

Review Article



Psychological Insights into Blood Donation: A Narrative Review

Rabeya Tariq¹, Noore Saba², Usman Rasheed Butt³, Jaweria Aftab⁴, Usman Waheed⁵

¹Department of Clinical Psychology, Shifa Tameer-i-Millat University, Islamabad, Pakistan

²Peshawar Regional Blood Centre, Provincial Ministry of Health, Khyber Pakhtunkhwa, Pakistan

³Department of Public Health, Health Services Academy, Islamabad, Pakistan

⁴Department of Psychology, Air University, Islamabad, Pakistan

⁵Department of Allied Health Sciences, Islamabad Medical and Dental College, Islamabad, Pakistan

Author's Contribution

^{1,3}Substantial contribution to the conception or design of the work; or the acquisition; ^{2,4}Active participation in methodology and literature review; ^{2,5}Analysis, or interpretation of data for the work, ^{2,5}Drafting the work and revising it critically for important intellectual content

Funding Source: None

Conflict of Interest: None

Received: Sept 18, 2024

Accepted: Nov 11, 2024

Address of Correspondent

Rabeya Tariq

Department of Clinical Psychology,
Shifa Tameer-i-Millat University,
Islamabad, Pakistan

E: rabeya97@gmail.com

ABSTRACT

Blood donation is a crucial component of healthcare systems, saving millions of lives globally. The World Health Organization (WHO) stresses the need for a safe and sustainable blood supply, strengthened by voluntary, non-remunerated blood donations. Despite widespread awareness of its benefits, the demand for blood often exceeds supply, posing a continuous challenge. This narrative review examines the psychological factors influencing blood donation behaviour, including motivators and barriers, and offers strategies to enhance donor participation. Key psychological theories, such as the Theory of Planned Behaviour, Health Belief Model, and Prosocial Behaviour Theory, help explain donors' motivations and the psychological barriers they encounter, such as fear, misinformation, and lack of convenience. Cultural and social norms, particularly in regions like Pakistan, play a significant role in shaping donation behaviour, where religious values and familial ties encourage donation. Strategies for promoting blood donation include addressing fears through reassurance, leveraging social recognition, and tailoring campaigns to demographic groups. Targeted interventions, such as behavioural nudges, reminders, and positive reinforcement, can help convert occasional donors into regular ones. Additionally, a positive post-donation experience reinforces future donation behaviour. During humanitarian emergencies and disasters, increased donor participation is driven by a sense of urgency and responsibility, highlighting the need for sustained engagement strategies. Integrating psychological insights into public health approaches can bridge the gap between blood demand and supply, encouraging a culture of regular, voluntary donation to support healthcare needs worldwide.

Key words: Blood donation, Psychology, Voluntary, Pakistan

Cite this article as: Tariq R, Saba N, Butt UR, Aftab J, Waheed U. Psychological Insights into Blood Donation: A Narrative Review. Ann Pak Inst Med Sci. 2024; 20 (Suppl. 2):879-884. doi: 10.48036/apims.v20iSuppl.2.1263.

Introduction

The World Health Organization (WHO) has recently emphasized the critical need for a safe and sustainable blood supply worldwide to enhance the efficient implementation of health services and programmes.¹ A key safety component is the collection of blood from voluntary non-remunerated blood donors. Blood donation plays a critical role in healthcare systems worldwide, as donated blood saves millions of lives every year.² However, the global demand for blood often exceeds supply, creating an ongoing challenge.³ In 2017, global

statistics indicated a demand of 304 million units of blood (each unit measuring 200 ml), while the available supply was only 272 million units, highlighting a considerable shortfall. It was estimated that over 61% of the 195 countries worldwide faced shortages in blood supply.⁴ The science behind blood donation is constantly evolving, incorporating advances in biotechnology, molecular biology, and immunology to improve safety, efficiency, and availability, ultimately supporting life-saving transfusions worldwide.⁵ Psychological factors are key in influencing donor behaviour, both in encouraging and discouraging people from donating blood.⁶ This narrative

review explores the psychological determinants, motivators, deterrents, and interventions aimed at promoting voluntary blood donations. The goal is to offer a comprehensive understanding of the psychological processes that shape donor behaviour and how these insights can be utilized to increase donation rates.

Psychological Theories of Blood Donation

Several psychological models help explain the motivations and barriers associated with blood donation. Key theories include:

1. Theory of Planned Behaviour (TPB): Theory of Planned Behaviour⁷ suggests that an individual's intention to donate blood is influenced by three components:

a. Attitudes: The belief that blood donation is beneficial (for both the recipient and society).

b. Subjective Norms: Perceived social pressure from family, friends, or community to donate.

c. Perceived Behavioural Control: Confidence in one's ability to donate successfully.⁸

This theory emphasizes that positive attitudes and social norms alone may not guarantee blood donation unless individuals feel capable of donating.

2. Health Belief Model (HBM): This model explains that a person's decision to donate blood is based on perceived benefits (e.g., saving lives) versus perceived barriers (e.g., fear of needles or health risks). It also factors in cues to action, such as reminders from organizations or peer influence.⁹

3. Altruism and Prosocial Behaviour Theory: Altruism plays a significant role in voluntary blood donation. Many donors are motivated by the desire to help others without expecting any reward. Prosocial behaviour theory suggests that individuals derive personal satisfaction from doing good deeds, which reinforces future donation behaviour.¹⁰

Motivators for Blood Donation

Understanding why people donate blood is essential for designing effective interventions. Several psychological motivators have been identified:

a. Altruistic Motivation: Research indicates that the primary motivator for many blood donors is altruism.¹¹ Individuals who perceive blood donation as a way to contribute to the well-being of others are more likely to donate regularly.¹²

b. Social Recognition and Approval: Many donors are driven by social recognition or a sense of belonging to a community.¹³ Blood donation campaigns that highlight social rewards (e.g., public acknowledgment, certificates) tend to have higher participation rates.

c. Emotional and Psychological Benefits: Donors often report a sense of personal fulfillment, pride, and satisfaction after donating blood.^{14,15} This emotional reinforcement can encourage repeat donations.¹⁶

d. Religious and Cultural Beliefs: In some cultures, blood donation is seen as a moral or religious duty.¹⁷ Campaigns that align donation drive with religious or cultural values have successfully increased donor participation in certain communities.¹⁸ For example, a study from Iran proved that religious beliefs are the second most frequent motivation factor for blood donation.¹⁹

Psychological Barriers to Blood Donation

Despite the recognized benefits, several psychological barriers prevent individuals from donating blood:

a. Fear and Anxiety: Fear of needle, pain, weakness, or fainting are among the common psychological barriers.²⁰ Pre-donation anxiety can deter first-time donors or those with prior negative experiences.²¹

b. Misinformation and Myths: Some individuals avoid donating due to misconceptions, such as believing that the process is harmful or weakens the donor's health.²² Misunderstandings about eligibility criteria (doubting one's eligibility to donate) also discourage potential donors.²³

c. Lack of Time or Convenience: Many people express a willingness to donate but cite time constraints²⁴ or lack of convenient donation centres as barriers, the latter is especially true for females.²⁵ This demonstrates the importance of logistical considerations in psychological decision-making.

Strategies to Promote Blood Donation: Insights from Psychology

Psychological principles can be employed to address the global blood shortage crisis. With demand consistently outpacing supply, understanding the behavioural drivers and barriers related to blood donation becomes essential. Evidence-based psychological strategies are needed to encourage voluntary blood donations, from enhancing donor motivation and trust to leveraging social influence and altruism. Hence, psychological insights can guide

interventions to encourage more people to donate blood. Successful strategies include:

- a. Addressing Fear and Anxiety:** Interventions such as relaxation techniques, reassurance from medical staff, or providing detailed information about the procedure help reduce anxiety. Creating a welcoming and supportive environment for first-time donors is also essential.²⁶
- b. Behavioural Nudges and Reminders:** Sending regular reminders through text messages, WhatsApp, Facebook, emails, or phone calls increases donation rates.²⁷ Behavioural nudges, such as using motivational language or setting default appointments, encourage participation.²⁸
- c. Social Norm Campaigns:** Campaigns emphasizing social norms can increase donations by showcasing how common and valued the behaviour is within communities.²⁹ Phrases like “Join thousands of others in saving lives” tap into social conformity principles.
- d. Incentivizing Donations:** While altruism is a major driver, small incentives such as refreshments, branded merchandise, or recognition certificates can motivate donors, particularly first-timers.³⁰
- e. Targeted Campaigns Based on Demographics:** Psychological research suggests that different demographic groups (e.g., youth, women, or minorities) respond to different types of messages. Tailoring campaigns to specific groups based on their values and preferences improves outcomes.³¹ For example, to encourage female blood donors, the Government of Pakistan appointed acclaimed Pakistani filmmaker and double Oscar winner, Ms. Sharmeen Obaid-Chinoy, as the ‘Honorary Ambassador for Blood Safety.’ Meanwhile, to engage younger donors, the National Health Ministry’s Safe Blood Transfusion Programme partnered with international football star Cristiano Ronaldo to introduce a culture of voluntary blood donation in Pakistan.³²

Regular versus Occasional Donors

Research reveals significant psychological differences between regular and occasional donors:

- a. Regular donors** are often more altruistic and feel a greater sense of personal responsibility. They also report higher levels of satisfaction from the act of donation and are more likely to have experienced positive reinforcement.³³
- b. Occasional donors** are more likely to donate in response to specific events (e.g., natural disasters, family members in need of blood) or external cues such as reminders.³⁴ They may need additional encouragement and positive reinforcement to become regular donors.³⁵

Understanding these differences is crucial for designing targeted interventions aimed at converting occasional donors into regular ones.

Psychology in Post-Donation Behaviour

The psychological experience following blood donation also influences future behaviour. If donors have positive post-donation experience, they are more likely to donate again.³⁶ Key factors include:

- a. Positive Feedback:** Thank-you messages and post-donation acknowledgments reinforce prosocial behaviour.³⁷
- b. Peer Influence:** Sharing donation experiences on social media increases the visibility of behaviour and encourages others to participate.
- c. Handling Adverse Reactions:** Ensuring that donors receive prompt care and support after any adverse reaction prevents negative associations with the experience.³⁸

Psychological Approaches in Disasters and Humanitarian Emergencies

Psychology can effectively enhance blood donations during times of crisis (e.g., pandemics or natural disasters). In emergencies, traditional methods of blood collection may be insufficient as the need for blood often escalates, while potential donors may face heightened anxiety, uncertainty, and logistical challenges.³⁹ Psychology plays a critical role in explaining this behaviour, as individuals feel a heightened sense of responsibility and urgency during crises. Psychological approaches play a pivotal role in not only mobilizing new donors but also encouraging repeat donations by fostering a sense of collective responsibility and urgency. Techniques such as targeted messaging that appeals to social norms, narratives emphasizing community heroism, and reducing donor anxiety through clear communication and reassurance can enhance participation. Further, understanding the motivations behind altruistic behaviour allows for the creation of campaigns that align with people’s values, promoting sustained and reliable blood donations during critical times.⁴⁰ However, sustaining donation rates beyond the immediate crisis period is a challenge. Keeping donors psychologically engaged requires strategic follow-up efforts. By highlighting the ongoing need for blood and the impact of their donations, organizations can encourage a habit of regular donation.⁴¹

Blood Donation Psychology in Pakistan

In Pakistan, with a population of 240 million, around 2.7 million units of blood are collected each year, yet only 18% are from voluntary non-remunerated donors, despite 60% of the population being under 29.⁴² Therefore, increasing voluntary blood donations is crucial to maintaining a sufficient and sustainable blood supply, particularly by encouraging first-time donors. The psychological dynamics of blood donation in Pakistan reflect a blend of cultural, religious, and social factors. Altruism is deeply rooted in societal values, often driven by Islamic teachings, where acts of charity and saving lives are emphasized. Many individuals donate blood to fulfill religious obligations, especially during events such as Ramadan or Ashura, where the spirit of giving is heightened. Additionally, family and community ties play a significant role; people are more likely to donate blood for family or friends in need, underscoring the influence of social norms and familial obligations in motivating donations.⁴³

Blood donation is a vital practice that can save lives, and our society has an important role in encouraging it, especially among the youth. We can start at home by motivating family members to consider blood donation as a meaningful contribution to the community. Schools should also educate children about its significance, helping them understand the impact of their contributions. By promotion this culture of giving, we empower young people to engage in blood donation, ultimately benefiting society as a whole. Together, we can create a community that values and prioritizes this essential act of generosity.

However, psychological barriers such as fear, misinformation, and lack of awareness about voluntary donation limit participation.⁴⁴ Myths around health risks, coupled with a fear of needles or physical weakness post-donation, discourage many potential donors. Moreover, there is a significant reliance on replacement donors - those who donate for specific patients - rather than a culture of voluntary, regular donations.^{45,46} Psychological interventions such as awareness campaigns, social media drives, and collaborations with religious institutions can help promote positive attitudes toward regular blood donation. Creating supportive donation environments and addressing fears through targeted messages are essential strategies for increasing voluntary blood donations across Pakistan.

Conclusion

Psychology provides valuable insights into the motivations and barriers associated with blood donation. While altruism and prosocial behaviour drive many donors, factors such as fear, misinformation, and lack of self-efficacy deter others. Effective interventions based on psychological principles can help address these barriers and encourage more people to donate regularly. Campaigns that use behavioural nudges, social norm messaging, and targeted interventions tailored to demographic groups are more likely to succeed. Moreover, creating a positive post-donation experience and engaging donors during crises ensure long-term participation. By integrating psychological insights into public health strategies, healthcare organizations can bridge the gap between the demand for and supply of blood, ultimately saving more lives.

References

1. World Health Organisation. Action framework to advance universal access to safe, effective and quality-assured blood products 2020–2023. Geneva: World Health Organisation; 2020.
2. Jacobs JW, Bates I, Cohn CS, Choudhury N, Owusu-Ofori S, Vrielink H, Patel EU, Wendel S, Tobian AAR, Bloch EM. The global blood donation index: an imperfect measure of transfusion need. *Lancet.* 2024;404(10456):988-990. [https://doi.org/10.1016/S0140-6736\(24\)01550-2](https://doi.org/10.1016/S0140-6736(24)01550-2).
3. Walter K. Blood Donation. *JAMA.* 2023 ;330(19):1921. <https://doi.org/10.1001/jama.2023.16345>.
4. Roberts N, James S, Delaney M, Fitzmaurice C. The global need and availability of blood products: a modelling study. *Lancet Haematol.* 2019;6(12):e606-e615. [https://doi.org/10.1016/S2352-3026\(19\)30200-5](https://doi.org/10.1016/S2352-3026(19)30200-5).
5. Benítez-Arvizu G, Campos-Aguirre E. Biología molecular en un banco de sangre [Molecular biology in a blood bank]. *Rev Med Inst Mex Seguro Soc.* 2023 ;61(Suppl 1):S46-S51.
6. Hughes SD, France CL, West-Mitchell KA, Pina T, McElfresh D, Sayers M, Bryant BJ; NHLBI SoS Working Group #1: Blood Donors and the Supply. Advancing Understandings of Blood Donation Motivation and Behaviour. *Transfus Med Rev.* 2023 ;37(4):150780. <https://doi.org/10.1016/j.tmr.2023.150780>.
7. Liu J, Han H. Applying a modified and extended theory of planned behaviour to predict blood donation intentions among Chinese university students: An empirical investigation. *Heliyon.* 2023;9(8):e18851. <https://doi.org/10.1016/j.heliyon.2023.e18851>.
8. Chen L. Applying the extended theory of planned behaviour to predict Chinese people's non-remunerated blood donation intention and behaviour: the roles of perceived risk and trust in blood collection agencies. *Asian J. Soc. Psychol.* 2017;20(3-4):221–231. <https://doi.org/10.1111/ajsp.12190>.

9. Masser BM, White KM, Hamilton K, McKimmie BM. An examination of the predictors of blood donors' intentions to donate during two phases of an avian influenza outbreak. *Transfusion*. 2010;51:548-557. <https://doi.org/10.1111/j.1537-2995.2010.02887.x>.
10. Ferguson E. Mechanism of altruism approach to blood donor recruitment and retention: a review and future directions. *Transfus Med*. 2015;25(4):211-26. <https://doi.org/10.1111/tme.12233>.
11. Piersma TW, Bekkers R, de Kort W, Merz EM. Altruism in blood donation: Out of sight out of mind? Closing donation centers influences blood donor lapse. *Health Place*. 2021;67:102495. <https://doi.org/10.1016/j.healthplace.2020.102495>.
12. Evans R, Ferguson E. Defining and measuring blood donor altruism: a theoretical approach from biology, economics and psychology. *Vox Sang*. 2014;106(2):118-26. <https://doi.org/10.1111/vox.12080>.
13. Goette L, Tripodi E. The limits of social recognition: Experimental evidence from blood donors. *J Pub Economics*. 2024;231:105069. <https://doi.org/10.1016/j.jpubeco.2024.105069>
14. Sojka BN, Sojka P. The blood-donation experience: perceived physical, psychological and social impact of blood donation on the donor. *Vox Sang*. 2003 Feb;84(2):120-8. <https://doi.org/10.1046/j.1423-0410.2003.00271.x>.
15. Esefeld M, Sümnig A, Alpen U, Grabe HJ, Greinacher A. A Cross-Sectional Study of Blood Donors' Psychological Characteristics over 8 Weeks. *Transfus Med Hemother*. 2021 Aug;23;49(2):67-74. <https://doi.org/10.1159/000517566>.
16. Suemnig A, Konerding U, Hron G, Lubenow N, Alpen U, Hoffmann W, et al. Motivational factors for blood donation in first-time donors and repeat donors: a cross-sectional study in West Pomerania. *Transfus Med*. 2017;27:413-420. <https://doi.org/10.1111/tme.12450>.
17. Abohghasemi H, Divkalayi NS, Seighali F. Contribution of religion to blood donation: Iran experience. *Asian J Transfus Sci*. 2011;5(2):185-6. <https://doi.org/10.4103/0973-6247.83262>.
18. Vassilis S, Pichon I, Trompette L, Verschueren M, Rebecca D. Prosocial Behaviour and Religion: New Evidence Based on Projective Measures and Peer Ratings. *J Sci Study Relig*. 2005;44:323-348.
19. Maghullu M. Assessing the Motivation of Blood Donors in 28 Provinces of Iran. Research Collection of Iranian Blood Transfusion Organization. Iranian Blood Transfusion Research Center Publication. (2nd ed) 2005;2:37.
20. France CR, France JL, Himawan LK, Duffy L, Kessler DA, Rebosa M, et al. Fear is associated with attrition of first-time whole blood donors: A longitudinal examination of donor confidence and attitude as potential mediators. *Transfusion*. 2021;61(12):3372-3380. <https://doi.org/10.1111/trf.16671>.
21. Li Z, Lei S, Li X, Zhao Y, Dai Y, Jin S, et al. Blood Donation Fear, Perceived Rewards, Self-Efficacy, and Intention to Return Among Whole Blood Donors in China: A Social Cognitive Perspective. *Front Psychol*. 2021;12:683709. <https://doi.org/10.3389/fpsyg.2021.683709>.
22. Baig M, Habib H, H Haji A, T Alsharief F, M Noor A, G Makki R. Knowledge, Misconceptions and Motivations Towards Blood Donation Among University Students in KSA. *Pak J Med Sci*. 2013;29(6):1295-9. <https://doi.org/10.12669/pjms.296.4137>.
23. Dorle A, Gajbe U, Singh BR, Noman O, Dawande P. A Review of Amelioration of Awareness About Blood Donation Through Various Effective and Practical Strategies. *Cureus*. 2023;15(10):e46892. <https://doi.org/10.7759/cureus.46892>.
24. Wevers A, Wigboldus DH, de Kort WL, van Baaren R, Veldhuizen IJ. Characteristics of donors who do or do not return to give blood and barriers to their return. *Blood Transfus*. 2014;12 Suppl 1(Suppl 1):s37-43. <https://doi.org/10.2450/2013.0210-12>.
25. Waheed U, Azmat M, Zaheer HA. Knowledge, attitude and practices towards blood donation in Pakistan: A nationwide survey. *Hematol Transfus Int J*. 2015;1(3):83-86. <https://doi.org/10.15406/htij.2015.01.00018>.
26. Hashemi S, Maghsudlu M, Nasizadeh S, Esmailifar G, Pourfathollah AA. Effective ways to retain first-time blood donors: a field-trial study. *Transfusion*. 2019 Sep;59(9):2893-2898. <https://doi.org/10.1111/trf.15404>.
27. Zaheer HA, Waheed U, Tahir S, et al. Promotion of voluntary blood donation through Facebook blood donation feature in Pakistan. *Vox Sang*. 2019;114(Suppl. 1):23. <https://doi.org/10.1111/vox.12792>.
28. Waheed U, Wazeer A, Saba N, Qasim Z. Effectiveness of WhatsApp for blood donor mobilization campaigns during COVID-19 pandemic. *ISBT Science Series*. 2020;15(4):378-380. <https://doi.org/10.1111/voxs.125726>.
29. Guglielmetti Mugion R, Pasca MG, Di Di Pietro L, Renzi MF. Promoting the propensity for blood donation through the understanding of its determinants. *BMC Health Serv Res*. 2021;21(1):127. <https://doi.org/10.1186/s12913-021-06134-8>.
30. Guarnaccia C, Giannone F, Falgares G, Caligaris AO, Sales-Wuillemin E. Differences in social representation of blood donation between donors and non-donors: an empirical study. *Blood Transfus*. 2016;14(6):487-489. <https://doi.org/10.2450/2015.0048-15>.
31. Bhuiyea MSH, Faiyaz SR, Jaman N, Uddin MJ. Factors influencing voluntary blood donation practice among university students of Bangladesh. *Transfus Apher Sci*. 2022;61(4):103379. doi: 10.1016/j.transci.2022.103379.
32. Waheed U, Hosseini N. Voluntary blood donation and social media. 2023;12(2):68-70. <https://doi.org/10.35787/jimdc.v12i2.1010>.
33. Kamhieh-Milz S, Kamhieh-Milz J, Tauchmann Y, Ostermann T, Shah Y, Kalus U, Salama A, Michalsen A. Regular blood donation may help in the management of hypertension: an observational study on 292 blood donors. *Transfusion*. 2016;56(3):637-44 <https://doi.org/10.1111/trf.13428>.
34. Saba N, Nisar M, Muhammad I, Waheed U. Use of Social Media (Facebook) to Mobilise Voluntary Blood Donors in Disasters: A Case of Suicide Bombing in Peshawar, Pakistan. *Vox Sanguinis*. 2024;119 (Suppl. S1): 190-191. <https://doi.org/10.1111/vox.13650>.

35. Zaheer HA, Waheed U. Blood transfusion service in disasters. *Transfus Apher Sci.* 2016;55(2): 186-190. <http://doi.org/10.1016/j.transci.2016.09.007>.
36. Merz EM, Zijlstra BJH, de Kort WLAM. Blood donor show behaviour after an invitation to donate: The influence of collection site factors. *Vox Sang.* 2017;112(7):628-637. <https://doi.org/10.1111/vox.12562>.
37. Wilkinson SL, Steele WR, High PM, Wright DJ; NHLBI Retrovirus Epidemiology Donor Study-II. Characteristics of post donation information donors and comparison with appropriately deferred donors. *Transfusion.* 2011;51(7):1503-10. <https://doi.org/10.1111/j.1537-2995.2010.03043.x>.
38. Soodejani MT, Haghdoost AA, Okhovati M, Zolala F, Baneshi MR, Sedaghat A, Tabatabaei SM. Incidence of adverse reaction in blood donation: a systematic review. *Am J Blood Res.* 2020;10(5):145-150.
39. Van Denakker TA, Al-Riyami AZ, Feghali R, Gammon R, So-Osman C, Crowe EP, Goel R, Rai H, Tobian AAR, Bloch EM. Managing blood supplies during natural disasters, humanitarian emergencies, and pandemics: lessons learned from COVID-19. *Expert Rev Hematol.* 2023;16(7):501-514. <https://doi.org/10.1080/17474086.2023.2209716>.
40. Laermans J, O D, Van den Bosch E, De Buck E, Compernolle V, Shinar E, Vandekerckhove P. Impact of disasters on blood donation rates and blood safety: A systematic review and meta-analysis. *Vox Sang.* 2022;117(6):769-779.
41. Abdella Y, Hajjeh R, Sibinga CTS. Availability and safety of blood transfusion during humanitarian emergencies. *East Mediterr Health J.* 2018;24(8):778-788. <https://doi.org/10.26719/2018.24.8.778>.
42. Zaheer HA, Waheed U, Tahir S, Nasir K. National blood banks data collection report (2019). Safe Blood Transfusion Programme, Government of Pakistan. Available at <https://www.sntp.gov.pk/downloads> accessed on 5 March 2024.
43. Jamal S, Mansoor N, Ali A, Nadeem A, Aijaz J, Meraj F. Degree of blood safety of voluntary non-remunerated versus replacement blood donations: A multi-centre study of the large cohort of blood donors from two provinces of Pakistan. *Vox Sang.* 2023;118(12):1078-1085. <https://doi.org/10.1111/vox.13546>.
44. Saba N, Nisar M, Nasir JA, Shaukat A, Majeed N, Wazeer A, Waheed U. Blood donation deferral pattern among prospective blood donors in northwest region of Pakistan. *Ann Pak Inst Med Sci.* 2020;16(2): 63-68.
45. Mumtaz Z, Bowen S, Mumtaz R. Meanings of blood, bleeding and blood donations in Pakistan: implications for national vs global safe blood supply policies. *Health Policy Plan.* 2012;27(2):147-55. <https://doi.org/10.1093/heapol/czr016>.
46. Los APM, Waheed U, Kohorst P, Smid WM. Creation of an enabling environment for voluntary blood donation in Pakistan. *Vox Sang.* 2012; 103(Suppl. 1):100. <https://doi.org/10.1111/j.1423-0410.2012.01615.x>.