# Title Page

**Title**

Determinants of intention to return to donate blood among first-time blood donors in Ghana

**Short Title**

First time donors’ intention to return

Lucy Asamoah-Akuoko1, Henrik Ullum 2,Bernard Appiah 3, Oliver W Hassall4, Tom Ndanu5, Philip Adongo6, Imelda Bates4

1 National Blood Service Ghana

2 Copenhagen University Hospital, Denmark

3 Texas A&M University School of Public Health, USA

4 Liverpool School of Tropical Medicine, Liverpool, UK

5 College of Health Sciences, University of Ghana

6 School of Public Health, University of Ghana

**Conflicts of interest**

The authors declare no conflict of interest.

**Acknowledgements**

The authors wish to acknowledge the support and input of Ole Birger Vesterager Pedersen, Emmanuel Nene Dei and Franklin Konadu Agyeman.

**Funding**

European Union Seventh Framework Programme (FP7/2007-2013) under grant agreement n° 266194.

# Abstract

**Objective**

This study seeks to identify factors that are predictive of intention to return to donate blood among first-time blood donors.

**Methods**

A cross-sectional survey of 505 first-time blood donors, selected from blood donation sessions across three regions in Ghana. Data were obtained on their intention to donate blood in the next four months, factors that would influence this decision. Logistic regression models were used to test factors that were predictive of intention to return.

**Results**

First-time donors were young with 87.4% below 35 years of age, male (72.5%), single (73.3%), Christian (93.7%), employed (58.8%), with at least a basic education (98%). Factors that positively predicted intention to return included: motivational incentives (OR=1.67, 95%CI 1.01 – 2.78; p=0.045); ease of access to the donation site (OR=2.65, 95%CI 1.48 – 4.73; p=0.001); SMS and email reminders (OR=2.84, 95%CI 1.60 – 5.06; p<0.001); and television, radio or newspaper advertisements (OR=2.97, 95%CI 1.66 – 5.31; p<0.001). Factors that negatively predicted intention included preferential access to transfusions (i.e. ‘blood credits’) (OR=0.43, 95%CI 0.23 – 0.83; p=0.012); getting to know test results (OR=0.40, 95%CI 0.20 – 0.80; p=0.010); and not knowing and/or trusting what happens to the blood after donating (OR=0.50, 95%CI 0.28 – 0.88; p=0.016).

**Conclusion**

Motivational incentives, convenient access to donation sessions, reminders and mass media advertisements appear to positively influence intention to return to donate. Conversely not knowing what happens to the blood after donation negatively influenced intention to return. Interventions to promote repeat blood donation should consider the identified factors.

**Key words**

First-time donors, intention to return, sub-Saharan Africa, blood donation

# Introduction

Maintaining adequate levels of blood for transfusion is a global challenge, and a critical public health problem in sub-Saharan Africa (SSA). The World Health Organization recommends a minimum blood collection index of 10 units of blood per 1000 population. However, all 66 countries reporting a blood collection index of less than 10 to the WHO were low- and middle-income countries, with 33 of these, including Ghana, located in SSA [1].

Voluntary non-remunerated blood donors are defined as blood donors who donate blood by their own free will without receiving any payment in cash or ‘in kind’. WHO recommends donation by voluntary non-remunerated blood donors because, compared to other types of donors, they have lower levels of markers for transfusion transmissible infections (TTI) especially if they donate repeatedly. Voluntary non-remunerated blood donors are uncommon in low- and middle-income countries. Low- and middle-income countries constitute 50 of the 58 countries worldwide that collect more than 50% of blood from family replacement blood donors who donate blood only in response to need by a patient who is known to them, usually a family member, friend or an acquaintance [1]. Family replacement blood donors are the main source of blood in several African countries, with less than 25% of blood in countries such as Cameroon and Democratic Republic of Congo being provided by voluntary non-remunerated blood donors [2]. Blood from family replacement blood donors in SSA serves as either an alternative for, or a supplement to insufficient donations from voluntary non-remunerated blood donors.

Blood shortages in SSA are predominantly attributed to insufficient numbers of reliable, regular donors. The decision to donate blood is influenced by both the factors that motivate and those that deter blood donation. These factors have been used to predict actual blood donor return in a South African study [3].

The Theory of Planned Behaviour expounds that human behaviour is guided by beliefs about outcomes of the behaviour (behavioural beliefs), normative expectations of others (normative beliefs) and the presence of factors that may affect the performance and the perceived power of these factors (control beliefs) [4]. According to the Theory of Planned Behaviour, intention is a strong predictor of behaviour, and attitude, subjective norm, and perceived behavioural control, predict intention [5]. In the context of blood donation, the Theory of Planned Behaviour has been applied in a number of studies, mostly in high income countries. In SSA, a study in Ethiopia [6] tested the Theory of Planned Behaviour and found that knowledge, subjective norm and attitude explained 12.7% of the variance of the intention to donate blood, although this did not hold for SSA migrant communities in Australia [7].

In Ghana, a nation in SSA with a population of 30 million, the National Blood Service Ghana coordinates blood collections through one stand-alone blood centre (the Southern Area Blood Centre), two hospital-based blood centres (the Central and Northern Area Blood Centres), and 147 hospital blood banks. National Blood Service Ghana’s records show that the annual blood collection has been relatively static for the last five years and is about 60% of the estimated annual requirement of 300,000 donations, blood donation is predominantly by family replacement blood donors, with only about 33% from voluntary non-remunerated blood donors, and first-time donor return rate in six months is 15.2%.

A better understanding of the motivators for, and barriers to, blood donation is needed in order to make a significant impact on increasing blood donations in Ghana. There has been very little research from Ghana, or from SSA, on the factors that affect first-time blood donors’ decisions to become regular donors. The aim of this study was therefore to identify factors that predict intention to return to donate among first-time blood donors in Ghana. This information could then inform interventions that the National Blood Service and other organisations across SSA could introduce to increase the number of returning donors and consequently increase the blood supply.

# Methods

## Study Design and Methods

A prospective, cross-sectional survey of first-time blood donors was conducted at the Southern Area Blood Centre from June to October 2015. The Southern Area Blood Centre serves a population of about 5 million and covers the Greater Accra Region, and parts of the Eastern and Central Regions of Ghana. Donors were recruited from 75 blood donation sessions of fixed blood donation clinics located in six hospitals in Greater Accra Region, and mobile blood donation sessions in settings such as secondary and tertiary schools, religious organisations (churches and other religious groups), a social youth group, a soccer academy, shopping malls and workplaces.

To detect a return rate of 15.2% (National Blood Service Ghana records) with 80% power at a confidence level of 95% and 5% margin of error, the required study sample size was 505 (250 voluntary non-remunerated blood donors and 255 family replacement blood donors) with a stratified design for voluntary non-remunerated blood donors and family replacement blood donors, and 10% non-response rate. The15.2% donor return rate was used to calculate the sample size because the study initially aimed at predicting first-time donor return rates. However, due to logistic challenges at the study site, the return rate was very low (3.1%), therefore the study looked at predictors of intention, which is antecedent to donor return [4]. For each session within the selected area for the period of the study, all first-time donors were approached and recruited, until the end of the particular session, for the questionnaire survey. All first-time donors at each session were recruited based on the stratification for voluntary non-remunerated blood donors and family replacement blood donors until the required number of respondents was achieved.

## Questionnaire design and administration

The contents of the questionnaire were based on findings from a qualitative study on determinants of blood donation [8], and the constructs of the standard Theory of Planned Behaviour. The constructs of the theory of planned behaviour measures including intention to donate blood were based on published measures [9]. The questionnaire, which has been presented as supplementary file 1, assessed several indicators including socio-demographic characteristics and motivators (30 items) and deterrents (33 items) to blood donation among first-time donors, as well as predictors of donors’ intention to return to donate, using the Theory of Planned Behaviour model. The questionnaire contained different formats of items, which were multiple-choice with one or multiple answers, five-point Likert-type ranging from strongly disagree (1) to strongly agree (5), dichotomous and open-ended questions. The United States Census and Survey Processing System (CSPro) software [10] was used as a platform for the questionnaire administration and data entry. The English version of the developed questionnaire was captured into the software by a database developer.

Six data collectors were trained to administer the questionnaire and collect data alongside the lead investigator. The questionnaire was piloted with 10 respondents, who were then excluded from the main study.

## Measures

The Theory of Planned Behaviour constructs measured were intention (one item), attitude (six items), subjective norm (two items), perceived behavioural control (two items) and altruism (five items) (See Appendix).

## Data analysis

Descriptive summaries were generated for socio-demographic characteristics such as age, sex, marital status, education, ethnic background and employment, as well as for motivators and deterrents to blood donation. Deterrent and motivational factors were categorised into binary variable with significantly disagree to neutral being coded as 0 (disagree) and agree to strongly agree being coded as 1 (agree). Univariate test was done after which significant variables were included in a binomial logistic regression analysis to test for independent significant predictors of intention to return to donate blood, using intention to return to donate blood as the dependent variable and the demographic characteristics, motivators for, and deterrents to blood donation, as well as the attitude, subjective norm, behavioural control and altruism, as independent or explanatory variables. Significant level was set at alpha equal at 0.05 (α=0.05; thus p<0.05).

## Ethical considerations

This study was approved by the Ethics Committees the Ghana Health Service (GHS-ERC: 10/09/13) and the Liverpool School of Tropical Medicine (Research Protocol: 13.27). In conducting the study, voluntary participation, confidentiality and anonymity of respondents were ensured. Written informed consent was also obtained from all respondents.

# Results

## Demographic characteristics of respondents

The age of respondents ranged from 18 years to 58 years (Table 1), with highest proportion being those in the age group 18-24, and most being male (72.5%), employed (58.8%), Christian (93.7%) and receiving at least basic education (98.0%). Respondents below 35 years of age formed 84.7% of the study population.

## **First-time donor return**

One item was used to measure actual return behaviour after six-months of follow up. 83% of donors were reached, one donor (0.2%) declined to respond. Of 418 donors who responded, 3.1% had returned to donate blood. About 91% (n=385) of participants who did not return gave reasons for **not** returning to donate. Sixty-eight percent did not return because they had not received information on need, where and when to donate to donate from the Blood Centre, or the blood collection teams had not returned. Nineteen percent had not returned due inconvenience of distance to the donation site, or busy schedule.

## Factors relating to the respondents’ decision to donate blood

Most respondents were family replacement blood donors (50.5%) who donated specifically for someone (sick friends, acquaintances, colleagues, and family members); while those donating for no-one specifically comprised of 49.5%. However, based on their own understanding of volunteering, most respondents (82.6%) perceived themselves as having donated voluntarily, with only 17.4% either not knowing or perceiving themselves as non-voluntary donors. Of all the respondents, 67.9% reported receiving incentives for donating, and of those, 96.2% received incentives in the form of motivational items such as branded pens, exercise books, and carrier bags; as well as refreshments. Of those who reported receiving incentives, 84.8% received them from the Blood Centre or Blood Bank, 14% from other sources such as churches or sponsors, and 1.2% from the blood recipients. The factor that mostly influenced respondents’ perceptions about blood was formal education (59%), although religion and culture also influenced perceptions. Of the 398 respondents who responded to seeing or hearing National Blood Service Ghana/Blood Bank advertisements, 374 (93.7%), heard or saw the adverts via radio or television. Receiving reminders by phone or SMS was preferred (84.5%) to mail or email (12.5%). Moreover, 68.7% of respondents planned to return to donate in four months’ time, and 87.7% planned to continue donating for as long as their health allowed.

## Association between respondents’ demographic characteristics and intention to return to donate

Six items were used to assess the demographic predictors of intention to return to donate blood, and three were significant. These were: a) Marital status (p=0.036), with those who were married being two times as likely to intend to return to donate compared to those who were single (OR=1.953, 95% CI 1.059 - 3.600; p=0.032): b) Education; those with basic education (OR=2.341, 95% CI 1.401– 3.912; p=0.001) and secondary education (OR=2.194, 95% CI 1.332– 3.613; p=0.002) were twice as likely to intend to return compared to those with tertiary education: c) Ethnic background; the Ga/Dangbe ethnicity being about half as likely to intend to return compared to the Akan ethnicity (OR=0.565, 95% CI 0.346 - 0.924; p=0.023). The Nagelkerke R-square value for the final logistic regression model was 0.085.

## Association between factors related to the respondents’ decision to donate blood and respondents’ intention to return to donate blood

Of the six items reflecting other characteristics of respondents, two were statistically significant (Table 2). There was no significant association between “type of donor” and intention to return. However, respondents (either voluntary non-remunerated blood donors or family replacement donors, according to the definition of the National Blood Service Ghana, and based on who the respondent donated blood for) who did not consider themselves as voluntary donors (OR=0.295, 95% CI 0.134 - 0.649; p=0.002) or who did not know whether they considered themselves as voluntary donors (OR=0.356, 95% CI 0.148 - 0.853; p=0.021) were significantly less likely to intend to return to donate as compared to those who considered themselves to be voluntary donors. The Nagelkerke R-square value for the final logistic regression model was 0.124.

## Association between motivating factors for blood donation and intention to return to donate blood in Ghana

Of the 30 items that were entered into the model to determine motivators for blood donation that predict intention to return to donate blood, seven were significantly associated with intention to return (Table 3). Five factors **(“if it is easy to get to the blood donation site’, “if Ghana needs blood”, “because it would make me feel good about myself”, “if I am notified through SMS/email reminders”, and “by radio, TV or newspaper advertisement on blood donation”)** were positively associated**,** and two **(“for blood credits for me and my family”, and “if I will get to know my transfusion transmissible infection test results”)** were negatively associated with intention to return. The Nagelkerke R-square value for the final logistic regression model was 0.362.

## Association between deterrents to blood donation and intention to return to donate blood

Thirty factors were included in the model to determine deterrents to blood donation that are associated with intention to return to donate blood **(Table 4)**. Of these, four deterrents **(“because, the motivational items that are given to blood donors are not good enough”, “if I do not know where the nearest blood donation site is”, “that, I think blood mostly goes to people who are rich”, and “that, it is against my culture”)** were positively associated, and one **(“that, I do not know what happens to the blood after donation”)** was negatively associated with intention to return. The Nagelkerke R-square value for the logistic regression model was 0.167.

## Association between attitude, subjective norm, behavioural control and altruism, and intention to return to donate blood

Of the four items that were used to determine the association between attitude, subjective norm, behavioural control and altruism on one hand, and intention to return to donate on the other hand, three were significantly associated with intention to return. Only attitude was not significantly associated with intention to return (OR=2.093, 95% CI 0.889- 4.929; p=0.091). Behavioural control score (OR=1.905, 95% CI 1.267- 2.865; p=0.002); altruism score (OR=2.309, 95% CI 1.125- 4.740; p=0.023); and subjective norm score (OR=1.909, 95% CI 1.249- 2.919; p=0.003) were positively associated with intention to return. The Nagelkerke R-square value for the logistic regression model was 0.088.

## Determinants of intention to return to donate blood among first-time **voluntary non-remunerated blood donors and family replacement blood donors**

When 20 variables that were identified as significant predictors of intention from all the group analyses were entered into a single multivariable logistic model, half were statistically significant (Table 5).

Being given refreshment, a motivational item or an incentive to donate blood; ease of access to the blood donation site; donating to help country; feeling good about self; SMS/email reminders and notification and television, radio or newspaper advertisement on blood donation were all positively associated with intention to return to donate. Blood credits (a form of a contract with the blood centre, where blood donors receive preferential access to blood transfusion for family and oneself), getting to know their test results for transfusion transmissible infections, and not knowing what happens to the blood after donating were negatively associated with intention to return to donate. The Nagelkerke R-square value for the final logistic regression model was 0.404.

# Discussion

This study has identified the demographic and other factors that predict the intention of first-time blood donors to return to donate blood. To the best of our knowledge, this is the first study in Ghana to comprehensively explore the predictive values of determinants of intention to return to donate blood among of first-time donors, and among first-time voluntary non-remunerated blood donors and family replacement blood donors in Africa.

Based on the bivariate logistic regression models performed at group levels, motivators explained the greatest variance in intention to return to donate blood (36.2 %;), followed by deterrents (16.7%) and three constructs of the Theory of Planned Behaviour (attitude, behavioural control and subjective norm) and altruism score (8.8%). The final logistic regression model with all 20 significant variables explained 40.4% of the variance in predicting intention to return to donate blood. These findings suggest that interventions to aid the intention to return to donate blood among all first-time donors should focus more on motivational factors. The low explanatory power of the Theory of Planned Behaviour in predicting the intention to donate blood suggests that scholars should not only explore these theoretical constructs in related future studies among the study population but should include other factors including deterrents, motivators and demographic factors.

In Ghana attitude as a construct of the Theory of Planned Behaviour was not found to be a significant predictor of intention to return to donate blood. This supports the findings of a study of African migrant communities in Australia [7], but not those of studies in Ethiopian adults [11], and in some high income countries [12,13] where attitude is a significant contributor to intention to donate blood. Those who perceived themselves to have control over behaviour relating to blood donation and who had family and friends who supported blood donation were more likely to return as compared to those who did not in the group analysis. This is in agreement with the study by Kassie et al. (2020). Also, those who agreed to being altruistic were more likely to return, supporting the proposition that blood donation is an altruistic behaviour. However, as with Polonsky et al. (2013), these Theory of Planned Behaviour constructs did not predict intention to return in the final logistic analysis.

Overall, the age of respondents in the current study was skewed towards younger donors and followed a similar pattern to the age distribution of blood donors who donate at the Southern Area Blood Centre. Gender representation of respondents was 72.5% males and 27.5% females. Data on age distribution of 30140 blood donors at the Southern Area Blood Centre of National Blood Service Ghana, from March 2017 to February 2018 (National Blood Service Ghana records), showed that 74.4% of donors were below 35 years, and 76.8% were males. Although marital status, education and ethnicity were significantly associated with intention to return to donate blood in the sub-group analysis, they were insignificant in the final logistic model. The major ethnic groups in Ghana are Akan 47.5%, Hausa/Dagbani 16.6%, Ewe 13.9%, Ga-Dangme 7.4% of the population (Ghana Statistical Services records). The study covered three regions in southern Ghana, therefore it is not surprising that the Ga/Dangbe and Ewe were more than the Hausa/Dabgani, predominant in northern Ghana, in this study. The non-significant finding regarding education resonates with those studies conducted in high-income countries including Australia [12] and Ireland [13]. The significant associations found at the sub-group analysis level mirrors other studies conducted elsewhere. For example, in our study, marital status was a significant determinant of intention to return to donate blood with the married people being twice as likely to return as the unmarried. A study in Saudi Arabia [14] showed that married individuals had higher blood donation knowledge level compared to unmarried (mean rank was 182.3 versus 158.9), and higher blood donation attitude score compared to unmarried (mean rank was 184.6 versus 153.8). However, contrary to the findings of the study by Alfouzan (2014), which showed that married individuals had higher rate of blood donation compared to unmarried individuals (53.3% versus 29.4%), our study of first-time donors showed lower blood donation rates among married people compared to unmarried individuals, possibly due to the younger age of most respondents.

Similarly, secondary and tertiary education were identified as a significant positive predictors of intention to return to donate compared to those with tertiary education. This is similar to findings by a study in Botswana [15]. Secondary schools are a convenient organised group that are targeted, educated and mobilised for blood donation in Ghana. Blood collection in schools increases the convenience of access to donation sites for donors and eliminates barriers relating to time, lack of opportunity, and difficult access. Having a convenient place to donate has been identified as a motivator for frequent repeat donations [16].

In the final logistic regression model, factors that positively predicted intention to donate blood included: motivational incentives for donating; ease of access to the blood donation site; donating blood because Ghana needs blood; donating because it makes one feel good about oneself; SMS and email reminders; and television, radio or newspaper advertisement on blood donation. Other studies have also identified the use of mobile phones, television, radio or newspaper advertisements for promoting repeat blood donation in SSA [3,17] and elsewhere [18,19]. Thus, interventions for encouraging first-time blood donors to return to donate should include those that focus on television and radio advertisement and educational information; telephone calls and mobile phones messages with reminders to donors on when and where to donate. The potential impact of reminders to blood donors with information on when **blood is needed**, when and how to donate is supported by the finding that 68% of reasons for donors not returning were due the Blood Centre’s failure or inability to send such reminders.

In Ghana, “blood credits” have been used as incentive for blood donation, but is in the process of being phased out due to poor implementation and abuse. First-time donors were less likely to have the intention to return if they were motivated by “blood credits”. They are also less likely to have intention to return if they would donate blood with the motive of getting to know their results for transfusion transmissible infection tests. These findings are contrary to the findings of previous qualitative studies which identified these factors as motivators for blood donation [8,22]. “Blood credit” as a negative predictor of intention to return is mirrored by the findings of a study in South Africa which showed that donors were more likely to return if they were not motivated to donate because blood would be available for themselves [3]. The fear of knowing one’s transfusion transmissible infection, especially HIV test results, and associated stigmatization has been identified as a strong deterrent by numerous studies in SSA [20–23], and especially among young donors in Ghana [8]. It is, therefore, not surprising that getting to know the results of transfusion transmissible infection tests negatively predicted intention to return to donate among respondents in this study who are mostly young. Interventions for helping first-time blood donors in the study population to become repeat blood donors should, therefore, include education on the importance of infectious disease screening of donated blood, and avoid any focus on providing “blood credits”.

Similarly, group analysis indicated that those who received refreshment/incentives were twice as likely to return as compared to those who did not receive refreshment/incentives. The understanding of what constitutes an acceptable motivational item for donation compared to an item that has a value high enough to be considered as remuneration, or even paid donation, varies widely [8,24]. In our study, respondents’ description of incentives referred to refreshments, token motivational items (e.g. pens) and items received by both voluntary non-remunerated blood donors and family replacement blood donors from patients or their families. **Another surprising finding was that those who considered inadequate motivational items for blood donors as a deterrent to blood donation were more likely to have the intention to return to donate. This could also be attributed to the lack of clarity on what items are considered as motivational items by blood donors. It is also possible that the respondents, who were all first-time blood donors, considered what they received as motivational items for donating blood to be adequate. Unfortunately, this study does not have enough data to determine whether the respondents considered the current motivational items as being adequate.** In Ghana, incentives are not clearly defined, and could vary between donation centres. An important step for the Blood Service is to discuss with stakeholders to define which incentives are acceptable for non-remunerated donations, and which constitute remuneration for donations; and develop a policy document and donor education materials based on the outcome of such discussions. It is also important to have a dialogue with all stakeholders and standardise incentives. This will facilitate a controlled implementation and evaluation of the effect of incentives on repeat blood donations, thus providing evidence on how to effectively apply incentives without compromising the autonomy of the donor and the safety of the blood supply. The issue of what constitutes an incentive and remuneration for blood donation has received some attention in the in SSA [17] and non-SSA countries [25]. Thus, it was not surprising that motivational incentives significantly increased the intention of respondents to return to donate blood.

Although “not knowing where the nearest blood donation site is”, “thinking that blood mostly goes to people who are rich”, and cultural connotations to blood donation were not significantly associated with the intention to return in the final logistic regression model, these were significantly associated with intention to return in the in the subgroup analysis. The lack of awareness of blood donation site as a deterrent [22] to returning to donate is mirrored by ease of access to the blood donation site as a motivator [22]. Therefore, improvement of access to donation site should be a critical focus of interventions to promote blood donation. Negative influence of cultural beliefs and practices have been identified by a previous study as a deterrent to blood donation [27].

Respondents who would be deterred from donating blood by not knowing what happens to the blood after donation and if they thought that blood mostly goes to the rich were less likely to have the intention to return to donate blood. Rumours, mistrust and misconceptions related to blood and blood donation have been identified [8,22,26] that could make donors worry about what happens to the blood. Common misperceptions include the belief that blood has spiritual significance; that it is used for rituals and sacrifices to deities and for covenants between persons, including covenants between the blood donor and the blood recipient [8]; and that donated blood is sold [20,21,27]. Spiritual connotations relating to blood were identified as a key perception about blood and blood donation, possibly influenced by certain traditional practices, in a qualitative study in Ghana [8], and it is therefore not surprising that this deters intention to return to donate in the study population. Interventions aimed at promoting blood donation in Ghana need to focus on demystifying myths and misperceptions through education.

## Limitations of the study

The current study involved three regions of Southern Ghana, Greater Accra, Eastern and Central regions, and thus the findings may not reflect the population of first-time blood donors in whole of Ghana. The current study did not assess the determinants of actual return to donate blood but used intention to return as a predictor of donor return. Although intention is a predictor of actual behaviour, intention to return to donate blood may not necessarily translate into actual blood donation behaviour.

# Conclusion

Factors that positively influence blood donor return include motivational items, convenient access to blood donation session, if the donors know that Ghana needs blood, and if it makes people feel good about themselves, SMS and email reminders, and advertisements on blood donation through television, radio or newspapers Factors that negatively influence repeat blood donation include, donating to get “blood credits”, getting to know one’s TTI test, and not knowing what happens to the blood after donating. This study suggests that interventions that are likely to increase first-time donor return in Ghana include those aimed at providing information and education on blood donation, improving access to donation sites, reminders for blood donation and a more evidence-based incentive system. Incentives should receive priority attention, as they could potentially motivate or demotivate blood donors. There is the need for the Ghana NBS to work with academic institutions and implementation researchers to develop and implement interventions in an empirical manner to facilitate quality evaluations and scale-up studies.

References

1 WHO: *Blood Safety and Availability*. 2019 https://www.who.int/news-room/fact-sheets/detail/blood-safety-and-availability

2 Tagny CT. The current need for family and replacement donation in sub-Saharan Africa should not hide the difficulties of its management. *Transfus Med* 2012;**22**:298–299

3 Swanevelder R, Reddy R, Chowdhury D et al.: Using a motivator and deterrent questionnaire to predict actual donation return behavior among first-time African-origin blood donors. *Transfusion* 2019;59:2885–2892

4 Ajzen I: Behavioral interventions based on the theory of planned behavior. 2019 http://people.umass.edu/aizen/pdf/tpb.intervention.pdf

5 Ajzen I: The theory of planned behavior. *Organ Behav Hum Decis Process* 1991;**50**:179–211

6 Mirutse G, Fisseha G, Abebe L, et al.: Intention to donate blood among the eligible population in Mekelle City, Northern Ethiopia: Using the theory of planned behavior. *Am J Health Res* 2014;**2**:158-163

7 Polonsky MJ, Renzaho AMN, Ferdous AS, et al.: African culturally and linguistically diverse communities’ blood donation intentions in Australia: integrating knowledge into the theory of planned behavior. *Transfusion* 2013;**53**:1475–1486

8 Asamoah-Akuoko L: *Evolving Strategies to Encourage Repeat Donations Among First Time Voluntary and Replacement Blood Donors In Southern Ghana*. Liverpool, UK: University of Liverpool. 2018

9 Lemmens KPH, Abraham C, Hoekstra T, et al.: Why don’t young people volunteer to give blood? An investigation of the correlates of donation intentions among young nondonors. Transfusion 2005;**45**:945–955

10 US Census Bureau DIS. *Census and Survey Processing System (CSPro)*, 2015 http://www.census.gov/population/international/software/cspro/

11 Kassie A, Azale T, Nigusie A: Intention to donate blood and its predictors among adults of Gondar city: Using theory of planned behavior. *PLoS One* 2020;**15**

12 Francis KL, Polonsky MJ, Jones SC, Renzaho AMN. The effects of a culturally-tailored campaign to increase blood donation knowledge, attitudes and intentions among African migrants in two Australian States: Victoria and South Australia. *PLoS On*e 2017;**12**

13 McMahon R, Byrne M: Predicting donation among an Irish sample of donors and nondonors: extending the theory of planned behavior. *Transfusion* 2008;**48**:321–331

14 Alfouzan N. Knowledge, attitudes, and motivations towards blood donation among King Abdulaziz Medical City Population [Internet]. *Int J Family Med* 2014

15 Pule PI, Rachaba B, Magafu MGMD, et al.: Factors Associated with intention to donate blood: sociodemographic and past experience variables. *J Blood Transfus* 2014

16 Schlumpf KS, Glynn SA, Schreiber GB, et al.: Factors influencing donor return. *Transfusion* 2008;**48**:264–272

17 Appiah B: *Promoting Blood Donation in Sub-Saharan Africa: Role of Culture and Interventions*. College Station, TX: Texas A&M University, 2013

18 Godin G, Vézina-Im L-A, Bélanger-Gravel A et al.: Efficacy of interventions promoting blood donation: A systematic review. *Transfus Med Rev* 2012;**26**:224-237

**19 Gemelli CN, Carver A, Garn A, Wright ST et al.: Evaluation of the impact of a personalized postdonation short messaging service on the retention of whole blood donors. Transfusion. 2018 Mar;58(3):701-9**

20 Agbovi K-K, Kolou M, Fétéké L, Haudrechy D, North M-L, Ségbéna A-Y. [Knowledge, attitudes and practices about blood donation. A sociological study among the population of Lomé in Togo]. *Transfus Clin Biol J Société Fr Transfus Sang* 2006;**13**:260–265

21 Kabinda JM, Miyanga SA, Ramazani SY,et al.: Assessment of knowledge, attitude and practice of the general population of Bukavu in the Democratic Republic of Congo on Blood Donation and Blood Transfusion. *Health* 2014;**6**:2525–2234

22 Muthivhi TN, Olmsted MG, Park H, et al.: Motivators and deterrents to blood donation among Black South Africans: a qualitative analysis of focus group data. *Transfus Med* 2015**25**(4):249–258

23 Obi SN. Antenatal blood donation for pregnant Nigerian mothers: the husbands’ perspective. *J Obstet Gynaecol* 2007;**27**:467–469

24 Koster J, Hassall OW. Attitudes towards blood donation and transfusion in Bamenda, Republic of Cameroon. *Transfus Med* 2011;**21**:301–307

25 Farrugia A, Penrod J, Bult JM. Payment, compensation and replacement--the ethics and motivation of blood and plasma donation. *Vox Sang.* 2010;**99**(3):202–211

26 Asamoah-Akuoko L, Hassall OW, Bates I, et al.: Blood donors’ perceptions, motivators and deterrents in Sub-Saharan Africa - a scoping review of evidence. *Br J Haematol*. 2017;**177**:864–877

27 Alinon K, Gbati K, Sorum PC, et al.: Emotional-motivational barriers to blood donation among Togolese adults: a structural approach. *Transfus Med* 2014;**24**:21–26

Tables

### Table 1: Demographic characteristics of respondents in the study

|  |  |  |  |
| --- | --- | --- | --- |
| **Characteristics** | **Categories** | **Number**  **(total = 505)** | **Percentage**  **%** |
|
| Age in years | 18-24  25-34  35-44  45-60 | 239  189  63  14 | 47.3  37.4  12.5  2.8 |
| Sex | Male  Female | 366  139 | 72.5  27.5 |
| Marital status | Single  Married  Other | 370  119  16 | 73.3  23.6  3.2 |
| Level of education | No formal education  Basic  Secondary  Tertiary | 10  157  185  153 | 2.0  31.1  36.6  30.3 |
| Ethnic background | Akan  Ewe  Ga/Dangbe  Hausa/Dagbani  Other | 199  122  130  27  27 | 39.4  24.2  25.7  5.3  5.3 |
| Religion | Christian  Muslim | 473  32 | 93.7  6.3 |
| Employment | Student  Unemployed/Homemaker  Employed/formal/self  Other | 165  38  297  5 | 32.7  7.5  58.8  1.0 |

### Table 2: Association between factors related to the respondents’ decision to donate blood and intention to return to donate

| **Predictor Variable** | **Categories** | **P-value** | **OR** | **95% C.I. for OR** | |
| --- | --- | --- | --- | --- | --- |
| **Lower** | **Upper** |
| Type of donor  (Ref – Voluntary) | Replacement | 0.066 | 0.420 | 0.166 | 1.060 |
| Who the donor donated for  (Ref -Friend/acquaintance/colleague) | Relative | 0.056 | 2.061 | 0.982 | 4.324 |
| Blood bank/Blood service | 0.943 | 1.030 | 0.459 | 2.311 |
| Community | 0.218 | 2.399 | 0.596 | 9.664 |
| Whether a donor considers self as voluntary donor  (Ref - Yes) | No | **0.002** | 0.295 | 0.134 | 0.649 |
| Don’t know | **0.021** | 0.356 | 0.148 | 0.853 |
| Whether donor received incentive/refreshment for donating  (Ref – No) | Yes | **0.033** | 1.710 | 1.043 | 2.804 |
| Factor that mostly influence donor’s perceptions of blood (Ref - Culture) | Education | 0.184 | 0.542 | 0.219 | 1.338 |
| Religion | 0.188 | 0.511 | 0.188 | 1.389 |
| Other | 0.727 | 0.745 | 0.143 | 3.883 |
| Ever seen/heard advertisement from NBSG/Blood Bank  (Ref – Radio) | Television | 0.606 | 1.141 | 0.692 | 1.880 |
| Newspaper/Other | 0.335 | 0.250 | 0.015 | 4.193 |

*Ref, reference category; NBSG, National Blood Service Ghana*

### Table 3: Association between motivation for blood donation and intention to return to donate

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Motivators**  **(Ref – Disagree)** | **P-value** | **OR** | **95% C.I. for OR** | |
| **Lower** | **Upper** |
| … if it is easy to get to the blood donation site | **0.006** | 2.306 | 1.277 | 4.163 |
| … to help save lives | 0.358 | 2.370 | 0.376 | 14.923 |
| … if my friends or relatives needed blood | 0.267 | 0.386 | 0.072 | 2.071 |
| … to help my community | 0.547 | 0.729 | 0.261 | 2.037 |
| … if it meant that there will be blood available in future when my family or friends need it | 0.819 | 0.867 | 0.257 | 2.931 |
| … if it meant that there will be blood available in future when I need it | 0.506 | 1.398 | 0.520 | 3.760 |
| … because my religion encourages me to donate blood | 0.851 | 0.947 | 0.540 | 1.663 |
| … to help the Blood Bank | 0.732 | 0.837 | 0.303 | 2.313 |
| … if Ghana needs blood | **0.010** | 3.572 | 1.349 | 9.459 |
| … for blood credits for me and my family | **0.013** | 0.440 | 0.231 | 0.839 |
| … because it would make me feel good about myself | **0.002** | 2.639 | 1.431 | 4.867 |
| … to know how it feels like | 0.052 | 0.560 | .0312 | 1.006 |
| … if I am notified through SMS/email reminders | **0.004** | 2.354 | 1.310 | 4.229 |
| … by educational talks on blood | 0.214 | 1.610 | 0.760 | 3.412 |
| … if I was asked by my peers who are blood donors | 0.554 | 1.192 | 0.666 | 2.136 |
| … by radio, TV or newspaper advertisement on blood donation | **0.006** | 2.467 | 1.296 | 4.694 |
| … by a blood drive at my school or workplace | 0.904 | 1.046 | 0.506 | 2.162 |
| … if I will get to know my blood group | 0.146 | 1.779 | 0.818 | 3.870 |
| … if I will get to know my other (TTI) test results | **0.023** | 0.389 | 0.173 | 0.877 |
| … if I will get a free medical check-up | 0.641 | 0.837 | 0.396 | 1.767 |
| … if I will get cash payment | 0.735 | 0.884 | 0.433 | 1.804 |
| … if I will get cash gifts | 0.662 | 1.169 | 0.580 | 2.356 |
| … because it is good for my health | 0.736 | 1.111 | 0.601 | 2.056 |
| … if I will get incentives such as milk, milo, T-shirts, blood tonic etc. | 0.424 | 0.738 | 0.350 | 1.555 |
| … to get the motivational items given to donors such as pens, exercise books etc. | 0.490 | 1.300 | 0.617 | 2.741 |
| … by the awards/prizes given on blood donor day | 0.165 | 0.641 | 0.342 | 1.201 |
| … because it is a way to make a difference | 0.965 | 1.015 | 0.534 | 1.926 |
| … because many of my friends/family are blood donors | 0.245 | 1.400 | 0.794 | 2.468 |
| … by an appeal for blood donation on radio or TV | 0.052 | 1.968 | 0.995 | 3.891 |
| … if my friends, relatives or co-workers asked me to donate blood) | 0.574 | 0.838 | 0.453 | 1.551 |

*Ref, reference category; TV, television; TTI, transfusion transmissible infection; SMS, Short Message Service*

### Table 4: Association between deterrents to blood donation and intention to return

| **Deterrents**  **(Ref – Disagree)** | **P-value** | **OR** | **95% C.I. for OR** | |
| --- | --- | --- | --- | --- |
| **Lower** | **Upper** |
| … that, I do not have time to donate blood | 0.491 | 0.846 | 0.526 | 1.361 |
| … that, I think do not have enough blood | 0.799 | 1.065 | 0.658 | 1.723 |
| … that, I think blood donation is for other people | 0.381 | 1.410 | 0.653 | 3.044 |
| … that, the blood collection times are not convenient to me | 0.096 | 0.663 | 0.408 | 1.076 |
| … that, I do not like to complete the blood donor questionnaire | 0.916 | 1.038 | 0.519 | 2.074 |
| … if, the queues are too long | 0.079 | 0.649 | 0.400 | 1.052 |
| … if I am not called or asked to give | 0.083 | 0.646 | 0.394 | 1.059 |
| … because, the TV/Radio advertisements do not convince me to donate blood | 0.256 | 0.735 | 0.433 | 1.249 |
| … because, the motivational items that are given to blood donors are not good enough | **0.002** | 3.505 | 1.558 | 7.885 |
| … because I do not receive money for donating blood | 0.175 | 0.529 | 0.211 | 1.327 |
| … if I do not know there is a need for blood | 0.141 | 0.695 | 0.428 | 1.128 |
| … if I do not know where the nearest blood donation site is | **0.019** | 1.798 | 1.101 | 2.937 |
| … that, I do not know what happens to the blood after donation | **0.023** | 0.541 | 0.318 | 0.918 |
| … if I am not treated well by the Blood Bank staff | 0.628 | 0.883 | 0.534 | 1.460 |
| … if, the blood donation clinic setting is poor | 0.955 | 0.986 | 0.603 | 1.614 |
| … that, I am scared of the needle or pain/discomfort | 0.947 | 1.020 | 0.563 | 1.850 |
| … that, I am afraid of bruising/having a sore arm | 0.527 | 1.278 | 0.597 | 2.736 |
| … that, it can make me sick | 0.092 | 0.561 | 0.286 | 1.099 |
| … that, it can make me weak spiritually | 0.563 | 1.290 | 0.545 | 3.052 |
| … that, I am afraid of catching HIV if I donate blood | 0.450 | 0.741 | 0.340 | 1.615 |
| … because I had a bad reaction or fainted when I gave blood | 0.671 | 1.188 | 0.536 | 2.632 |
| … because I heard that others had a bad reaction or fainted after donating | 0.121 | 0.599 | 0.314 | 1.144 |
| … that, I am afraid of the sight of blood | 0.088 | 2.129 | 0.895 | 5.064 |
| … that, I am afraid of finding out about my HIV status | 0.791 | 1.102 | 0.539 | 2.253 |
| … that, I think the blood bank sells the blood that is donated for free | 0.087 | 0.585 | 0.316 | 1.082 |
| … that, I think blood mostly goes to people who are rich | **0.008** | 2.709 | 1.301 | 5.640 |
| … that, I am afraid the blood bank gives away donated blood to occultists/“sakawa” practitioners | 0.927 | 0.968 | 0.478 | 1.957 |
| … that, it is against my personal beliefs | 0.390 | 0.676 | 0.277 | 1.652 |
| … that, it is against my culture | **0.040** | 3.515 | 1.059 | 11.664 |
| … that, it is against my religion | 0.478 | 0.689 | 0.246 | 1.928 |

*Ref, reference category; TV, television; HIV, Human Immunodeficiency Virus*

### Table 5: Determinants of intention to return

| **Predictor Variable** | **Categories** | **P-value** | **OR** | **95% C.I. for OR** | |
| --- | --- | --- | --- | --- | --- |
| **Lower** | **Upper** |
| ***Demographic characteristics*** |  |  |  |  |  |
| Marital status  (Ref - Single) | Married | 0.629 | 0.868 | 0.489 | 1.541 |
| Other | 0.142 | 4.444 | 0.607 | 32.538 |
| Education  (Ref - No formal education) | Basic | 0.470 | 0.445 | 0.049 | 4.003 |
| Secondary | 0.669 | 0.617 | 0.067 | 5.665 |
| Tertiary | 0.289 | 0.302 | 0.033 | 2.764 |
| Ethnic background  (Ref - Akan) | Ewe | 0.755 | 0.905 | 0.484 | 1.691 |
| Ga/Dangbe | 0.156 | 0.649 | 0.357 | 1.180 |
| Hausa/Dagbani | 0.179 | 0.491 | 0.174 | 1.386 |
| Other | 0.360 | 0.612 | 0.214 | 1.751 |
| ***Factors related to the respondents’ decision to donate blood*** |  |  |  |  |  |
| Whether a donor considers self as voluntary donor  (Ref - Yes) | No | 0.211 | 0.610 | 0.281 | 1.324 |
| Don’t know | 0.884 | 1.074 | 0.413 | 2.791 |
| Whether donor received incentive/refreshment for donating  (Ref - No) | Yes | **0.045** | 1.678 | 1.011 | 2.785 |
| ***Motivators*** |  |  |  |  |  |
| … if it is easy to get to the blood donation site  (Ref - Disagree) | Agree | **0.001** | 2.650 | 1.485 | 4.731 |
| … if Ghana needs blood  (Ref - Disagree) | Agree | **0.034** | 2.572 | 1.075 | 6.155 |
| … for blood credits for me and my family  (Ref - Disagree) | Agree | **0.012** | 0.434 | 0.226 | 0.834 |
| … because it would make me feel good about myself  (Ref - Disagree) | Agree | **0.049** | 1.792 | 1.004 | 3.201 |
| … if I am notified through SMS/email reminders  (Ref - Disagree) | Agree | **<0.001** | 2.843 | 1.596 | 5.064 |
| … by radio, TV or newspaper advertisement on blood donation  (Ref - Disagree) | Agree | **<0.001** | 2.972 | 1.662 | 5.315 |
| … if I will get to know my other (TTI) test results  (Ref - Disagree) | Agree | **0.010** | 0.397 | 0.196 | 0.804 |
| ***Deterrents*** |  |  |  |  |  |
| … because, the motivational items that are given to blood donors are not good enough  (Ref - Disagree) | Agree | **0.046** | 2.363 | 1.017 | 5.490 |
| … if I do not know where the nearest blood donation site is  (Ref - Disagree) | Agree | 0.967 | 0.989 | 0.587 | 1.668 |
| … that, I do not know what happens to the blood after donation  (Ref - Disagree) | Agree | **0.016** | 0.499 | 0.283 | 0.877 |
| … that, I think blood mostly goes to people who are rich  (Ref - Disagree) | Agree | 0.107 | 1.800 | 0.881 | 3.675 |
| … that, it is against my culture  (Ref - Disagree) | Agree | 0.204 | 1.911 | 0.703 | 5.191 |
| ***TPB constructs and altruism*** |  |  |  |  |  |
| Subjective Norms  (Ref - Negative) | Positive | 0.089 | 1.561 | 0.935 | 2.606 |
| Behavioural control  (Ref - Negative) | Positive | 0.120 | 1.507 | 0.899 | 2.525 |
| Altruism  (Ref - Negative) | Positive | 0.228 | 1.768 | 0.700 | 4.463 |

*Ref, reference category; TV, television; TTI, transfusion transmissible infection; SMS, Short Message Service;*

*TPB, Theory of planned behaviour*

Appendices

## Measures

### Intention

Intention to return to donate blood was measured by using one questionnaire item “I plan to return to donate blood in 4 months when I will be due for donation”. Responses ranged from "strongly disagree" (1) to "strongly agree" (5). Intention to donate blood was categorised into binary outcome as intend to return (1) or not (0).

### Attitude

Attitude towards blood donation was assessed using six items, “I find giving blood negative/positive, good/bad, meaningless/worthwhile, pleasant/unpleasant, annoying/enjoyable, unappealing/appealing” on five-point Likert scale. The negative items were reverse scored. A mean score of attitude was computed and categorised into a binary variable using a cut-off point of </=3.4 as 0 “disagree”, and >/=3.5 as 1 “agree”.

### Subjective norm

Subjective norm was assessed using two questionnaire items, “My family/friends think I should continue giving blood as long as my health allows it; and “I normally do what my family and friends want me to do” on five-point Likert scale. A mean score of subjective norm was computed and categorised into a binary variable using a cut-off point of </=3.4 as 0 “disagree”, and >/=3.5 as 1 “agree”.

### Perceived behavioural control

Direct perceived behavioural control was assessed by two items, “If I wanted to, I would be able to continue giving blood as long as my health allows it; and I find it hard to give blood time after time” on five-point Likert scale. The negative items were reverse scored. A mean score for perceived behavioural control was computed and categorised into a binary variable using a cut-off point of </=3.4 as 0 “disagree”, and >/=3.5 as 1 “agree”.

### Altruism

Altruism was assessed using five items, “I prefer working toward my own well-being”, “I try to work towards the well-being of society”, “I am not very interested in helping others”, “It is important to me that I help others”, and “It is important to help the poor and the needy”. Respondents were to select only one item that most applied to them. The negative items were coded as “0” and positive items as “1”.

# Supporting Information

Supplementary File S1 Survey Questionnaire