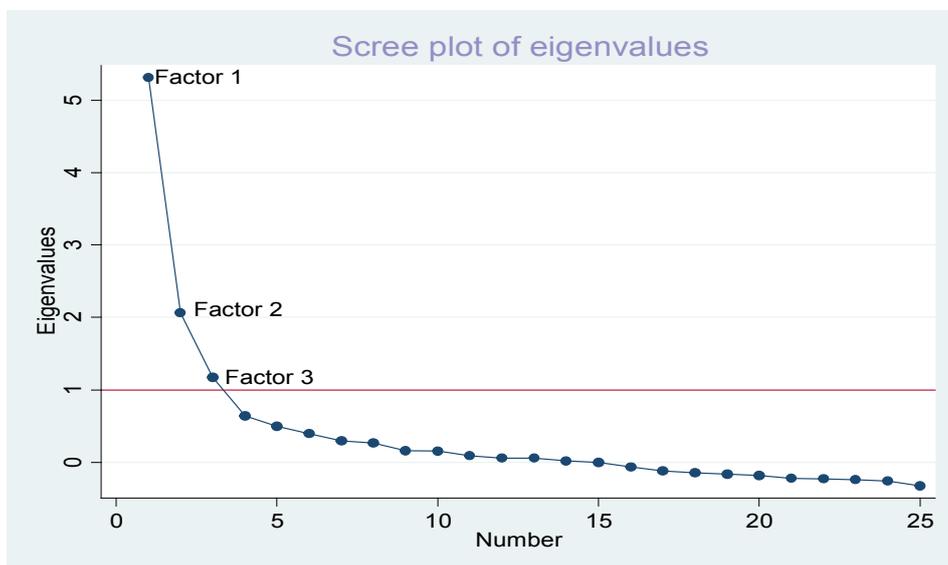


Figure 3: Scree plot of the Eigen values on the un-rotated Factor Matrix.

the VFI. Variables Q, R, D and H correspond to the Enhancement factor of the VFI. Variable I correspond to the Understanding factor. The results revealed that all the eight items had factor loadings >0.4 with the first 4 items that had the largest factor loadings in ascending order a combination of the Value factor and the Enhancement factor. The second factor accounted for 22.3% of the total variation and was labelled as a merged factor, Value and Enhancement factor.

Factor 3

The last factor was formed by the correlation between variables A, C, K and E which all corresponds to the Social factor of the VFI, with the highest loading of 0.7240 and the lowest loading 0.5720. The factor was labelled the Social factor representing blood donation as way to develop and strengthen social ties. Factor 3 explained 12.7% of the total variation in the data.

Reliability tests (Cronbach’s alpha)

Reliability test of the factors was conducted using Cronbach’s alpha test. The value scores for alpha range between 0 and 1, higher values indicate higher reliability. Results from the test showed acceptable and strong reliability for all the factors as in Table 1. Cronbach’s alphas for these factors were 0.7568, 0.7578 and 0.75 respectively.

Overall reliability for the whole scale was 0.8573 (a strong measure of internal consistence).

Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy

The KMO value scores range between 0 and 1, higher values indicate better sampling adequacy. The overall KMO value score obtained is 0.8406 hence the sample size was adequate enough for the conducted factor analysis.

Test for associations

A chi squared test was conducted to test if there was an association between Age and the number of donations. There was a significant association between number of donations and age of the blood donors (p value=0.000)

The following hypothesis was tested at 5% level of significance.

H₀: Blood donation behaviour is mostly driven by the value factor among High School aged blood donors.

H₁: Blood donation behaviour is mostly driven by other factors.

Results from the factor analysis indicated that the Understanding factor had the highest Eigen value (5.2) as well as explaining a greater proportion of the total variation (57.3%). Therefore, we

Table 1: Summary of Exploratory Factor Analysis of Blood Donation Motivation Measure using promax (Oblique) rotation (N=215).

VFI	Motivational statements for donating blood from the questionnaire	Factor 1 Understanding Factor	Factor 2 Value and Enhancement Factor	Factor 3 Social Factor	Commonalities
S.	Donating blood is a way to make new friends	0.7035	-	-	0.482
P.	I can learn how to deal with a variety of people	0.6799	-	-	0.46
T.	I can explore my own strength	0.5789	-	-	0.4327
Z.	I want to help my school donate more than any other school	0.5369	-	-	0.2949
V.	I think blood donation benefits my own health	0.5342	-	-	0.3256
G.	I can learn more about the cause for which I am donating	0.4360	-	-	0.26
Y.	For me blood donation is primarily a moral duty	0.4037	-	-	0.244
M.	I feel it is important to help others	-	0.7049	-	0.4051
Q.	Donating blood makes me feel needed	-	0.5824	-	0.4371
R.	Donating blood makes me feel better about myself	-	0.569	-	0.368
B.	I am concerned about those less fortunate than myself	-	0.5059	-	0.2004
D.	Donating blood makes me feel important	-	0.5046	-	0.3008
N.	I can do something for a cause that is important to me	-	0.4988	-	0.2849
H.	Donating blood increases my self-esteem	-	0.4601	-	0.2318
I.	Donating blood allows me to gain a new perspective on things	-	0.4338	-	0.402
A.	My friends donate blood	-	-	0.724	0.5154
C.	People I’m close to want me to donate	-	-	0.6809	0.4526
K.	Others with whom I am close place a high value on donating blood	-	-	0.5843	0.3822
E.	People I know share an interest in donating blood	-	-	0.5720	0.4791
	% of variance explained	57.3	22.3	12.7	-
	Eigen value	5.2	2.1	1.2	-
	Cronbach's alpha (Reliability test)	0.7568	0.7578	0.7500	-
	Cronbach's alpha (Whole system)	-	-	0.8573	-

reject the null hypothesis and conclude that the blood donation behaviour amongst high school aged blood donors in Manicaland province Zimbabwe is mostly driven by factor the understating factor (factor 1).

Preferred incentives

Coffee mugs was the most popular form of incentive needed among the respondents, with a response rate of 71%. This was then followed by 57% and 55% of the respondents that also very strongly agreed with the T shirt and Key holder incentives respectively. The most unwanted incentive are pens as 35% of the respondents strongly disagree with it. Ordinal logistic regression was also conducted to determine if the variables age, gender and number of donations had a significant effect on the odds of a high answer on preferred incentives versus the combined adjacent answer categories. Only the variable number of donations had significant regression coefficients for T shirts, Hats, coffee mugs and juice bottles. The computed p values were 0.012, 0.008, 0.01 and 0.03 respectively as shown in Figure 4.

Deterrents to blood donation

More than 50% of the respondents strongly disagreed with the statements. Ordinal logistic regression was conducted to determine if the variables age, gender and number of donations had a significant effect on the odds of a high answer versus the combined

adjacent answer categories and no significant relationship was established. Combining the percentage contributions for agree, strongly disagree and very strongly agree some deterrents like “I felt badly after donation”, “NBSZ is far from area” and “My blood group is not needed” becomes significant with 26%,24% and 19% respectively. More than 75% of the respondents reported that they were more likely to donate blood again in the future Table 2.

DISCUSSION

Maintaining a sustainable and adequate supply of blood and blood products is the main thrust of any blood service organization across the globe. The adequacy is attributable to a profound donor recruitment and retention strategy that is largely influenced by the motives driving the blood donors. It implies that understanding the motivations and potential barriers to donation amongst the young donors in Zimbabwe may prove to be critical in the success of National Blood Service Zimbabwe. An in-depth analysis of Figure 2 suggests that males donated more than females because males had a slightly higher frequency of donations in comparison to females. The difference in numbers may be due to the reason that men generally have higher iron levels than women, so they are less likely to be deferred from donating due to low haemoglobin.

Previous study that was conducted in Norway, factors with factor loadings greater than 0.4 were considered important [19]. A stepwise regression analysis was also conducted to determine which

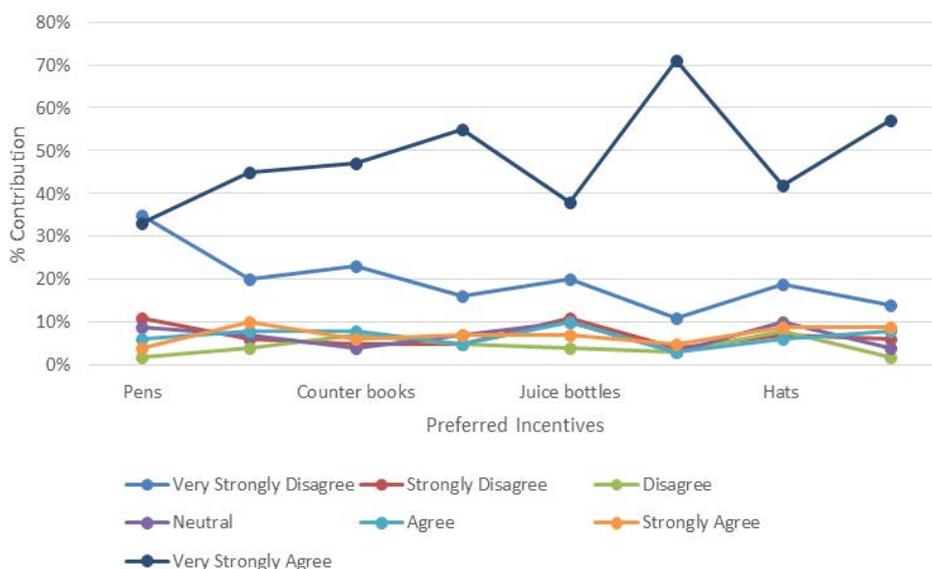


Figure 4: Responses to preferred incentives.

Table 2: Donor responses to potential deterrents.

Potential Deterrents	Very Strongly Disagree	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Very Strongly Agree
Donating blood is painful	63%	9%	5%	7%	5%	2%	9%
Donating blood is inconvenient	66%	8%	8%	3%	2%	0%	13%
I hate the sight of blood	64%	9%	7%	10%	4%	2%	4%
Donating blood takes much time	65%	11%	3%	3%	4%	3%	11%
I don't like missing class to donate blood	69%	7%	5%	5%	2%	3%	9%
I felt badly after donation	52%	10%	5%	7%	7%	7%	12%
The nurses/staff were not friendly	64%	13%	5%	4%	3%	1%	10%
NBSZ is far from area	60%	7%	5%	4%	2%	6%	16%
My blood group is not needed	60%	11%	4%	6%	5%	4%	10%

variables predicted the blood donation motivation significantly. In another study, it was revealed that motivation is a key factor in both the initiation and duration of volunteer service [5]. These findings reveal the importance of investigating the motives that drive blood donation among high school aged blood donors in an effort to ensure safe and adequate blood and blood products for the Zimbabwean population.

The outcome of the exploratory factor analysis indicated that high school aged blood donors were motivated by the Understanding factor, value and enhancement factor and also the social factor. The analysis also revealed interesting findings in that the second factor that was extracted had variables that significantly loaded on it and the variables corresponded to two factors from the VFI.

Four factors were adopted from the VFI in the design of the questionnaire and the results from factor analysis revealed three factors although the other factor was a merged factor, but the VFI structure was clearly revealed.

SUMMARY

The study population consisted of 215 participants, 56.3% were females and 43.7% were males. Seventeen year olds had the most number of donations than any other age and the age range was 16-20 years. Male donors were identified as having a greater desire to donate blood in comparison to females. The findings of the study revealed that high school aged donors were motivated by the Understanding factor, Social factor, Value and enhancement factor of motives. Additionally, the donors were extremely motivated by helping their schools donate more than any other in the region. No potential deterrents were revealed as significant and three incentives (coffee mugs, T-shirts and Key holders) received a high level of support from majority of the respondents.

CONCLUSION

In a nutshell, the findings of the study provide empirical evidence for the utilization of the VFI in the Zimbabwean context and high school aged donors were motivated mainly by the Understanding factor. The donors were also motivated by the competitive aspect of helping one's school donate more blood than any other school. Concrete items are more attractive to high school aged blood donors as form of incentives.

CONFLICT OF INTEREST

The authors have no conflict of interests to disclose.

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