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Title:

Knowledge, attitudes and practices towards blood donation in Barbados

Running title:

Attitudes towards blood donation in Barbados

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Abstract (257 words)

Background: The World Health Organization (WHO) recommends 100% blood should be from voluntary non-remunerated donors (VNRD) yet the majority of blood donations (75%) in Barbados are family/replacement donations. Increasing VNRD is paramount to achieving a safe, reliable blood supply and understanding the population is a strategy suggested by the WHO to inform donor recruitment and education.

Objective: To obtain information to devise strategies for a voluntary donor mobilization campaign in Barbados.

Methods: Participants in Barbados (n=429) completed a self-administered questionnaire in 2014. The questionnaire comprised 31 questions including demographics (age, sex, highest educational attainment) and blood donation-related knowledge, attitudes and practices. Analysis of variance, t-test and linear regression were used to analyse data.

Results: Fifty-three per cent (n=219) of participants had previously donated blood; only 23.9% of these had donated within the past two years and almost half were family/replacement donors only. Knowledge deficits included blood donation requirements, deferral factors and maximum yearly donations. Most participants (79%) were willing to donate with more information. Participants with higher educational attainment and previous donors had higher total knowledge and attitude scores ($p<0.01$). Single, female, and younger participants were less likely to donate blood ($p<0.05$).

Conclusion: Barbados can likely increase voluntary blood donation rates by addressing knowledge deficits through education campaigns and increasing awareness of the need for donation.

Word count= 3661 words

Keywords: beliefs, attitude, blood donation, voluntary, replacement

Introduction

Barbados is a Caribbean country with approximately 280,000 citizens who are primarily Black in ethnicity(Barbados Statistical Service, 2013). The GDP per capita in 2011 was US\$13,900(Ministry of Economic Affairs, Empowerment, Innovation, Trade, Industry and Commerce, Research and Planning Unit, 2011) of which 8.76% goes to health(Barbados Ministry of Health, 2011). Barbados has one, public tertiary care centre (emergency and specialist care), two renal dialysis facilities, one private hospital and six clinical laboratories(Pan American Health Organization, 2008). Over 80% of deaths are related to non-communicable diseases(World Health Organisation, 2014) with 8,676 road traffic accidents in 2006 (22 fatal) (Pan American Health Organisation, 2012). Over 70% of the population is between 15 and 69 years of age(Barbados Statistical Service, 2013). The adult literacy rate for persons over 15 years is 99.7% (Ministry of Economic Affairs, Empowerment, Innovation, Trade, Industry and Commerce, Research and Planning Unit, 2011) and 72% of the population were Internet users in 2011 with 127 per 100 persons having a cellular-phone subscription(The World Bank Group, 2013). Barbados has an active tourism industry with over 180,000 visitors from the United Kingdom in 2014; many spend between 4 and 14 days on the island(Barbados Statistical Service, 2014).

In 1975, the World Health Organisation (WHO) first promoted increased voluntary blood donations (World Health Organisation, 1975) and now recommends that 100% of blood is collected from voluntary, non-remunerated donors (VNRD)(World Health Organisation, 2010). Voluntary blood donation is generally safer with lower rates of transmissible infections when compared to replacement donors (World Health Organisation, 2010). Voluntary donors' motivation is simply the gift of life and they are unlikely to withhold information about their medical and social history (World Health Organisation, 2010; Mousavi et al., 2011; Dubey, Sonker, Chaurasia, & Chaudhary, 2014).

In 2009, there were only 4,781 units of blood collected in Barbados (Pan American Health Organization, 2013); this is less than one-third of WHO recommendation, which is that annual blood units should equate to 5% of the population (Szalassy, 1990). Additionally, in 2009, only 15% of all donations in Barbados were from VNRDs (Pan American Health Organization, 2013), substantially less than WHO recommendations (World Health Organisation, 2010). The majority of blood in Barbados is collected through family/replacement (F/R) donations (Pan American Health Organization, 2013). F/R donations involve donors giving blood only when a family member or friend needs it prior to a medical procedure. In Barbados, F/R donors receive a donor slip after donating blood which their family member or friend then presents to the hospital as evidence for the donation. There are no real incentives given to VNRDs in Barbados. There is no National Blood Service but a single blood collecting centre and blood bank exist at the lone, centrally located, public hospital, Queen Elizabeth Hospital (QEH) (Pan American Health Organization, 2008).

In the Latin American and Caribbean (LAC) region, only two countries have achieved 100% voluntary blood donation: Cuba and Nicaragua. The latter terminated blood from F/R donors in 2009 and increased voluntary blood donation from 39% in 2007 to 100% in 2010 through national communication campaigns and reorganisation of the blood system (Berrios, Gonzalez, & Cruz, 2013). It is important to determine culturally specific interventions and research in developing countries within the LAC region has divulged potential areas that can be targeted by public health programmes (Sampath et al., 2007; Bourne, Richards, & Holder-Nevins, 2013; Gomez, Messam, & Toner, 2013). We sought to explore factors that may impact blood donation in Barbados to guide implementation, monitoring and evaluation of interventions to increase voluntary donations toward 100% and meet WHO targets.

Methods

This cross-sectional survey was performed between September and October 2014 in Barbados. Inclusion criteria included being Barbadian and between 18 and 65 years. We used volunteer sampling with three methods of data collection: 1) *Crowded centres*: churches and shopping areas 2) *Online*: The study was advertised on social media and all encouraged to share 3) *Email*: Two local email marketing companies sent an email blast to their members inviting Barbadians to participate in the study. Using web-based statistical software (www.openepi.com), we calculated a minimum sample size requirement of 384. We used a 95% confidence level and 5% margin of error and used 50% estimated population proportion. The sample size was increased by 10% to account for incomplete questionnaires giving a desired sample size of 422 participants.

Participants completed a self-administered questionnaire. The questionnaire was one modified, with permission, from Sabu et al (2011). To test face validity, the questionnaire was piloted on 34 persons. It comprised of 31 questions in four sections: demographics (age, gender, marital status and educational level), knowledge, attitudes and practices. The knowledge section included questions about the donor criteria, donor deferral, maximum yearly donations and the universal donor and recipient. Each correct answer gave 1 point and participants could score between 0 and 21 points. The attitude section comprised 10 four-point Likert-scale questions that assessed attitude towards blood donation and participants could score between 10 and 40 points. The practices section included four questions for previous donors and two questions for non-donors; donors were asked about the nature of previous donations and frequency of donation while non-donors were asked to select reasons for not donating blood. Previous donors could score between 1 and 7 while non-donors were given a score of 0. The alpha coefficient for the total questionnaire and each of knowledge, attitude and practice domains were 0.75, 0.78, 0.72 and 0.65 respectively.

Data were analysed using Stata v13. Demographic groups were compared between online and face-to-face participants using chi-square test. To determine the association with total score in each domain (knowledge, attitudes and practices), t-tests and analysis of variance were used, to determine the difference between groups, Tukey post-hoc testing was used as needed. T-tests were also used to determine the association between the total score in each domain with gender and donor status (question five). P-values of <0.05 were considered statistically significant. Linear regression was used to determine the relationship of mean total knowledge scores to total attitude scores. This was repeated to determine the relationship of mean total attitude scores to total practice scores and total knowledge scores with total practice scores. All regression was repeated within demographic groups.

Ethics

Ethical approval was received from both the University of Liverpool and from The University of the West Indies-Cave Hill/Barbados Ministry of Health Research Ethics Committee/Institutional Review Board.

Results

There were 429 persons included in this study; 134 (31.2%) were in-person (self-administered in hard copy) and 295 (68.8%) were completed online. Among online data collection, only 10% of participants did not complete all fields. Participants were between 18 and 65 years, and were divided into 3 age groups: 117 (27.3%) were in the age group of 18 to 29 years, 196 (45.7%) in 30 to 49 and 101 (23.5%) in 50-65 years. Regarding gender, 106 (24.7%) were men and 311 (72.5%) women. There were 176 (41%) single participants, 157 (36.6%) were married, 36 (8.4%) were divorced, 29 (6.8%) were live-in partners and 16 (3.7%) were separated. The highest level of education was primary school for 3 (0.7%), secondary school for 79 (18.4%), tertiary education for 251 (58.5%), and postgraduate education for 83 (19.3%). Just over half the sample ($n=219$; 53.2%) had donated

blood at least once previously. Online participants were more likely to be female ($p=0.03$), have higher educational attainment ($p<0.001$) and had previously donated blood ($p<0.001$).

Knowledge

The mean total knowledge score of participants was 13.14 out of a possible 21 (median 14). Table 1 shows the proportion of the sample answering some knowledge questions correctly. Most participants previously heard about blood donation before and believed it could save lives (>98%). Only 42 (10.4%) participants knew all of the given requirements to donate blood; 103 (25.6%) knew all of the given deferral factors for blood donation and 130 (33.3%) knew maximum yearly donations (Table 1). Interestingly, 46 (11.4%) participants believed that a blood donor had the potential to contract HIV through blood donation and 40 (9.9%) believed it was possible to contract hepatitis. Most of the sample 315 (90%) had never heard the term 'donor deferral'. Total knowledge scores were higher in those achieving higher education status ($p=0.008$) and previous donors ($p=0.0013$).

(Table 1)

Attitudes

The mean total attitude score was 27.78 out of a possible 40 (median 30). Three hundred and fifty-five (90.6%) participants agreed or strongly agreed that they would disclose correct medical information prior to blood donation (Fig. 2). Over two-thirds of participants ($n=308$; 79%) indicated a willingness to donate if they were given more information on the importance and significance of blood donation (See Fig 1). One-half of participants ($n=197$; 50%) indicated a willingness to donate only if they were paid (Fig. 1), 100 (50.8%) of whom were previous donors. More participants strongly agreed that they would donate to their immediate family ($n=277$; 70.3%) in comparison to other family members ($n=221$; 56.4%), friends ($n=200$; 50.8%) or strangers ($n=95$; 24.4%) (Fig. 1).

Total attitude scores were statistically higher in those achieving higher education status ($p=0.004$) and previous donors ($p<0.001$). Married and live-in participants were more willing to donate to strangers ($p<0.001$).

(Figure 1)

Practices

The mean total practice score was 2.51 out of a possible 7 (median =1). A total of 72 (69%) of men 147 (48%) of women had donated blood at least once in their lifetime ($n=219$; 53.2%). Less than one-quarter of donors ($n=58$; 23.9%) had donated two or more times within the past two years; less than one-quarter ($n=53$; 21.8%) had donated once within the past two years; and over one-third ($n=88$; 36.2%) of donors had not donated within the past two years. One hundred and six (48.4%) participants donated via replacement donations alone; 55 (25%) donors had donated voluntarily alone and 32 (14.6%) were involved with both voluntary and replacement donations. Few participants reported some discomfort after donated blood ($n=33$; 13.9%).

One hundred and ninety-three participants (46.8%) had never donated blood. As seen in Table 2, the most common reason for not donating was a lack of awareness with 28.4% stating no one close to them needed blood, 23.6% saying no one ever asked and 17.5% stating they never thought about it. Total practice scores were statistically higher among older age groups (>30 years compared to those 18-29 years; $p<0.001$), males ($p=0.0015$), and married participants (compared to single; $p<0.001$).

(Table 2)

Relationship between blood donation-related knowledge, attitude and practices

Total knowledge scores statistically significantly predicted total attitude scores ($p<0.001$) and knowledge accounted for 31.8% of the explained variability in attitude. Total knowledge scores predicted total practice scores ($p<0.001$), except among those between 18 and 29 years ($p=0.35$),

those with up to secondary school education ($p=0.31$) and those with up to postgraduate education ($p=0.6$). Total attitude scores predicted total practice scores ($p<0.001$). Total knowledge and total attitude accounted for 6.8% and 8.5% of the explained variability in practice scores respectively.

Discussion

This study elicited blood donation-related knowledge deficits that should be addressed through education. Some participants had good attitudes towards blood donation but desired more information. Additionally, there were some participants with worrying attitudes such as being willing to give incorrect medical histories and a desire to be paid for blood donation. We found that men and those in relationships were more likely to donate blood.

The World Health Organisation (WHO) proposes 100% of blood should come from voluntary non-remunerated donors (VNRD) to maintain a safe, adequate blood supply in all countries (World Health Organisation, 2010), however, Barbados, like other Caribbean countries, has low rates of voluntary donation (Pan American Health Organization, 2013). This study gives insight into potentially modifiable factors leading to low rates of voluntary donation. It is clear that national efforts are imperative to increase voluntary blood donations and this study addresses the lack of baseline information needed to inform such efforts in Barbados. The World Health organisation has outlined a framework to achieve 100% voluntary donation with four stated goals: 1) create an enabling environment for 100% voluntary non-remunerated blood donation 2) foster a culture of voluntary blood donation 3) build and maintain a safe, sustainable voluntary donor base and 4) provide quality donor service and care (World Health Organisation, 2010). This study addresses the second goal in the framework: 'Foster a culture of voluntary blood donation'; this can only be done when a country understands its blood donors (World Health Organisation, 2010). We have made a step in understanding the Barbadian population's beliefs and attitudes towards blood donation.

Addressing knowledge deficits and misconceptions

Knowledge deficits in this sample surrounded blood donation requirements, deferral factors, maximum yearly donations and the blood types of universal donors and recipients. Some participants thought donors were at risk for contracting an infectious disease (e.g. HIV and Hepatitis) as found in other developing countries such as Chile (Vásquez, Ibarra, & Maldonado, 2007), China(Zaller et al., 2005), Iran (Javadzadeh Shahshahani, Yavari, Attar, & Ahmadiyeh, 2006) and Trinidad and Tobago(Sampath et al., 2007). This misconception is likely to be a deterrent to blood donation and should be addressed through education. Higher total knowledge scores in this study were associated with higher total practices scores also found in Lowniks and colleagues' review (Lownik et al., 2012), this suggests that by increasing blood donation-related knowledge, blood donation practices will improve. Non-donors and those with lower education levels had lower knowledge scores and any educational programme should target these persons. A national education campaign could be useful to increase knowledge of blood donation thereby likely optimising blood donations. This campaign should aim to create a better understanding the blood donation process. The campaign should utilise electronic media (radio and social media), with clear simple messages to address the aforementioned deficits and misconceptions related to blood donation. As suggested by the WHO (World Health Organisation, 2010), this campaign should utilise World Blood Donor Day and community leaders to widen the audience reached.

Addressing lack of awareness of the need for blood donation

Most non-donors did not donate either because they never thought about it, no one close to them needed blood or no one had asked them to donate. This suggests that there was low awareness of the necessity to donate blood even if not needed by family or friends. Increased awareness has been a motivation for blood donors including African-American females (Glynn et al., 2002; Grossman,

Watkins, Fleming, & DeBaun, 2005) suggesting that a national blood donation promotion campaign could sensitise the public to shortages in the blood bank and the need for regular blood donation.

Over half of our participants did not promote blood donation. This was not found in the literature but could suggest that participants do not feel they are informed well enough to publicise or do not see it as important. There were many participants willing to donate if they had more information, which further suggests that participants do not feel well-informed. A national campaign should focus on all aspects of blood donation including benefits to the donors and recipients and information regarding the blood collection centre. Blood donation programmes such as Club25 societies should be present in all secondary schools to educate the young thereby increasing knowledge in those at lower educational levels. Club 25 members commit to donating at least 25 times in their lifetime and can create awareness (World Health Organisation, 2010).

Addressing unsatisfactory attitudes towards blood donation

More than half of the sample wanted to be paid for their blood donations; this was not well discussed in the literature (Olaiya et al., 2008; Sabu et al., 2011; Salaudeen & Odeh, 2011). Half of those who wanted to be paid for blood donation in this sample were previous donors. This might suggest that these previous donors could have engaged in 'hidden paid donations' disguised as family/replacement (F/R) donations. Hidden paid donations may emerge within a F/R donation system (World Health Organisation, 2010) but further research would be needed to explore the occurrence of hidden paid donations in Barbados.

A small number of participants (10%) would consider giving an incorrect medical history prior to blood donation as seen in India (Sabu et al., 2011). This could be due to the F/R system in Barbados where donors have external motivation for donating blood (to a loved one); this may cloud their

inclination to be honest. Giving incorrect medical histories has critical implications for the safety of the blood supply and wastage of resources as high-risk potential donors may pass screening and donate blood—later is found to be seropositive for infectious diseases. In 2009, Barbados had 0.1%, 0.27%, 0.33%, 0.13 and 0.36% of units reacting positively for HIV, hepatitis B, hepatitis C, syphilis and HTLV I/II respectively (Pan American Health Organization, 2013). Educating the public on the importance of accurate medical histories could potentially reduce these figures.

Increasing numbers in the blood donor base

This study suggests a need to not only retain and reactivate lapsed donors but also to recruit new ones. This study is the only one where the majority of a mixed gender sample had donated at least once in their lifetime (Hosain, Anisuzzaman, & Begum, 1997; Javadzadeh Shahshahani et al., 2006; Sampath et al., 2007; Vásquez et al., 2007; Wiwanitkit et al., 2008). It is important to note that the relatively high proportion of previous donors in this study could have been explained by the potential bias of online data collection since online participants were more likely to have donated previously and be female. Yasmin et al(2014) suggest that benefits of online data collection may outweigh the possibility of over-estimation. Even though, the majority of participants in this sample previously donated blood, they were primarily F/R donors, this was also seen in Trinidad(Sampath et al., 2007) and indicates the potential to convert existing F/R donors to VNRDs. It is likely that Barbados should consider terminating the current F/R system, as done in Nicaragua (Pan American Health Organization, 2011; Berrios et al., 2013), so that all donors donate altruistically and refrain from withholding blood donation until someone they know needs it. A donor retention programme may be useful to convert previous donors to VNRDs. Recalling lapsed donors may be cheaper than recruiting new first-time donors (FTD) (World Health Organisation, 2010) and thus this may be a useful way to optimise the voluntary donor base. Among previous donors, there were a few (13.9%) who experienced discomfort after donating blood. Although it is not clear the nature of discomfort

from this study, it could signal the need to optimise donor satisfaction such that previous donors are willing to return in the future.

This study showed that older participants were more likely to have more reasons for permanent deferral from blood donation (e.g. illness). Although this finding was not seen in the literature, this is further justification for promoting blood donation among younger, eligible, individuals. WHO suggest targeting the youth as they are a healthy and large proportion of the population (World Health Organisation, 2010). Younger participants were less likely to donate in this sample, also seen in Moldova (United States Agency for International Development, 2007) and suggests the need to specifically find ways to recruit younger persons as blood donors. Donor recruitment strategies could utilise social media to target the youth.

Similarly to results found in the review by Lownik et al. (2012), in Iran (Mousavi et al., 2011) and in Nigeria (Salaudeen & Odeh, 2011), female, single participants in this study had poorer blood donation practices as compared to males or those in relationships. Married individuals might offer a safer blood supply, due to likely monogamy in marriage. However, educating the single population on blood donation, importance of an accurate medical history and safe lifestyle choices could be invaluable to safely increase blood supply. Post-graduates did not follow general trend that increased knowledge predicted improved practices; this might suggest that there are additional barriers such as time for VNRD among post-graduates. It is interesting that generally, total knowledge and attitudes scores accounted for less than 10% of the variability of total practices scores which suggests that there are other factors we may need to explore with respect to increasing VNRDs in Barbados.

Limitations

This study is not without limitations. Firstly, online respondents were more likely to be female and previous donors as compared to face-to face participants. This potentially introduced bias such as over-estimating the proportion of blood donors in the study. However, we achieved the desired sample size and 90% completion rates online, many of our results are in line with those in the literature, which suggests accuracy of our conclusions. Lownik et al's review(2012) suggested inclusion of online surveys in KAP assessment towards blood donation, as this has not yet been done. Therefore though this was not a primary objective of this study, this gap of the literature has now been filled. Additionally, though these findings may be an overestimation, it suggests that reality may be worse and interventions are paramount to optimise blood donation in Barbados.

Conclusion

We surveyed a sample in a Caribbean country with a single blood-collecting centre that is primarily dependent on F/R donations. This study contributes towards one goal in the WHO's framework for achieving 100% voluntary blood donation. We found many areas of deficient knowledge, concerning attitudes and practices with regards to blood donation in Barbados. There is a need to investigate barriers to blood donation apart from knowledge and attitudes. A tailored, multifaceted programme— targeting females, those who are single, and the young— which addresses blood donation education, promotion and donor retention may be useful in helping Barbados achieve 100% VNRD. Improved access to blood donation could be important to address donor retention as currently there is only one blood collecting centre in Barbados. Implementation of a specific blood service committee will be paramount to monitor and evaluate all programmes and blood donation-related practices.

Acknowledgements

The authors wish to acknowledge all participants in this study. The authors would also like to thank Dr. Kenneth Charles for his comments on the manuscript.

Author contributions

AA contributed to the study design, performed the research, analysed the data and wrote the paper. CT contributed to the study design and gave critical input to previous drafts of the paper. AW collected and entered data and gave critical input to previous drafts of the paper. CJ contributed to the study design and gave critical input to previous drafts of the paper. All authors approved the final manuscript.

Competing interests

The authors have no competing interests.

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Table 1: Knowledge surrounding blood donations among a sample population in Barbados, 2014

Questions estimating knowledge surrounding blood donation	Correct answer chosen n(%)
Previously heard the term blood donation	398 (98.5)
All blood donation requirements chosen	42 (10.4)
Blood donation after tattoos/piercings	181 (44.7)
Blood donation after antibiotics, steroids & alcohol in previous 72 hours	272 (67.2)
Maximum yearly donations	130 (33.3)
Previously heard the term universal donor or recipient	246 (61.8)
-Knows the universal donor	79 (32.1)
- Knows the universal recipient	79 (32.1)
Previously heard the term donor deferral	74 (19.0)
All deferral factors chosen	103 (25.6)

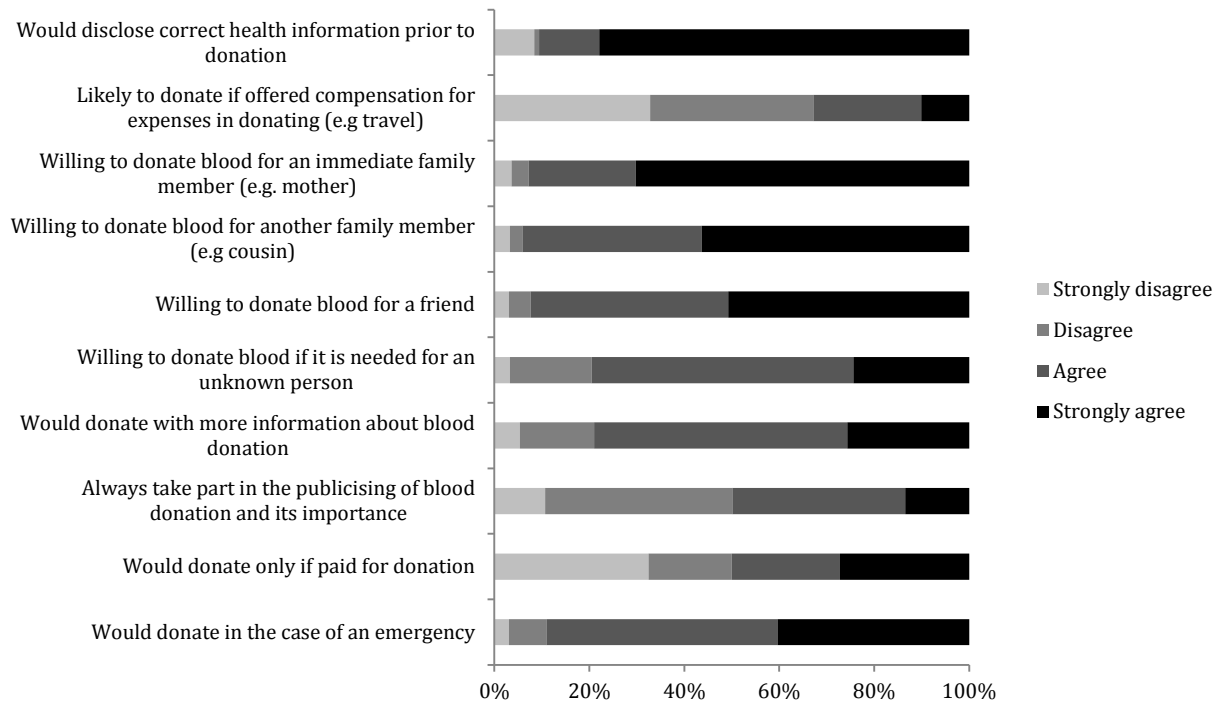


Figure 1: Bar chart showing responses to questions assessing attitude towards blood donation among a sample in Barbados, 2014

Table 2: Reasons for not having donated blood among a sample population in Barbados, 2014

<i>Reasons for not donating blood</i>	<i>N(%)</i>
No one close to me has ever needed blood	60 (28.4)
No one has ever asked me to donate	49(23.6)
Due to fear or pain	40 (19.0)
I never thought about doing it	37 (17.5)
I am medically unfit	34 (16.1)
Due to illness (e.g. diabetes, kidney disease)	28 (13.3)
I can't donate because I have a tattoo/piercing	28 (13.3)
I don't have enough time to donate blood	15 (7.1)
I don't have adequate access to the blood collecting centre	14 (6.6)
Due to fear that it is not safe	13 (6.2)
Parents/friends/relatives told me not to donate blood	4 (1.9)