

Moze T.<sup>1</sup>, Abdul Karim F.<sup>2</sup>,  
Hami R.<sup>3</sup>, Tuan Din SA.<sup>3,\*</sup>

<sup>1</sup>National Blood Centre,  
Jalan Tun Razak, 50400  
Kuala Lumpur, Malaysia

<sup>2</sup>Pathology Department,  
Hospital Ampang, 68000  
Ampang, Selangor,  
Malaysia.

<sup>3</sup>Advanced Medical and  
Dental Institute, Universiti  
Sains Malaysia, 13200  
Kepala Batas, Pulau  
Pinang, Malaysia.

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\*Corresponding author  
Sharifah Azdiana Binti Tuan Din  
E-mail: [azdiana@usm.my](mailto:azdiana@usm.my)

## Factors Affecting the Return of First-time Blood Donors After Temporary Deferral

**Abstract**— Blood donation in Malaysia is practised as voluntary non-remunerated. However, recruiting and retaining blood donors remain a challenge in the transfusion service. The main aim of this study was to understand the factors affecting the return of first-time blood donors. This was a retrospective study involving 480 first-time temporarily deferred whole blood donors from National Blood Centre (NBC), Kuala Lumpur. Data of donors who were deferred from 2010 to 2014 were extracted from the Blood Bank Information System. Deferred blood donors were categorised into two main groups, namely, a group of donors who returned for blood donation and a group that did not return for the donation. Each blood donor was contacted personally via telephone. Donors who returned were younger ( $p < 0.001$ ), with females in a higher proportion (61.3%) compared to males (38.8%) ( $p < 0.001$ ). Singles (68.3%) were more likely to return for donation compared to married donors (31.7%) ( $p < 0.001$ ). Donors who lived in urban areas were more likely to return for donation compared to donors who lived in rural areas (34.6%) ( $p < 0.005$ ). The most common factor that had motivated these donors to return was self-satisfaction (29.9%), while the most common factor that hindered them from returning for donation was the lack of time (28.50%). As a conclusion, more awareness and education regarding regular blood donation should be considered to donors from a rural areas. Additionally, mobile blood donation drives should be made easier for blood donors who have a busy lifestyle.

**Keywords** — temporary deferral, whole blood donors, motivating factors, hindering factors.

### 1 INTRODUCTION

The act of giving blood by an individual can be defined as blood donation [1]. According to World Health Organization (WHO), blood donation is categorised into three categories, namely, voluntary non-remunerated blood donation, family or replacement donation, and paid donation [2]. At the National Blood Centre (NBC), the increasing demand for blood and its product usage compared to the amount of blood being collected is a major concern. However, altruism and the need to entice a pool of safe blood donors from these donations are the main intentions for blood drives. Voluntary non-remunerated blood donors are the cornerstone of safe blood donations [2].

It is important to understand blood donors based on their knowledge and attitude, especially young donors, who could potentially be regular donors in order to retain their contribution. Understanding the factors that motivate donors will be very useful in transfusion services to ensure all transfused products are safe and at the highest quality. Donors with a positive attitude will be highly motivated to return for subsequent blood donations and they can become regular

blood donors by abiding to donor criteria. Consequently, the blood transfusion service (BTS) will be able to maintain regular collections and provide blood products all year-round. In addition, retaining blood donors will be more feasible when all relevant factors fit [3].

The blood transfusion service (BTS) is an essential part of the health care system. In Malaysia, BTS is challenged by the increasing number of transfusion-dependent patients. The goal of transfusion services is to provide quality blood and blood products. In view of this situation, BTS has a huge responsibility to have adequate blood supply and its components at the ready, as well as the humongous task of providing the safest products. These products should be cost-effective and easily accessible for the patient's needs. With so many diseases appearing out of various situations, providing adequate supply in its safest form is the primary and most crucial responsibility placed on the BTS. Although the NBC conduct various modes of screening using the latest laboratory techniques, due to the window period for transfusion transmitted infections, donor counselling is as equally important as the donor's intention for donating blood.

WHO has suggested that every country should ensure at least 5% of their total population are regular non-remunerated blood donors. WHO also aims to ensure that 2% of each country's population become voluntary non-remunerated blood donors [2]. Understanding and reconstructing the modifiable factors that affect temporarily deferred blood donors to return will help the NBC retain them as regular blood donors, and achieve the goals proposed by WHO. Hence, this study was designed to identify factors associated with their return for blood donation in order to motivate them to donate blood again. Each blood donor has different needs depending on sociodemographics and geographical factors, so results of other studies might be different from this current local study. So far, there had been no study on this field performed in this state of Malaysia.

## 2 MATERIALS AND METHODS

### 2.1 Study design and sampling

A retrospective study was conducted to assess the factors that can motivate or hinder deferred first-time whole blood donors from 2010 until 2014. This study was conducted at the National Blood Centre (NBC), Kuala Lumpur, Malaysia. Records of whole blood donations from 2010–2014 were extracted from the Blood Bank Information System (BBIS). All first-time donors were extracted from the total list. Using the new list of all first-time temporarily deferred donors, every eighth subject was extracted until 480 names have been collected. These names were further divided into two groups, namely, the returned donors and those who did not return. First-time deferred donors are defined as donors who are temporarily deemed ineligible for blood donation. Returned donor defined as subjects who return for donation within six months following first time temporary deferred period. All subjects have never donated elsewhere and were temporarily deferred according to NBC's deferral guideline. Autologous donors and donors who were deferred for more than six months or permanently deferred were not included in this study. Phone calls were made to the selected donors and questions were asked based on a set of questions.

### 2.2 Designing and validation of questionnaire

Research questionnaire was a compilation of sets of questions following discussion with expert

content (Lecturer for Multimedia & communication IPPT, Wisma Sejarah). A list of 16 questions were created related to donor counselling. Along with that, reasons for common temporary deferral was analysed for identifying suitable variable to identify factors that motivates and hinders whole donors. These questions were verified and validated by randomly answered by other donors who have visited NBC before proper usage. The questionnaires was prepared after literature review on blood donation, referring to the National Blood Centre donor enrolment form and based on the donor criteria guideline for blood donation by NBC, Ministry of Health Malaysia. Every time a donor was contacted, donor was explained about the study and verbal consent was taken for participation in the study. This study's questionnaire consists of 8 questions in total. Each question has relatively 2 to 6 choices of answer to be selected. Donors are allowed to only choose one answer as their choice. All donors who were included for data collection had understood the purpose of the study and consented verbally. The requirement of verbal consent was suggested by Human Research Ethics Committee of Universiti Sains Malaysia (USM).

### 2.3 Statistical analysis

The data collected from questionnaires and BBIS were used for analysis. The questionnaire answers were categorised into motivating and hindering factors and other variables were analysed. Socio demographic characteristics of all cases were tabulated for descriptive statistics.

Donor characteristics were summarised in means and standard deviations for continuous normally-distributed variables, using medians and interquartile ranges for non-normally distributed variables and using frequencies and percentages for categorical variables. The characteristics of deferred donors who returned and did not return were compared using independent t-test, Wilcoxon Mann-Whitney test, Pearson's chi-square test or Fisher's Exact test.

Logistic regression was used to determine factors associated with return of deferred donors. The threshold for statistical significance was set at  $p < 0.05$ . All analyses were performed using Stata, version 11 (StataCorp, College Station, TX).

### 2.4 Ethical approval

This study has been approved by the National Medical Research Register (NMRR), with research identification number NMRR 14-636-21535, and by the Human Research Ethics Committee of Universiti Sains Malaysia (USM) USM/JEPeM/270.3(4).

## 3 RESULTS AND DISCUSSION

### 3.1 Sociodemographic factors

Temporary deferrals represents 18.3% of total donations (803,431) between 2010 to 2014. A total of 480 temporarily deferred blood donors were involved in this study. The median age was 31 years old (interquartile range = 16 years), with the distribution of age found to be positively skewed using the Shapiro-Wilk test for normality ( $W = 0.943, p < 0.001$ ).

Donors who returned were significantly younger than donors who did not return (29.5 years old versus 35 years old,  $p < 0.001$ ). Gender, marital status, occupation, and living location were also found to be significantly associated with returning donors. A higher proportion of females (61.2%) became returned donors compared to males (38.8%) ( $X^2 = 20.84, p < 0.001$ ). Singles (68.3%) were more likely to return compared to married donors (31.7%) ( $X^2 = 14.57, p < 0.001$ ), while donors who lived in urban areas (65.4%) were more likely to return compared to those who lived in rural areas (34.6%) ( $X^2 = 5.87, p = 0.015$ ). Additionally, 26.7% of students (versus 20.4%), 22.1% of general workers (versus 21.7%), and 38.8% of professionals (versus 33.3%) were more likely to return for blood donation, as shown in Table 1.

**Table 1:** Sociodemographic of first-time deferred blood donors (n = 480)

| Characteristics         | Total, n = 480                       | Return, n = 240 | Did not Return n = 240 | X2 / U  | p-value <sup>a</sup> |
|-------------------------|--------------------------------------|-----------------|------------------------|---------|----------------------|
| Median age (IQR), years | 31 (16)                              | 29.5 (12)       | 35 (19.5)              | 21136.5 | < 0.001 <sup>b</sup> |
| Gender, n (%)           |                                      |                 |                        | 20.84   | < 0.001              |
| Race                    | Male<br>236 (49.2)                   | 93 (38.8)       | 143 (59.6)             |         | <0.001               |
|                         | Female<br>244 (50.8)                 | 147 (61.2)      | 97 (40.4)              |         | 0.614 <sup>c</sup>   |
| Race, n (%)             |                                      |                 |                        |         | 0.614 <sup>c</sup>   |
|                         | Malay<br>356 (74.2)                  | 173 (72.1)      | 183 (76.3)             |         |                      |
|                         | Chinese<br>75 (15.6)                 | 42 (17.5)       | 33 (13.8)              |         |                      |
|                         | Indian<br>41 (8.5)                   | 20 (8.3)        | 21 (8.8)               |         |                      |
|                         | Others<br>8 (1.7)                    | 5 (2.1)         | 3 (1.3)                |         |                      |
| Marital status n (%)    | Single<br>287 (59.8)                 | 164 (68.3)      | 123 (51.3)             | 14.57   | < 0.001              |
|                         | Married<br>193 (40.2)                | 76 (31.7)       | 117 (48.8)             |         |                      |
| Occupation, n (%)       |                                      |                 |                        |         |                      |
|                         | Housewife/<br>Unemployed<br>15 (3.1) | 7 (2.9)         | 8 (3.3)                | 16.04   | 0.014                |
|                         | Student<br>113 (23.5)                | 64 (26.7)       | 49 (20.4)              |         |                      |
|                         | General<br>worker<br>105 (21.9)      | 53 (22.1)       | 52 (21.7)              |         |                      |
|                         | Uniform body<br>38 (7.9)             | 15 (6.3)        | 23 (9.6)               |         |                      |
|                         | Professional<br>173 (36.1)           | 93 (38.8)       | 80 (33.3)              |         |                      |
|                         | Others<br>15 (3.1)                   | 4 (1.7)         | 11 (4.6)               |         |                      |
| Address, n (%)          |                                      |                 |                        |         |                      |
|                         | Rural<br>192 (40.0)                  | 83 (34.6)       | 109 (45.4)             | 5.87    | 0.015                |
|                         | Urban<br>288 (60.0)                  | 157(65.4)       | 131 (54.6)             |         |                      |

<sup>a</sup> Pearson's chi-squared test for independence; <sup>b</sup> Wilcoxon-Mann-Whitney test; IQR = Interquartile range

Age was a significant predictor for the return of deferred donors. The older the deferred donor, the less likely he or she is to return. With every

increase in one year of age, there was 5% higher odds for the deferred donor not to return (OR<sub>adj</sub> = 0.95, 95% CI = 0.93, 0.97,  $p < 0.001$ ) (Table II).

Married donors were also less likely to return compared to single donors (OR<sub>Unadj</sub> = 0.49, 95% CI = 0.36, 0.71, p < 0.001). However, after adjusting for other factors, marital status was no longer a significant predictor of returning donor (p = 0.227). Females had twice the odds of returning compared to males (OR<sub>Adj</sub> = 2.00, 95% CI = 1.33, 3.01, p = 0.001). Donors who lived in urban areas were also more likely to return, at 1.68 higher odds of returning compared to donors who lived in rural areas (OR<sub>Adj</sub> = 1.65, 95% CI = 1.11, 2.51 p = 0.018). However, occupation and race were not statistically significant predictors of the return of deferred donors, as shown in Table 2.

**Table 2:** Associated Factors of Motivation for Blood Donation

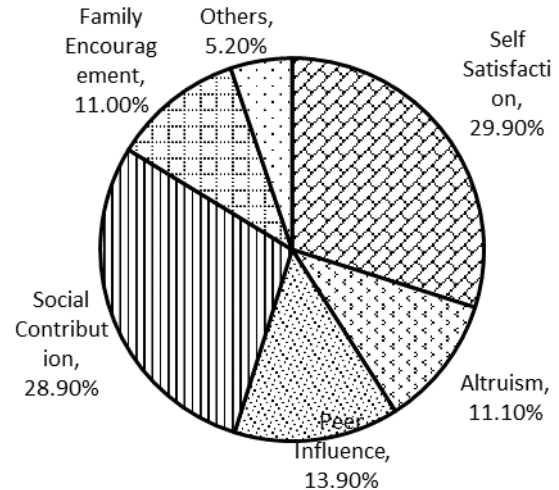
| Factors        |                      | Unadjusted OR (95% CI) | p-value <sup>a</sup> | Adjusted OR (95% CI) | p-value <sup>b</sup> |
|----------------|----------------------|------------------------|----------------------|----------------------|----------------------|
| Age, years     |                      | 0.95 (0.93, 0.97)      | < 0.001              | 0.95 (0.93, 0.97)    | < 0.001              |
| Gender         | Male                 | 1.0                    |                      | 1.0                  |                      |
|                | Female               | 2.33 (1.62, 3.36)      | < 0.001              | 2.00 (1.33, 3.10)    | 0.001                |
| Race           | Malay                | 1.0                    |                      | 1.0                  |                      |
|                | Chinese              | 1.35 (0.82, 2.22)      | 0.245                | 0.85 (0.48, 1.51)    | 0.573                |
|                | Indian               | 1.01 (0.53, 1.92)      | 0.982                | 0.71 (0.35, 1.44)    | 0.348                |
|                | Others               | 1.76 (0.42, 7.49)      | 0.442                | 2.03 (0.43, 9.66)    | 0.373                |
| Marital status | Single               | 1.0                    |                      | 1.0                  |                      |
|                | Married              | 0.49 (0.36, 0.71)      | < 0.001              | 0.74 (0.45, 1.21)    | 0.227                |
| Occupation     | Housewife/Unemployed | 1.0                    |                      | 1.0                  |                      |
|                | Student              | 1.49 (0.51, 4.40)      | 0.0467               | 0.76 (0.22, 2.65)    | 0.664                |
|                | General worker       | 1.16 (0.39, 3.44)      | 0.783                | 1.29 (0.39, 4.28)    | 0.675                |
|                | Uniform body         | 0.75 (0.22, 2.49)      | 0.633                | 1.36 (0.36, 5.20)    | 0.654                |
|                | Professional         | 1.33 (0.46, 3.83)      | 0.598                | 1.49 (0.46, 4.79)    | 0.504                |
|                | Others               | 0.42 (0.09, 1.92)      | 0.260                | 0.40 (0.07, 2.13)    | 0.282                |
|                | Unknown/Missing      | 0.27 (0.06, 1.19)      | 0.084                | 0.25 (0.05, 1.26)    | 0.093                |
| Address        | Rural                | 1.0                    |                      | 1.0                  |                      |
|                | Urban                | 1.57 (1.09, 2.27)      | 0.016                | 1.65 (1.09, 2.51)    | 0.018                |

<sup>a</sup> simple logistic regression, <sup>b</sup> multiple logistic regression  
OR = Odds Ratio; CI = Confidence Interval

### 3.2 Motivating factors

Figure 1 shows that self-satisfaction (29.90%) is the most common motivating factor. Donors, who returned with the intention of making a social contribution, are the second highest (28.90%). This is followed by peer influence (13.90%), altruism (11.10%), family encouragement (11.00%), and others (5.20%).

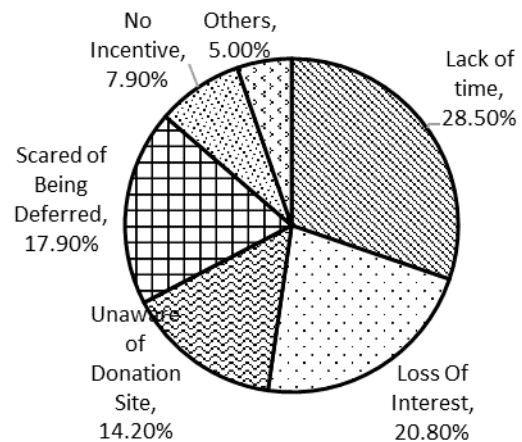
Other factors may include having no specific reasons, just wanted to try blood donation, and other significant reasons.



**Figure 1:** Percentages of common motivating factors among donors who returned for donation following temporary deferral.

### 3.3 Hindering factors

Figure 2 shows that the most common hindering factor was the lack of time to return for donation (28.50%). This is followed by loss of interest (20.8%), scared of being deferred again (17.9%), unsure of blood donation site (14.20%), and others (5.00%), which include fear of needles and inconvenient mobile blood drive site.



**Figure 2:** Common hindering factors for donors who did not return for donation following temporary deferral.

## 4 DISCUSSION

Sociodemographic details showed that younger donors would return for a second blood donation. The younger generations are being exposed to blood donations at school, which increases their awareness to come forward for blood donation. The current study showed that the younger generation up to middle-aged donors contributed

to a higher number of returns. This is most likely because the younger generation has lesser personal responsibilities and simpler needs. A study conducted in North India, also showed similar result as the younger generation were more likely to return for donation following temporary deferral. However, the author indicated knowledge and awareness regarding blood donation played a vital role [4]. Another study which focused on younger generation between two different departments has led to a success of able to produce safe and regular blood donation campaign in one of the colleges in sub Saharan region. In this study, tertiary group of students using a cross sectional method were evaluated. In conclusion of this study it was clear that those students with extra lectures closer to exam did not turn up for donation due to time factor, on the contrary student from departments not due for exam regularly turned up for donation [1].

The proportion of female donors who returned for donation following first time deferral was significantly higher than male donors. This outcome can be attributed to the causes for temporary deferral, such as lactation, low level of haemoglobin, and menstruation. These are modifiable reasons since after a certain deferral period, these donors can resume donating blood again. Thus, female donors' return rate would be higher. Misje et al., 2010 has extensively investigated the reason why more female donors contributed to their deferral rates, yet the overall regular donors were also female. The analysed reasons for deferral showed that most of these ladies belonged in the reproductive age group [5]. Common reasons for deferral include anaemia, pregnancy, lactation, postnatal period, and menstruation, which are modifiable factors. For example, once the root cause of anaemia has been treated, donors can return for blood donation [5]. Another study conducted in South India revealed that there were 16,706 donors registered for donation with females constituted only 11.27%. The deferral rate was about five times more for females (19.85%) as compared to males (4.06%). The three most common reasons for deferral in female were low haemoglobin levels, followed by on medication and hypertension [6].

Single donors contributed to a larger number of return rate in this study. This result is similar to the result obtained by another study that found that most single donors have lesser responsibilities compared to married donors [1]. A study conducted among Polish men revealed that

married men generally present with a higher diastolic blood pressure [7]. Associating factors have been identified as economic status, high levels of stress, and other personal reasons. Thus, when married donors attempt to donate blood, they would contribute towards the temporary deferral state [7]. A study conducted in Sikkim, India had analysed the sociodemographic characteristics of blood donors. They found that 46% of the study population had clear perceptions on blood donation [8], which was significantly related to marital status. Individuals who fall into the above average income category tend to have better chances to return for donation compared to those who fall into the below average category. This main variable of the study was subjective to the associated factors when the determining factor was related to socio-economic status [8].

This study found that professionals contributed to a higher percentage of return rate, followed by students. As professionals, their level of awareness and education levels might have help them understand the importance of donating blood and encourage them to donate. In 2011, a study was conducted in Israel based on the Theory of Planned Behaviour using questionnaires. The purpose of this study was to correlate planned behaviour to higher education level, which led to the finding that the professional group showed a significantly higher percentage of blood donation. Additionally, education was also associated with professionalism, which created better awareness and this group of donors was more likely to be regular donor [9].

Most donors who returned for blood donation came from urban areas. It is factual that most blood donation drives are organised in urban areas. Common sites of these drives include in shopping malls, offices (government, private, and others), and colleges. Blood donation drives can also be set up according to the convenience of the organisers. In this case, public halls, higher secondary schools, and public events, such as carnivals and political events. However, most of these drives are held in and around high-density areas. Thus, donors from the urban population are open to vast options of donation drives. A study conducted in China has identified that high numbers of first-time donors that were deferred came from rural areas. Donors were deferred for various reasons, compounded by their lack of awareness. Thus, creating awareness regarding blood donation was actively introduced in rural states of China [10]. Recently,

a community-based cross-sectional study was conducted in Ethiopia, which showed that 56.8% of their donor population belonged to the highly educated group residing in urban areas [11]. Similarly, the donors in this current study, who returned for donation, were from the urban population. This observation could be attributed to the similarities among donors from urban areas, in addition to active donation sites and facilities.

This study has identified six motivating factors, which are common parameters in other studies conducted globally [12-17]. Self-satisfaction is a subjective feeling by an individual, which is always a challenge to quantify. In this study, self-satisfaction was analysed as a motivating factor. Similarly, a study in India described this factor as extremely subjective and reported that it was difficult to quantify the degree of satisfaction [12]. However, this subjective feeling has contributed to positive intentions among donors to return for blood donation repeatedly [13]. Social contribution is another subjective parameter. However, donors who returned for donation usually had, at some point in life, experienced someone important in their life saved due to blood transfusion. In return, as a show of gratitude, these donors come forward to pay their societal contribution [14]. Peer influence is another common and unavoidable factor. A study was conducted in Japan to understand what motivates their student population to come forward for blood donation and how to retain them as regular donors [15]. Numerous campaigns and motivational talks were done to ensure their donor retention is successful. Activities associated to current technologies, such as developing applications, a reminder notice is sent when a donor is due for donation, motivational talks, scientific approach towards understanding blood donation, and societal responsibility were introduced [15]. Altruism is an important aspect of donor's intention to return for blood donation. Young donors commonly start donating due to peer influence, but will gradually develop altruistic feeling towards donation, which helps in donor retention [16]. Apart from peer influence, family encouragement was another factor that was found to motivate donors to come forward for donation. Apart from intentions, belief instilled by family plays an important role in a donor's mind, especially in convincing him/her that blood donation is closely related to one's health and medical well-being [17].

This study has also analysed six common factors, which were among the reasons given by blood donors, which have hindered them from returning for donation. Associating these factors with other parameters, such as occupation and marital status clearly indicated that donors have other crucial commitments. Due to either work and/or the travelling distance, many donors had failed to turn up for their second blood donation. A recent study has reported that many donors claimed that the time taken for blood donation was too long, thus, they found it difficult to accommodate this activity because they have other commitments [18]. Loss of interest is another identified factor, in view of a prolonged period of not being able to donate. A study conducted in Adelaide tried to explain that the subjective aspect of deterrent factors, which included loss of interest, denotes that ensuring interest among donors plays a vital role in ensuring their return for blood donation [19]. Several donors claimed that they were in dilemma to return for donation because they were scared of being deferred again, as this will result in loss of interest and a waste of their time [12]. In the recent campaigns, advertisements and media talks have been engaged to inform donors who are unaware of a blood donation place. In this study, high importance was given to the intention of donors who did not return. Identifying the reasons that hindered donors from donating and rectifying these aspects will improve donor return rate. During the initial phase of transfusion services in the 1970s, Malaysia did practise giving incentives, such as giving boiled eggs, or reimbursement for travelling. However, over the years, more importance was given towards recruiting non-remunerated voluntary blood donors. Currently, in Malaysia, almost 100% voluntary non-remunerated blood donation has been achieved. Focusing on potential donors who are in younger generation, single, professional and lives in urban area will be the primary target to ensure uninterrupted supply and sufficient stock all around the year. More mobile blood donation drives should be done to encourage blood donors with a busy lifestyle to donate at their workplace or a nearby place. In addition to blood donation, the importance of how the act of donating blood can contribute to society should be emphasized. As for professionals who contributed to high rate of return donors, these donors should be given a societal responsibility to approach and encourage others to explain the importance and benefits of voluntary blood donation. Among governmental or private offices simple pamphlets or handouts

should be distributed. If possible, government policy makers should come forward and donate as setting an example rather role modal to show other citizens that these as noble acts.

As for those with peer influence or family encouragement, BTS should create a program such as come in group of three, if all three members successfully donated then a group picture will be taken and this will be posted in the variable multimedia publicity.

## 5 CONCLUSION AND RECOMMENDATION

Analyses of sociodemographic characteristics of donors have indicated that appropriate awareness regarding blood donation should be focused on rural areas. This study has identified that self-satisfaction, social contribution, and peer influence were the top three motivating factors, which indicated that Malaysian blood donors have good intentions towards blood donation.

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## DECLARATION

Author(s) declare that authors has no conflicts of interest.

## AUTHORS CONTRIBUTION (IF MORE THAN ONE AUTHOR)

Author 1: Data collection, Author 2: Scientific Writing, Author 3: Data analysis.  
Author 4: Developing Manuscript

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