

BINARY LOGISTIC REGRESSION OF FACTORS INFLUENCING PRACTICE OF BLOOD DONATION AMONG UNIVERSITY STUDENTS

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Abstract: *Blood donation is a vital public health activity that ensures an adequate and safe blood supply for medical needs. However, the level of blood donation practice among university students remains a concern. This study aimed to examine the practice of blood donation and its associated factors, including knowledge, attitude, perceived susceptibility, and perceived severity, among university students. A cross-sectional study design was employed, involving 186 undergraduate students in Universiti Teknologi MARA (UiTM) Kelantan, Kota Bharu Campus was selected using a simple random sampling method. Data were collected using a structured, self-administered questionnaire consisting of sections on demographic characteristics and the study variables. Chi-square tests were conducted to examine the association between the independent variables and blood donation practice. Binary logistic regression analysis using the backward likelihood ratio method was performed to identify significant predictors of blood donation practice. The descriptive findings indicated that blood donation practice among respondents was at a moderate level. Chi-square analysis revealed significant associations between knowledge, attitude, and perceived susceptibility with blood donation practice, while perceived severity was not significant at the bivariate level. However,*

the final binary logistic regression model identified knowledge level and perceived susceptibility level as significant predictors of blood donation practice. Respondents with higher knowledge levels were less likely to have poor blood donation practice, whereas respondents with higher perceived susceptibility were more likely to demonstrate poor practice. The logistic regression model demonstrated good fit based on the Hosmer–Lemeshow goodness-of-fit test. In conclusion, knowledge and perceived susceptibility were identified as an important factor influencing blood donation practice among university students. Therefore, interventions aimed at enhancing students' knowledge and strengthening awareness related to perceived susceptibility are recommended to improve voluntary blood donation participation among university students.

Keywords: *blood donation; knowledge; attitude; perceived susceptibility; perceived severity; binary logistic regression*

Introduction

Blood transports oxygen and nutrients, removes waste, and supports immune function. Donated blood is used in surgery, trauma care, cancer treatment, and the care of patients with chronic conditions such as anaemia and haemophilia. In emergencies, a timely transfusion can be lifesaving (Farzana et al., 2022). Donors also undergo basic health checks during the donation process. Despite the importance of transfusion services, many countries struggle to maintain an adequate blood supply (World Health Organization, 2021). Low donor participation, limited awareness, and difficulties in collection and storage contribute to these shortages; fear and misinformation may further discourage prospective donors. Evidence from Asian settings illustrates a gap between awareness and action. In one Indian study, 74.4% of respondents understood the importance of donation, but only 24% had donated blood; fear and misinformation were reported as barriers (Chauhan et al., 2018). Hossain et al. (2022) likewise described barriers to participation in Bangladesh, including social norms and limited targeted education.

These barriers point to the value of accessible donation services and education that responds to local concerns. In Malaysia, maintaining blood stocks can be particularly challenging during emergencies and festive periods. The Ministry of Health Malaysia (2022) reported rising demand for blood products alongside inconsistent voluntary donation. The reported annual donor rate of approximately 2.2% remains below the cited 5% target. Fear, limited time, and concerns about side effects may deter potential donors. University students are a relevant group for donor recruitment: many are eligible to donate and can be reached through campus programmes, yet knowledge and favourable attitudes do not always lead to donation. Identifying the factors associated with their actual practice may help inform more focused campus initiatives.

A shortfall in voluntary donation persists despite the need for blood in routine and emergency care. Annual demand in Malaysia has been reported to exceed 700,000 units, while approximately 2.2% of the population donates each year, below the cited 5% target (Ministry of Health Malaysia, 2022). Understanding the factors associated with donation among students could therefore support efforts to recruit and retain young donors.

The difference between what students know and what they do is evident in a study at Universiti Sains Malaysia revealed that 97.9% of undergraduates had adequate knowledge and 96.8% had

positive attitudes, but 40.4% had ever donated blood (Zainal Abidin & Shet, 2021). Knowledge and attitude alone may therefore offer an incomplete account of donation practice. Perceived susceptibility and perceived severity, two constructs of the Health Belief Model, have been examined in studies of preventive actions such as vaccination. Their relevance to blood donation is less clear because donating involves concerns about both personal health and the needs of recipients. This study examines whether knowledge, attitude, perceived susceptibility, and perceived severity are associated with blood donation practice among university students. Its findings may help guide education and awareness activities aimed at increasing voluntary donation.

Research Objectives

The following objectives have been established to guide this study.

- a) To assess the distribution of blood donation practice by level of knowledge, attitude, perceived susceptibility, and perceived severity among university students.
- b) To determine the association between level of knowledge, attitude, perceived susceptibility, and perceived severity and the practice of blood donation among university students.
- c) To determine the influence of knowledge, attitude, perceived susceptibility and perceived severity on the likelihood of having ever donated blood among university students.

Research Hypothesis

The following research hypothesis should be tested to answer the objectives of this study.

H_0 : There is no significant association between students' level of knowledge, attitude, perceived susceptibility, and perceived severity toward blood donation and their practice of blood donation.

H_1 : There is significant association between students' level of knowledge, attitude, perceived susceptibility, and perceived severity toward blood donation and their practice of blood donation.

H_0 : Knowledge, attitude, perceived susceptibility, and perceived severity are not significantly influencing the likelihood of having ever donated blood.

H_1 : Knowledge, attitude, perceived susceptibility, and perceived severity are significantly influencing the likelihood of having ever donated blood.

Literature Review

Practice of Blood Donation

Practice refers to the actual behaviors or actions individuals perform based on their knowledge and attitudes and it represents the real-life application of what people know and believe (Nghah et al., 2022). Globally, the practice of voluntary blood donation remains below optimal levels despite extensive health campaigns and rising awareness. According to the World Health Organization (2021), only 3–4% of the eligible population in many countries donates blood, far short of what is needed to maintain a safe and sufficient blood supply. Although knowledge and positive attitudes about blood donation are common, actual donation behavior continues to be limited by psychological, cultural, and logistical factors. In Malaysia, blood donation practice among university students remains modest. A cross-sectional study at Quest International University involving 279 students showed that only 36.2% had ever donated blood (Farzana et al., 2022). Despite strong willingness, actual donation was hindered by fear of pain, health misconceptions, and inconvenience.

Knowledge Regarding Blood Donation

Knowledge refers to the information, awareness, or understanding individuals possess about a particular subject, usually gained through education, experience, or exposure (Patience et al., 2021). It serves as the foundation for informed decision-making, enabling individuals to recognize the importance, risks, and benefits of certain actions. In the context of blood donation, knowledge is a crucial enabler of health behavior. A mixed-method study conducted in the UK by Town et al. (2020) found that over 80% of respondents could identify basic donation requirements, but fewer than half understood donation frequency or what happens to the blood after collection. Viwattanakulvanid and Chan Oo (2022) found that students with prior donation experience had significantly higher knowledge scores ($\beta = 0.396$, $p < 0.001$). In a Malaysian context, students exposed to structured educational content achieved significantly higher knowledge scores, particularly in areas such as donation intervals and safety procedures (Farzana et al., 2022). Similarly, Hossain et al. (2022) revealed that while 76.2% of participants knew that blood donation saves lives, only 32.5% were aware of the recommended frequency for safe donation. Together, these studies emphasize the critical role of targeted and well-designed educational efforts in enhancing blood donation knowledge and fostering future participation.

Attitude Regarding Blood Donation

Attitude encompasses a person's thoughts, beliefs, values, and feelings toward a particular subject (Fishman et al., 2021). It reflects how individuals perceive an issue and often influences their motivation and behavioral intentions (Rajeh, 2022). Even when individuals possess accurate knowledge, their actions are largely shaped by their attitudes. When it comes to blood donation, attitudes significantly influence motivation and willingness to donate. A study in Ethiopia by Beyene (2020) found that over 75% agreed that blood donation is a charitable and necessary act. Eltewacy et al. (2024), in a cross-national study among 12,606 university students from 16 countries, found overwhelmingly positive attitudes, with 78% agreeing that blood donation is a civic duty. In Malaysia, Zainal Abidin and Shet (2021) found that most respondents held positive views about blood donation, recognizing its benefits. Yet, despite high attitude scores, only a small percentage had ever donated blood. Collectively, these findings suggest that while positive attitudes are widespread, they do not automatically result in action.

Perceived Susceptibility

Perceived susceptibility refers to an individual's belief about the likelihood of experiencing a health issue due to a particular behavior. Within the Health Belief Model (HBM), this construct is foundational in predicting whether individuals will engage in preventive health actions. Zewdie et al. (2024) found that university students with higher perceived susceptibility were significantly more inclined to receive a COVID-19 booster dose ($p < 0.001$). Similarly, perceived susceptibility was a significant predictor of vaccine uptake across diverse populations (Vo & Le, 2025). Although these studies focus on vaccination, the underlying psychological mechanism is transferable to blood donation behavior. Individuals who perceive a higher societal or personal risk, such as the possibility of blood shortages during emergencies or the vulnerability of patients in need, may be more motivated to donate. Thus, perceived susceptibility remains a relevant and impactful construct when examining factors influencing blood donation practice.

Perceived Severity

Perceived severity refers to an individual's belief about the seriousness of a health threat and its potential consequences. In the context of COVID-19 vaccination, Tan et al. (2023) found that individuals who feared infection and acknowledged the seriousness of complications were significantly more likely to accept vaccination. Similarly, Zahari et al. (2022) found that participants who recognized the long-term health risks of smoking were more inclined to quit. In relation to blood donation, when individuals understand that blood shortages can lead to delayed surgeries, untreated trauma, or even death, their perception of severity may intensify, prompting them to donate. These findings suggest that perceived severity can be a powerful driver of action across different health contexts.

Methodology

Data Collection Method

This study utilized a quantitative cross-sectional survey design to assess students' knowledge, attitude, perceived susceptibility, and perceived severity regarding the practice of blood donation. Data were collected through self-administered questionnaires that were distributed online. The questionnaire was used because the sample size was large and it enabled the researcher to collect a large amount of information within a shorter period. The structured questionnaire was distributed via WhatsApp using Google Forms links, allowing quick and convenient access for the selected respondents. For respondents who did not initially respond, the researcher conducted follow-ups through reminder messages on WhatsApp to encourage participation and improve the response rate.

Sampling Design

The measuring instrument that was used for data collection was a structured questionnaire consisting of five sections. Part A consisted of demographic information, including gender, semester, faculty, blood donation practice (Yes/No), and frequency of blood donation. Part B measured level of knowledge questions using a Likert scale ranging from "not at all confident" to "totally confident." Part C consisted level of attitude statements and used a Likert scale ranging from "strongly disagree" to "strongly agree." Part D assessed level of perceived susceptibility, while Part E evaluated level of perceived severity. Both Part D and Part E were measured using a Likert scale ranging from "strongly disagree" to "strongly agree." The questionnaire was adapted from previous validated studies with minor modifications to suit the study context like in the Table 1. Prior to full deployment, a pilot study was conducted with 30 respondents to assess the clarity and reliability of the instrument.

Table 1: Summary of Questionnaire

Section	Variable	Number of Items	Source
A	Demographic	5 questions	—
B	Knowledge	10	Eltewacy et al. (2024); Thangaraj et al. (2024)
C	Attitude	7	Eltewacy et al. (2024)
D	Perceived Susceptibility	7	Tan et al. (2023); Othman et al. (2019)
E	Perceived Severity	6	Tan et al. (2023); Othman et al. (2019)

Data were collected using a structured questionnaire consisting of five sections: (A) Demographic information, (B) Knowledge-related questions, (C) Attitude-based question, (D) Perceived Susceptibility questions, (E) Perceived Severity question and all of which used a Likert scale like mention in Table 2.

Table 2: Type of Variable and Measurement

Section	Variables	Type of Variables	Category	Type of Measurement
A	Gender, Study Program, Semester, Blood Donation Practice, Frequency of Blood Donation	Qualitative	Multiple Choice	Nominal / Ordinal
B	Knowledge	Quantitative	7-point Likert scale	Interval
C	Attitude	Quantitative	7-point Likert scale	Interval
D	Perceived Susceptibility	Quantitative	7-point Likert scale	Interval
E	Perceived Severity	Quantitative	7-point Likert scale	Interval

Sampling Design

In this study, the target population consisted of students who were enrolled at UiTM Kelantan, Kota Bharu Campus. This group was selected because young adults represent a critical segment of potential voluntary blood donors and play an important role in sustaining the national blood supply. University students are generally healthy, accessible for health promotion initiatives, and frequently involved in community and awareness programmes, making them an appropriate population for examining psychosocial factors related to blood donation behaviour. Furthermore, focusing on university students allows the study to assess levels of knowledge, attitudes, perceived susceptibility, and perceived severity during early adulthood, a developmental stage where long-term health behaviours are formed. To ensure that the sampling process accurately represented this population, a well-defined sampling frame was established. The sampling frame comprised an official list of UiTM Kelantan, Kota Bharu Campus students obtained from the university's academic affairs or student records department. This list included students' full names, faculties, and contact information such as phone numbers or email addresses. The availability of this information allowed the researchers to organize the data systematically and apply a simple random sampling technique, where each student had an equal chance of being selected. This method reduced selection bias and ensured fairness in participant selection.

The required sample size for this study were calculated using the Raosoft Sample Size Calculator. Given a total population of 1185 full-time undergraduate students at UiTM Kelantan, Kota Bharu Campus, the parameters will set at a 90% confidence level, 7% margin of error, and 50% response distribution. Based on these inputs, the calculator recommends a minimum sample size of 169 respondents. To account for potential non-responses or incomplete data, an additional 10% will be added (Andrade, 2020). Bringing the final target sample size to 186 respondents. This approach helps ensure the data collected is statistically reliable and representative of the target population. The response rate for this study is 100% since for

respondents who did not initially respond, the researcher conducted follow-ups through reminder messages on WhatsApp to encourage participation and improve the response rate.

This study utilizes a probability sampling approach, specifically the Simple Random Sampling (SRS) technique. The sampling frame comprises a complete list of all 1185 full-time undergraduate students enrolled at UiTM Kelantan, Kota Bharu Campus. To ensure that every student has an equal probability of selection, the sample were generated randomly using Microsoft Excel.

Data Analysis

The collected data were analysed using the Statistical Package for the Social Sciences (SPSS). Cronbach's alpha was employed to assess the internal consistency and reliability of the measurement scales. Descriptive statistics were subsequently used to summarise the respondents' demographic characteristics. The chi-square test of independence was performed to examine the associations between categorical variables. Finally, binary logistic regression analysis was conducted to test the proposed hypotheses and determine the influence of knowledge, attitude, perceived susceptibility, and perceived severity on blood donation practice.

Results and Discussion

Data Screening

The first step before analyzing the model, data screening has been done to examine the data which is to make sure that there are no multicollinearity errors, outliers and influential points. In this study, there is no multicollinearity between any of the independent variable. Based Table 4, there is no multicollinearity between any of the independent variable. Since all the tolerance values are above 0.1 and the Variance Inflation Factor (VIF) values also are all less than 10. Thus, the independent variables are not correlated to each other.

Table 4: Multicollinearity Detection

Variables	Tolerance	VIF
Knowledge	0.691	1.447
Attitude	0.696	1.437
Perceived Severity	0.579	1.726
Perceived Susceptibility	0.579	1.727

Reliability Analysis

In this study, the internal consistency has been evaluated by applying reliability analysis using Cronbach's Alpha value. The Cronbach's Alpha value was computed for constructs of section B (knowledge), section C (attitude), section D (perceived susceptibility) and section E (perceived severity). The result of reliability test for each construct was shown in Table 5. The Cronbach's alpha values for all constructs ranged from 0.819 to 0.900 in the pilot study and from 0.868 to 0.897 in the actual study. All values exceeded the minimum acceptable threshold of 0.70, indicating good to excellent internal consistency (Hair et al., 2019). This suggests that the items used to measure knowledge, attitude, perceived susceptibility, and perceived severity were reliable and suitable for further analysis.

Table 5: Reliability Result

Construct	Pilot Cronbach's Alpha	Pilot No. of Items	Actual Cronbach's Alpha	Actual No. of Items
Section B: Knowledge	0.878	10	0.868	10
Section C: Attitude	0.900	7	0.897	7
Section D: Perceived Susceptibility	0.889	7	0.874	7
Section E: Perceived Severity	0.819	6	0.893	6

Demographic Characteristics

Descriptive analysis was conducted to explore the characteristics of demographic variables that were involved in this study. The demographic variable consists of gender, study program, and semester as shown in Table 6.

A total of 186 respondents participated in this study. Majority of respondents were female, with 130 respondents (69.9%), while male respondents accounted for 56 respondents (30.1%). This indicates that female students comprised a larger proportion of the study population compared to male students.

In terms of course distribution, the highest proportion of respondents were from CS241/CDCS241, with 92 respondents (49.5%). This was followed by BA242/BA272 with 22 respondents (11.8%), BA240/BA270 with 20 respondents (10.8%), BA250/BA280 with 19 respondents (10.2%), BA249/BA279 with 17 respondents (9.1%), and CS291/CDCS291, which recorded the lowest number of respondents at 16 respondents (8.6%). Overall, nearly half of the respondents were from the CS241/CDCS241 programme.

Regarding semester of study, most respondents were in Semester 6, comprising 59 respondents (31.7%). This was followed by Semester 5 with 38 respondents (20.4%) and Semester 4 with 30 respondents (16.1%). Smaller proportions of respondents were from Semester 7 (11.8%), Semester 3 (10.8%), Semester 1 (5.4%), and Semester 2 (3.8%). These findings indicate that the majority of respondents were in the later semesters of their study.

Table 6: Demographic Characteristics of Respondents

Variable	Category	n (%)
Gender	Female	130 (69.9)
	Male	56 (30.1)
Course	CS241/CDCS241	92 (49.5)
	BA242/BA272	22 (11.8)
	BA240/BA270	20 (10.8)
	BA250/BA280	19 (10.2)
	BA249/BA279	17 (9.1)
	CS291/CDCS291	16 (8.6)
Semester	Semester 6	59 (31.7)
	Semester 5	38 (20.4)
	Semester 4	30 (16.1)
	Semester 7	22 (11.8)
	Semester 3	20 (10.8)

	Semester 1	10 (5.4)
	Semester 2	7 (3.8)

Distribution of Practice of Blood Donation According to Knowledge, Attitude, Perceived Susceptibility and Perceived Severity

Table 7 presents the distribution of blood donation practice according to knowledge, attitude, perceived susceptibility, and perceived severity. Respondents with high knowledge showed a higher proportion of high practice (59.6%) compared to those with poor knowledge (33.0%). Similarly, respondents with high attitude demonstrated a higher proportion of high practice (65.9%) than those with poor attitude (26.3%). For perceived susceptibility, the proportion of high practice was almost similar between low (42.1%) and high (49.5%) levels. Respondents with high perceived severity showed a higher proportion of high practice (53.2%) compared to those with low perceived severity (38.0%).

Table 7: Distribution of Blood Donation Practice

Variable	Level	n	Low Practice n (%)	High Practice n (%)
Knowledge	Poor	97	65 (67.0)	32 (33.0)
	High	89	36 (40.4)	53 (59.6)
Attitude	Poor	95	70 (73.3)	25 (26.3)
	High	91	31 (34.1)	60 (65.9)
Perceived Susceptibility	Poor	95	55 (57.9)	40 (42.1)
	High	91	46 (50.5)	45 (49.5)
Perceived Severity	Poor	92	57 (62.0)	35 (38.0)
	High	94	44 (46.8)	50 (53.2)

Chi-Square Analysis Test for Association

The Chi-square test of association was constructed to determine the association between the independent variables which is knowledge, attitude, perceived susceptibility, and perceived severity with dependent variable, blood donation practice. This test has been since the assumptions were satisfied. The assumptions of the Pearson Chi-square test were assessed prior to analysis. Independence of observations was ensured, as each participant contributed only one observation. No cells had expected counts below 5. The minimum expected cell counts were 32.65 for knowledge, 30.05 for attitude, 32.65 for perceived susceptibility, and 34.13 for perceived severity, indicating that the expected cell frequency assumption was satisfied for all analyses. Table 8 presents the association between psychosocial factors and blood donation practice. The Chi-square analysis indicated that knowledge, attitude, and perceived susceptibility were significantly associated with blood donation practice, whereas perceived severity was not significantly associated. For knowledge, a significant association was observed ($\chi^2 = 12.534$, $df = 1$, $p\text{-value} < 0.001$). Respondents with poor knowledge showed a higher proportion of blood donation (57.3%) compared to those with high knowledge (42.7%). Similarly, attitude was significantly associated with blood donation practice ($\chi^2 = 6.071$, $df = 1$, $p\text{-value} = 0.014$). A slightly higher proportion of respondents with poor attitude (50.4%) donated blood compared with those with high attitude (49.6%). Perceived susceptibility also demonstrated a significant association with blood donation practice ($\chi^2 = 4.081$, $df = 1$, $p\text{-value} = 0.043$). Respondents with high perceived susceptibility showed a higher percentage of blood donation (53.0%) compared to those with low perceived susceptibility (47.0%). In contrast, perceived severity was not significantly associated with blood donation practice ($\chi^2 = 3.177$, df

= 1, p-value = 0.075), indicating that perceived severity did not have a meaningful relationship with blood donation behaviour among the respondents.

Table 8: Chi-Square Association

Variable	Level	n (%)	Practice Blood Donation		χ^2 (df)	p-value	Decision
			Yes n (%)	No n (%)			
Knowledge	Poor	80 (47.3)	67(57.3)	21 (30.4)	12.534(1)	<0.001	Significant
	High	98(52.7)	50(42.7)	48 (69.6)			
Attitude	Poor	81(43.5)	59(50.4)	22 (31.9)	6.071(1)	0.014	Significant
	High	105(56.5)	58(49.6)	47 (68.1)			
Perceived Susceptibility	Poor	98 (52.7)	55(47.0)	43 (62.3)	4.081(1)	0.043	Significant
	High	88(47.3)	62(53.0)	26 (37.7)			
Perceived Severity	Poor	92 (49.5)	52(44.4)	40 (58)	3.177(1)	0.075	Not significant
	High	94(50.5)	65(55.6)	29 (42)			

Note : No cells (0.0%) had expected counts below 5. The minimum expected cell counts were 32.65 for knowledge, 30.05 for attitude, 32.65 for perceived susceptibility, and 34.13 for perceived severity.

Binary Logistic Regression

Binary logistic regression was used in this study to analyse the significant effects level of knowledge, attitude, perceived susceptibility, and perceived severity, on blood donation practice among university students. Blood donation practice was classified into two categories: Yes (having donated blood) and No (never donated blood).

Model Assumption Testing

Binary logistic Regression analysis encounters the multicollinearity when two or more predictor variables have high degree of correlation and do not contribute independent information to the regression model. Based on the result in Table 4, it can be concluded that there is no multicollinearity exists between all the independent variables. Thus, the independent variables are not correlated to each other.

Omnibus Test of Model Coefficient

The Omnibus Test is used to evaluate the significance of the model. The null hypothesis of an omnibus test would be that all regression coefficients are equal to zero. The alternative hypothesis would be that at least one regression coefficient is not equal to zero. Based on Table 9, the p-value for Omnibus Test is <0.001 which is less than 0.05. Thus, the null hypothesis is rejected and it can be concluded that the model is significant.

Table 9: Omnibus Test of Model Coefficient

Model	Chi-Square	df	p-value
Model	18.992	2	<0.001

Hosmer–Lemeshow Goodness of Fit Test

To assess the model's goodness of fit, Hosmer-Lemeshow Tests were performed. It looks at the null hypothesis, which claims that the model fits the data well. Table 10 shows that the result of Chi-square and the significant value for Hosmer- Lemeshow Test. The value for Chi Square is 0.593 with degree of freedom equal to 2 and for the p-value is 0.743 where it is greater than

alpha value which is 0.05. Hence, the Hosmer-Lemeshow goodness of fit test indicates that Binary Logistic Regression model fits the data well.

Table 10: Hosmer–Lemeshow Goodness of Fit Test

Model	Chi-Square	df	p-value
Model	0.593	2	0.743

Cox & Snell R Square and Nagelkerke R Square

The value of Cox & Snell R Square and Nagelkerke R Square provide an indication of the amount of variation in the dependent variable explained by the model in Table 11. The final model produced a –2 Log Likelihood value of 226.330. The Cox and Snell R Square and Nagelkerke R Square values were 0.097 and 0.133, respectively, indicating that approximately 9.7% to 13.3% of the variation in practice could be explained by the predictors included in the model.

Table 11: Model Summary

–2 Log Likelihood	Cox & Snell R Square	Nagelkerke R Square
226.330	0.097	0.133

Classification Table

Based on the classification table in Table 12, the accuracy of the model was 68.8%. It can be concluded that the model was correctly specified. Thus, the value for the error rate of the model is 30.1%. Therefore, this model can be used precisely to predict blood donation practices.

Table 12: Classification Table

Observed	Predicted No (0)	Predicted Yes (1)	Percentage Correct
No (0)	99	18	84.6
Yes (1)	40	29	42.0
Overall percentage			68.8

Significant of Independent Variable

The results of the binary logistic regression analysis using the backward likelihood ratio method are presented in Table 13. Two variables were identified as significant predictors of practice in the final model, namely knowledge level and perceived susceptibility level. Knowledge level was found to be significantly associated with practice ($\beta = 1.240$, Wald = 13.847, $p = <0.001$). Perceived susceptibility level was also significantly associated with practice ($\beta = -0.804$, Wald = 5.983, $p = 0.014$). Attitude level and perceived severity level were not retained in the final model as they did not significantly contribute to the prediction of practice during the backward elimination process. Therefore, the final logistic regression model for predicting blood donation practice can be expressed as follows:

$$\ln [p/(1-p)] = -0.863 + 1.240(x_1) - 0.804(x_3)$$

where:

p represent the probability of ever donated blood

x_1 are knowledge,

x_3 are perceived susceptibility

Table 13: Significant Independent Variables

Variable	β	Wald (df)	p-value	Odds Ratio
Knowledge (1)	1.240	13.847 (1)	<0.001	3.456
Perceived Susceptibility (1)	-0.804	5.983 (1)	0.014	0.447

Odds Ratio

The odds ratios (OR) were examined to determine the strength and direction of the association between the predictors and practice of blood donation. Based on the final logistic regression model on Table 14, knowledge and perceived susceptibility were identified as significant predictors of blood donation practice. Next, respondents with high knowledge were approximately 3.46 times more likely to donate blood compared with those with poor knowledge (OR = 3.456, $p < 0.001$). In contrast, respondents with high perceived susceptibility had lower odds of donating blood compared with those with low perceived susceptibility, with the likelihood reduced by about 55.3% (OR = 0.447, $p = 0.014$).

Table 14: Odds Ratio

Variable	Exp(β)/OR	Interpretation
Knowledge	3.456	Student with high knowledge were more likely to donate blood.
Perceived Susceptibility	0.447	Student with high perceived susceptibility had lower odds of donating blood.

Conclusion, Discussion and Recommendations

Conclusion and Discussion

This study was conducted to determine the practice of blood donation among university students and to identify the factors associated with blood donation practice. A total of 186 respondents participated in this study. Based on the findings, blood donation practice among respondents was generally at a moderate level, with a slightly higher proportion of respondents demonstrating low practice compared to high practice. The descriptive analysis showed that respondents with higher levels of knowledge tended to demonstrate better blood donation practice compared to those with lower knowledge levels.

The chi-square analysis revealed that knowledge level, attitude level, and perceived susceptibility level were significantly associated with blood donation practice, whereas perceived severity level did not show a significant association at the bivariate level. The significant association between knowledge level and blood donation practice is consistent with previous findings reported by Viwattanakulvanid and Chan Oo (2022), who found that students with previous blood donation experience had significantly higher knowledge scores. Similarly, Farzana et al. (2022) reported that exposure to structured educational content was significantly associated with higher knowledge levels among university students. These findings suggest that adequate knowledge may play an important role in translating awareness into actual blood donation practice. The significant association between attitude and blood donation practice is also consistent with findings reported by Beyene (2020) and Eltewacy et al. (2024), who found generally positive attitudes towards blood donation and stronger intentions to donate among individuals with favourable attitudes. Zewdie et al. (2024) and Vo and Le (2025) reported that perceived susceptibility was an important factor in predicting health-related preventive behaviour. Conversely, the non-significant association between perceived severity and blood

donation practice differs from findings in other health contexts. Tan and Liew (2023), Zahari et al. (2022), and Othman et al. (2019) demonstrated that perceived severity was associated with preventive health behaviours such as vaccination, smoking cessation, and dengue prevention. The difference may indicate that perceived severity operates differently in the context of blood donation, where the perceived threat may relate more to the consequences faced by recipients of blood rather than a direct personal health threat to the donor.

Binary logistic regression analysis was conducted to determine the factors contributing to blood donation practice. The model demonstrated good fit based on the Hosmer–Lemeshow goodness-of-fit test. The final logistic regression model identified knowledge level and perceived susceptibility level as significant predictors of blood donation practice. Respondents with higher knowledge levels were significantly less likely to have poor blood donation practice compared to those with lower knowledge levels. This finding is consistent with Viwattanakulvanid and Chan Oo (2022), who reported that previous donation experience was significantly associated with higher knowledge scores, and Farzana et al. (2022), who demonstrated the importance of educational exposure in improving blood donation knowledge among university students. The finding further supports the argument that knowledge is an important factor in facilitating actual blood donation behaviour. Conversely, respondents with higher perceived susceptibility were more likely to demonstrate poor blood donation practice. This inverse relationship differs from the findings reported in previous HBM-based studies, where higher perceived susceptibility was generally associated with stronger engagement in preventive health behaviours (Zewdie et al., 2024; Vo & Le, 2025; Subedi et al., 2025). The unexpected direction of this relationship may suggest that students who perceive themselves as more susceptible to health-related risks may also experience greater concern or uncertainty regarding blood donation. Further research is therefore needed to clarify the role of perceived susceptibility in blood donation behaviour among university students.

An interesting finding was the reversal in the direction of the association between perceived susceptibility and the outcome. While perceived susceptibility demonstrated a positive association in the bivariate analysis, the association became inverse after adjustment in the multivariable model ($OR = 0.447$). This suggests that the crude association did not reflect the association observed when other variables in the model, particularly knowledge, were held constant. The adjustment for knowledge may have contributed to the change in the estimated direction of the association. However, a reversal of direction following adjustment does not, by itself, establish the presence of confounding or statistical suppression. Therefore, this finding should be interpreted as an adjusted association rather than evidence of a specific suppression or confounding mechanism.

Recommendations

Based on the findings of this study, the recommendations proposed focus specifically on the significant factors influencing blood donation practice, namely knowledge level and perceived susceptibility level among university students. First, educational and awareness programmes should be strengthened to enhance students' knowledge regarding blood donation. Universities may collaborate with relevant authorities such as the Ministry of Health Malaysia (MOH), National Blood Centre (Pusat Darah Negara), Malaysian Red Crescent Society, and university health centres to organise regular educational talks, blood donation campaigns, and digital awareness initiatives. Information disseminated should emphasise eligibility criteria, donation procedures, safety assurance, and the health benefits of regular blood donation. Improving students' knowledge may increase confidence and encourage consistent participation in blood

donation activities. Second, intervention strategies should address students' perceived susceptibility related to blood donation. Awareness campaigns conducted by health authorities and university organisations should provide clear and balanced information to reduce misconceptions and unnecessary fears associated with blood donation. Sharing real donor experiences, testimonials, and factual statistics on blood demand may help students better understand the importance of blood donation while minimising negative perceptions that may hinder participation. Third, universities are encouraged to integrate educational programmes with accessible blood donation opportunities. Collaboration between university administrations, student representative councils, and external health agencies can facilitate mobile blood donation drives scheduled at convenient times within campus areas. Creating a supportive and easily accessible environment may help translate knowledge and awareness into actual blood donation practice.

In relation to the limitations of this study, several recommendations for future research are proposed. As this study employed a cross-sectional design, causal relationships between variables could not be established; therefore, future studies may consider longitudinal or experimental designs to better examine behavioural changes over time. Additionally, the study was conducted among students from a single university which may limit the generalisability of the findings. Future research should involve multiple universities and larger, more diverse samples to improve external validity. Furthermore, since the data were self-reported, response bias may have occurred; thus, future studies may incorporate objective records of blood donation behaviour where possible.

Another limitation of this study relates to the predictive performance of the logistic regression model. Although the model achieved an overall classification accuracy of 68.8%, its sensitivity was relatively low (42.0%), indicating limited ability to correctly identify actual blood donors. Furthermore, the relatively modest explained variance (R^2 of approximately 10%–13%) suggests that the predictors included in the model accounted for only a limited proportion of the variation in blood donation behaviour. Other potentially relevant factors that were not measured in this study may therefore contribute to blood donation behaviour. Future studies should consider incorporating additional behavioural, social, environmental, and contextual factors to improve the explanatory and predictive performance of the model.

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