Asian Journal of Medicine and Health Sciences Vol 8 Issue 2, November 2025

ORIGINAL ARTICLE

Assessing Community Knowledge and Attitude towards Cardiopulmonary Resuscitation and Automated External Defibrillator in Ipoh, Perak.

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Submitted: 27/09/2025. Revised edition: 14/10/2025. Accepted: 15/10/2025. Published online: 01/11/2025.

Abstract

Introduction: Cardiopulmonary resuscitation (CPR) and automated external defibrillator (AED) use are critical interventions for out-of-hospital cardiac arrest (OHCA), significantly improving survival rates. This study assessed the knowledge and attitude towards CPR and AED among the local community in Ipoh, Perak, Malaysia. **Methods:** A cross-sectional study using convenience sampling was conducted from January to February 2024, involving 385 respondents. A self-administered questionnaire, available in English and Malay, collected sociodemographic data and assessed CPR knowledge (12 items) and attitude (10 items). Data were analysed using SPSS version 28. **Results:** Nearly all respondents (99.0%) had heard of CPR, but only 27.8% knew the correct initial step (call for help immediately). Knowledge was moderate (median score: 58.3%, IQR: 41.7-66.7), with significant associations with age group, education level, and employment status ($p<0.05$). While 65.5% were willing to perform CPR on family members, willingness decreased to 43.1% for strangers. Most (61%) had never received CPR training, but 76.4% expressed interest. AED awareness was lower (50.4%), and only 22.9% knew that anyone can use an AED. **Conclusion:** The Ipoh community demonstrates moderate CPR knowledge and attitude, but significant gaps persist, particularly regarding AED. There is a strong need for expanded community-based CPR and AED training, integration into educational curricula, and addressing barriers like legal fears and gender-related concerns to improve bystander intervention in OHCA incidence.

Keywords: *Attitude, automated external defibrillator, cardiac arrest, cardiopulmonary resuscitation, knowledge.*

Introduction

Cardiopulmonary resuscitation (CPR) is a life-saving procedure performed in emergencies when breathing or cardiac activity has ceased, often due to myocardial infarction, suffocation, or drowning. CPR involves a combination of chest compressions, which manually circulate blood, and rescue breaths, delivering oxygen to the lungs. The primary objective is to maintain circulatory flow and oxygenation to preserve brain function and other vital organs until medical assistance becomes available. This is a critical procedure, as within minutes of cardiac arrest, the lack of oxygenated blood can result in irreversible brain damage or death.

An estimated two million individuals globally die from sudden cardiac death each year, with many cases occurring outside of hospitals [1,2]. Some of these could have been avoided if early CPR performed by bystanders had been made possible [3]. The rate of early bystander-initiated CPR in Malaysia remains low. Based on studies among the local communities in a few states in Malaysia, namely Kelantan, Selangor, and Melaka, roughly about 1% to 10% out-of-hospital cardiac arrest (OHCA) cases received CPR from bystanders [3,4,5].

Reluctance to perform bystander CPR has been attributed to several factors, including lack of interest, low confidence, limited time, uncertainty about where to receive training, embarrassment, fear of legal implications, fear of injuring a victim, and concern over the transmission of infections [6,7,8]. Knowledge and skill are among the main influencing factors that contribute to the willingness of public to engage with out of hospital CPR [9,10]. Many of these barriers are linked to insufficient knowledge and a lack of CPR training [11,12].

Training not only improves knowledge but also enhances confidence and preparedness in emergency situations [13]. Studies have shown that individuals who have received CPR training are more likely to perform CPR compared to those without such experience [14,15,16]. In addition, CPR training has been associated with improved survival rates in cardiac arrest cases [17].

An essential concept in improving survival outcomes in OHCA cases is the "chain of survival," a sequence of critical actions including early call for help, initiation of CPR, and defibrillation using an automated external defibrillator (AED). An AED is a portable device that assesses heart rhythm and, when necessary, delivers an electric shock to restore the normal cardiac function while awaiting the arrival of medical personnel [18]. Therefore, along with CPR training, familiarity with the use of an AED forms a critical component of an emergency response. Hence, it is necessary that bystanders are equipped with the knowledge and skills required to operate an AED effectively. Again, studies have suggested that AED use by bystanders is low [3,19,20].

It is evident that knowledge and a positive attitude towards CPR can greatly improve the survival rate in emergency situations involving cardiac arrest. Therefore, it is important to assess the knowledge and attitude towards CPR among the local community in Ipoh. We also assessed AED knowledge as it is a critical component in the chain of survival. In addition, a question addressing the integration of CPR training into the school and university curricula was also included. Currently, CPR training is not part of the national curriculum in Malaysia, and its implementation often depends on individual school principals, who may have limited knowledge about the subject [21]. The findings of this study may contribute valuable data to support the development or enhancement of national policies on basic life support training for Malaysian citizens.

Materials and methods

This cross-sectional study was conducted from 22 January 2024 to 23 February 2024 among the local community in Ipoh, Perak. The minimum required sample size was 384, determined using the Sample Size for a Proportion method on

OpenEpi (Version 3). The anticipated frequency was 50%, with a 5% confidence limit.

A convenience sampling method was employed. The questionnaire was pretested and revised accordingly prior to data collection. The questionnaire was distributed either via Google Form or in hardcopy format for those who were unable to access the Google Form. The questionnaire was made available in English and Malay. The questionnaire consisted of three sections: Section A includes sociodemographic data such as, gender, age group, education level, and employment status; Section B contains 12 questions assessing knowledge of CPR; and Section C contains 10 questions evaluating the attitude towards CPR.

Ethical approval was obtained from the Medical Research Ethics Committee of Universiti Kuala Lumpur Royal College of Medicine Perak (UniKL RCMP/MREC/2023-2024/SSM-008).

Data analysis was performed using SPSS version 28. Descriptive analysis was used to summarise the sociodemographic data as percentages. For the knowledge section, the number of respondents who selected correct and incorrect answers was calculated and presented as percentages: a correct answer was given a score of one, and an incorrect answer a zero. The total knowledge score was calculated by summing the individual scores, converting them into percentages, and categorising them as good (x≥75%), moderate (50≤x<75%), or poor (<50%). In the attitude section, the number of 'yes' and 'no' responses was calculated and expressed as percentages: a 'yes' response is given a score of one, and a 'no' a score of zero. An exception is given to one statement: Do you agree that only health providers should perform CPR? for which 'yes was scored as zero and 'no' as one. Similarly, the total attitude score was summed, converted into a percentage, and categorised as good (x≥75%), moderate (50≤x<75%), or poor (<50%).

Median scores for knowledge and attitude are presented as median ± interquartile range (IQR). The Mann-Whitney U test and Kruskal-Wallis test were used to compare median scores across sociodemographic variables. Associations between sociodemographic variables and knowledge, as well as between sociodemographic variables and attitude were performed using the chi-square test. A p<0.05 is considered statistically significant.

Results

Sociodemographic characteristics of respondents

A total of 385 respondents were obtained, 52.5% female and 47.5% male. The breakdown of their age, educational level, employment status, and ethnicity is shown in Table 1.

Knowledge of CPR

The majority of the respondents had heard of CPR (99.0%) and knew that CPR can be performed outside of a hospital (89.4%). Most of them (79.2%) knew that 999 is the correct contact number for emergency medical services in Malaysia. However, only 27.8% respondents knew that the next step to take when encountering an unresponsive patient is to call for help immediately, with a majority thinking that they should check again for absence of breathing and pulse, then call for help, and subsequently start CPR (60.3%).

The majority of respondents (68.1%) knew the correct location for chest compressions. However, only 35.1% knew the correct chest compression-to-ventilation ratio for adults and children and 52.7% knew the correct depth for chest compression. Less than half of the respondents (41.8%) knew the correct steps in CPR. Nevertheless, the majority of respondents (80.0%) knew that chest compressions should be continued until the rescue team arrives.

Regarding AEDs, 50.4% of the respondents had heard about AEDs, and 41.0% knew about the main purpose of an AED, but only 22.9% of the respondents knew that anyone is allowed to use an AED. The majority of them (77.1%) believed that only emergency personnel or skilled

individuals are allowed to use an AED. The questions and the responses regarding knowledge of CPR are presented in Table 2.

A low percentage of respondents achieved a ‘good’ knowledge score (Table 3). This was consistent across genders (male: 23.5%; female: 23.3%). These low score in good knowledge is seen across all age groups and education levels. In employment status, a higher percentage is seen among the healthcare workers (44.4%), while a low percentage of good knowledge is seen among the rest of the employment status. The breakdown of this knowledge score is presented in Table 3.

Median score of knowledge of CPR

The median score was 58.3% (IQR: 41.7-66.7) for both male and female respondents with IQRs of 50.0-66.7 and 41.7-66.7, respectively. There was no statistically significant difference in the median scores between genders.

Concerning age, respondents aged 18 to < 30 years and those aged 30 to <45 years had the highest median CPR knowledge score of 58.3% with IQRs of 50.0-75.0 and 41.7-66.7, respectively. A statistically significant difference in median CPR knowledge scores was observed among the age groups (p<0.01).

Regarding education level, respondents with postgraduate and bachelor’s degrees had higher median score of 66.7% (IQR: 41.7-75.0) and 66.7% (IQR: 50.0-75.0), respectively, compared to those with UPSR/PMR/SPM/STPM qualifications [50.0% (IQR: 41.7-58.3)] [and Diploma holders [50.0% (IQR: 41.7-66.7)] qualifications. The differences in median scores among the education levels were statistically significant (p<0.01).

In terms of employment status, students had a median score of 58.3% (IQR: 50.0-75.0), healthcare workers scored 66.7% (IQR: 58.3-75.0), and non-healthcare workers scored 58.3% (IQR: 41.7-66.7). The unemployed, housewives, and retirees had lower median scores of 50.0% (IQR: 29.2-70.8), 50.0% (IQR: 29.2-70.8), and 50.0% (IQR: 41.7-54.2), respectively. The differences in median CPR knowledge scores among employment categories were statistically significant (p<0.01) (**Table 4**).

Association between sociodemographic parameters and knowledge of CPR

A significant association was observed between age group, education level, and employment status with knowledge of CPR among the community in Ipoh (p<0.01; p<0.05) (**Table 5**).

Attitude towards CPR

More than half of the respondents (65.5%) stated that they are willing to perform CPR without hesitation on their family members; this number decreased to 43.1% when it came to performing CPR on strangers. The majority of the respondents (82.1%) had never had an opportunity to perform CPR in their lifetime, and more than half (61%) had never received any CPR training. However, the majority (76.4%) indicated that they would attend free CPR training, while the remaining 23.6% showed no interest. Almost all respondents (98.7%) believed that CPR can significantly increase the chances of saving a person’s life in an emergency, and most (82.6%) disagreed that only health providers should perform CPR. An overwhelming majority agrees that CPR training should be mandatory at schools, universities, and workplaces (93.8%) and that CPR training should be integrated into the school and university curriculum (98.4%). Furthermore, more than half (62.3%) agree that CPR training should be a requirement for job applications. The questions and the responses regarding attitude towards CPR are presented in Table 6.

Attitude score of respondents

The distribution of attitude scores across sociodemographic categories is detailed in Table 3. Overall, moderate attitude scores were predominant among most respondent groups. A notably higher proportion of healthcare workers achieved a good score (85.2%) compared to all other employment categories. Similarly, respondents with Bachelor's or Postgraduate

degrees showed a higher tendency towards good scores (47.2% and 45.5%, respectively) than those with lower educational qualifications. In contrast, housewives, retirees, and the unemployed had the highest proportions of poor attitude scores. Across age groups, the proportion of good scores was highest among younger respondents (18 to <45 years) and decreased with advancing age.

The overall median attitude score was 70.0% (IQR: 60.0-80.0). Statistically significant variations in median scores were found across all sociodemographic factors (Table 4). Specifically, scores were significantly higher among male respondents compared to females ($p<0.05$), younger respondents (18-<45 years) compared to older ones ($p<0.01$), and those with higher education (Diploma and above) compared to those with lower qualifications ($p<0.01$). A significant gradient was also evident by employment status ($p<0.01$), with healthcare workers scoring highest, followed by students and non-healthcare workers; the unemployed, housewives, and retirees consistently had the lowest scores.

Association between sociodemographic parameters and attitude towards CPR

A significant association was found between age group, education level, and employment status with attitude towards CPR among the community in Ipoh ($p<0.01$; $p<0.05$) (**Table 5**).

Discussion

This study assessed knowledge of CPR and AED use, as well as attitude towards CPR, among the community in Ipoh, Malaysia. While AED use is rarely incorporated in CPR training, we recognise the ability to use this critical tool in emergencies as its use could be essential in improving survival outcomes in out-of-hospital cardiac arrest (OHCA) cases.

Our findings revealed that most respondents had a moderate level of CPR knowledge, which is slightly higher than that reported by a previous study conducted in Ipoh [22]. This difference may be attributed to variations in the sociodemographic composition, as our study encompassed a wider age range. Notably, we found a significant association between higher education level and better CPR knowledge, a finding consistent with research from Riyadh City, Saudi Arabia [23]. This suggests that while education is a relevant factor, it may not be the sole determinant of CPR knowledge across the entire population.

Age-specific differences were also evident, with respondents above 65 years demonstrating significantly lower CPR knowledge scores - a trend similarly observed in a survey in Münster, Germany [24]. The lower knowledge score among older adults may be due to limited exposure to formal CPR education, reduced access to digital learning platforms, and fewer opportunities to participate in training programs. In Malaysia, it was only in the 1990s that the Ministry of Health began introducing CPR training in the medical and nursing schools [25]. Any public training could have come much later; therefore, the older generation (those 65 and above) may have missed out on the early campaigns. Furthermore, CPR education has only recently been implemented in the secondary school curriculum, embedded within several topics in the Health Education subject [26]. Poor educational attainment among older adults has been suggested to contribute to lower CPR knowledge and reduced confidence in performing resuscitation during emergencies [24].

It is encouraging to find that CPR is almost universally recognized within the community, indicating successful awareness campaigns, likely through media and public health channels. Most respondents correctly understood that CPR can be performed outside hospitals, indicating awareness that cardiac arrest can occur in out-of-hospital environments and that immediate bystander intervention is critical. Of concern, however, approximately 20% of the respondents were unaware of the correct emergency medical services number (999) in Malaysia, possibly due

to confusion with foreign emergency numbers, such as 911, which are frequently mentioned in the Western television series. In this study, employment status showed a significant association with CPR knowledge. Reassuringly, no healthcare workers in our sample had poor CPR knowledge. However, it is noteworthy that a greater number of them had moderate rather than good knowledge scores. This variation could be due to differences in job roles, for example, whether individuals were directly involved in patient care or worked in administrative positions where direct patient care and formal CPR training are limited. Unfortunately, our present study did not obtain these detailed role-specific data. Nevertheless, the level of CPR knowledge among healthcare workers has been reported to vary considerably across different studies; for instance, in some studies, fewer than one-third of healthcare respondents exhibited good CPR knowledge [27,28], whereas a more recent study reported that 89.5% had good knowledge [29]. Unemployed individuals, retirees, and housewives were found to have lower knowledge scores regarding CPR. Again, this may be due to reduced exposure to CPR training or fewer opportunities to attend CPR awareness programmes. For the housewives, their domestic commitments may limit their availability for such programmes. However, one study found that although 90% of young mothers had poor knowledge of infant CPR, they were highly motivated to learn and willing to participate in CPR training [30].

Where attitude is concerned, our study revealed that most respondents had a moderate level of attitude towards CPR, with the median attitude score being higher than the knowledge score. In each category of sociodemographic characteristics, almost all subcategories demonstrated moderate to good attitude among respondents. About 40% of the respondents had received CPR training, and fewer than 20% had experience performing CPR. A similar trend was seen in an earlier study where approximately 48.1% of the participants knew how to perform CPR, and 7.9% had performed it [31]. This indicates a low incidence of OHCA in both study communities. Education was associated with a better attitude towards CPR, with respondents who had a tertiary education showing higher median attitude scores. This difference can be attributed to the more advanced training and exposure that university students receive, particularly those in health-related fields. In addition, healthcare workers also had a good attitude score, which is a response expected of their work environment.

In the present study, gender did not significantly influence CPR knowledge. However, a significant difference was observed in the median attitude scores, with male respondents showing higher scores than females. Fear of being accused of inappropriate touching or sexual assault is a factor that prevents male respondents from performing CPR on female victims [31,32]. Likewise, female respondents have been shown to have a higher willingness to perform CPR on female victims than on male victims [32]. Therefore, female respondents may also experience fear or hesitation in conducting CPR on individuals of the opposite gender, similar to male respondents.

When it comes to performing CPR on family members as opposed to strangers, our respondents are more willing to perform CPR on family members but are more reluctant to do so on strangers. Although we did not explore the reasons for this reluctance, previous research has shown that it may stem from fear of causing unintentional harm or becoming involved in legal complications [33]. The procedure of mouth-to-mouth ventilation may also discourage rescuers, especially due to concerns about hygiene, direct contact with body fluids such as saliva, and the risk of spreading infectious diseases, including COVID-19. Thus, more targeted CPR awareness programmes should be implemented, addressing gender-related concerns and legal fears.

Despite these concerns, most of our respondents agree that performing CPR should not be limited to healthcare professionals, believing that CPR

can significantly increase the chances of survival during cardiac arrest. Many of our respondents expressed interest in attending CPR training. These findings suggest that although practical training and hands-on experience are limited, the overall attitude towards CPR is positive among the population. Furthermore, a majority of our respondents believed that CPR training should be integrated into the education curriculum at schools and universities with many agreeing that such training should be mandatory in these institutions. Indeed, García and Vargas (2025) have shown that students' levels of knowledge and confidence can increase after attending CPR training, highlighting the importance of integrating it into school curricula [34]. Therefore, it is encouraging to note that studies in a couple of states in Malaysia have shown that both students and teachers are open to such an idea [35,36]. In fact, as reported by Haiqal et al. (2024), the majority of secondary school principals in Malaysia agrees that CPR courses should be made mandatory before students complete their studies and were willing to allocate funds to hire certified instructor [21].

Where the use of AED is concerned, the majority of our respondents are unaware of the use of AED or that anyone can use them in an emergency. This finding was observed despite the majority of our respondents having moderate knowledge of CPR. Furthermore, many of our respondents are unaware of AEDs' existence and function; and did not know that anyone can use them, highlighting a critical gap in public education. Prior research has shown that structured educational programmes can effectively improve knowledge and confidence related to AED use. It has been demonstrated that such training significantly improves participants' confidence and willingness to perform CPR and to use AEDs [37].

Lastly, sociodemographic factor aside, while many of our respondents correctly answered technical CPR questions, the overall response pattern indicates that such items may not be easily answered without prior formal training. This highlights the importance of structured CPR education within the community, with more targeted CPR awareness programmes to address gender-related concerns and legal fears. This includes an introduction to AED and its hands-on use and increasing public access to such equipment. These approaches will help bridge current knowledge gaps in the community and enhance emergency preparedness. This is especially relevant given the Malaysian Ministry of Health's plan to make AED installation mandatory in all public facilities by 2025, which may further raise public awareness and encourage educational outreach.

Limitations of the study

This study has several limitations. It was conducted within a single urban community; therefore, the findings may not be generalisable to rural populations or other regions. Although respondents' employment status was categorised, their specific job roles were not identified, especially in the healthcare worker category, where the ability to assess how different types of healthcare workers vary in CPR knowledge and attitude was not identified. Additionally, while hesitancy to perform CPR on strangers was reported, the questionnaire did not include follow-up questions to explore the underlying reason for this reluctance.

Conclusion

In this present study, the majority of respondents from the Ipoh community demonstrated a moderate level of knowledge and attitude towards CPR. Both were significantly associated with sociodemographic factors such as age, education, and employment status. Our study highlights the importance of expanding community-based CPR and AED education, integrating CPR and AED training into school and university curricula, and addressing barriers such as legal fears and gender-related concerns among bystanders to improve willingness to assist in OHCA incidence.

Acknowledgement

The authors would like to thank the Faculty of Medicine, Royal College of Medicine Perak, Universiti Kuala Lumpur, Malaysia, for providing support and access to the necessary resources and facilities, and all respondents for their valuable time and cooperation in this study.

Conflict of interest

The authors declare that no conflict of interst may arise from the research publication.

Funding

No funding was involved in this research.

Authors' contributions

FZ, NFAAS, NAAMA, IPKS, IAA, AIAZ and BCSC contributed to the study design, data collection, and statistical analysis. FZ, RM and NAL performed the literature search and wrote the manuscript.

Table 1. Sociodemographic parameters of respondents

Variables	Category	N	Percentage (%)
Gender	Male	183	47.5
	Female	202	52.5
Age group	18 - <30	172	44.7
	30 - <45	88	22.9
	45 - 65	99	25.7
	>65	26	6.8
Education level	UPSR/PMR/SPM/STPM	118	30.6
	Diploma	97	25.2
	Bachelor	159	41.3
	Postgraduate (Master/PhD)	11	2.9
Employment status	Student	144	37.4
	Employed in healthcare sector (e.g., hospital, clinic, pharmacy)	27	7.0
	Employed in a non-healthcare sector	126	32.7
	Unemployed	13	3.4
	Housewife	42	10.9

Retired	33	8.6

Table 2. Respondents' responses to knowledge items regarding CPR

Questions	Category	N (%)
Have you ever heard of CPR?	Yes*	381 (99)
	No	4 (1)
Should CPR be done only in the hospital	Yes	41 (10.6)
	No*	344 (89.4)
Number for contacting emergency medical services in Malaysia in case of emergencies.	911	79 (20.5)
	919	0
	999*	305 (79.2)
The next step if you find a patient who is unresponsive.	Check for no breathing and no pulse, call for help then start CPR.	232 (60.3)
	Call for help directly. *	107 (27.8)
	Start CPR.	33 (8.6)
	Turn the patient towards the lateral side.	13 (3.4)
If we need to do chest compression for resuscitating an unconscious patient, what will be the location for the chest compressions?	Right side of the chest	26 (6.8)
	Left side of the chest	97 (25.2)
	In the centre of the chest, below breastbone*	262 (68.1)
While doing resuscitation, what will be the ratio of chest compression and ventilation in adult and children?	10:2	135 (35.1)
	20:2	95 (24.7)
	30:2*	135 (35.1)
	40:2	20 (5.2)
What is the depth for chest compression?	2 cm	107 (27.8)
	5 cm*	203 (52.7)
	8 cm	52 (13.5)
	10 cm	23 (6.0)
What are the steps in CPR?	Check for a response, call for help, open the airway, give two rescue breathing, and check for the pulse, if there is no pulse start chest compression*	161 (41.8)
	Check for response and simultaneously check for no breathing, call for help, check for pulse, and start chest compression if there is no pulse.	124 (32.2)
	Tap and shout for checking response, check for pulse, start chest compression, and give him ventilation by	61 (15.8)

	mouth-to-mouth or bag valve mask	
	Tap and shout for checking response, open the airway, check for pulse, and start chest compression.	39 (10.1)
Is it necessary to continue chest compression until rescue team arrive?	Yes*	308 (80)
	No	77 (20)
Have you heard about AED?	Yes*	194 (50.4)
	No	191 (49.6)
What is the purpose of the automated defibrillator (AED)?	To analyse the heart rhythm	38 (9.9)
	To analyse the heart rhythm and if necessary to give an electric shock*	158 (41.0)
	To give cardiac massage	19 (4.9)
	I do not know	170 (44.2)
Who is allowed to use an automated external defibrillator (AED)?	Every citizen*	88 (22.9)
	Only emergency personnel	139 (36.1)
	Only skilled people	158 (41.0)

*indicates the correct answer

Table 3. Categories of scores for respondents' knowledge and attitude towards CPR based on sociodemographic parameters

Sociodemographic parameters	Knowledge levels category			Attitude levels category		
	Good N (%)	Moderate N (%)	Poor N (%)	Good N (%)	Moderate N (%)	Poor N (%)
Gender:						
Male	43 (23.5)	96 (52.5)	44 (24.0)	76 (41.5)	93 (50.8)	14 (7.7)
Female	47 (23.3)	95 (47.0)	60 (29.7)	60 (29.7)	122 (60.4)	20 (9.9)
Age group:						
18 - < 30	47 (27.3)	85 (49.4)	40 (23.3)	67 (39.0)	94 (54.7)	11 (6.4)
30 - < 45	20 (22.7)	45 (51.1)	23 (26.1)	36 (40.9)	45 (51.1)	7 (8.0)
45 - 65	23 (23.2)	50 (50.5)	26 (26.3)	29 (29.3)	60 (60.6)	10 (10.1)
> 65	0	11 (42.3)	15 (57.7)	4 (15.4)	16 (61.5)	6 (23.1)
Educational level:						
UPSR/PMR/SPM/STPM	14 (11.9)	56 (47.5)	48 (40.7)	27 (22.9)	69 (58.5)	22 (18.6)
Diploma	21 (21.6)	46 (47.4)	30 (30.9)	29 (29.9)	61 (62.9)	7 (7.2)
Bachelor	52 (32.7)	84 (52.8)	23 (14.5)	75 (47.2)	79 (49.7)	5 (3.1)
Postgraduate (Master/PhD)	3 (27.3)	5 (45.5)	3 (27.3)	5 (45.5)	6 (54.5)	0
Employment status:						
Student	44 (30.6)	68 (47.2)	32 (22.2)	59 (41.0)	79 (54.9)	6 (4.2)
Employed in healthcare sector (e.g., hospital, clinic, pharmacy)	12 (44.4)	15 (55.6)	0	23 (85.2)	3 (11.1)	1 (3.7)
Employed in a non-healthcare sector	27 (21.4)	66 (52.4)	33 (26.2)	38 (30.2)	78 (61.9)	10 (7.9)
Unemployed	3 (23.1)	4 (30.8)	6 (46.2)	5 (38.5)	3 (23.1)	5 (38.5)
Housewife	2 (4.8)	21 (50.0)	19 (45.2)	4 (9.5)	30 (71.4)	8 (19.0)
Retired	2 (6.1)	17 (51.5)	14 (42.4)	7 (21.2)	22 (66.6)	4 (12.1)

Table 4. Median scores of knowledge and attitude towards CPR across sociodemographic parameters

Sociodemographic parameters	**Knowledge** Median score (IQR) (%)	p-value	**Attitude** Median score (IQR) (%)	p-value
Gender:				
Male	58.3 (50.0-66.7)	0.771	70.0 (60.0-80.0)	0.015**
Female	58.3 (41.7-66.7)		60.0 (50.0-80.0)	
Age group:				
18 - < 30	58.3 (50.0-75.0)	0.002*	70.0 (60.0-80.0)	0.001*
30 - < 45	58.3 (41.7-66.7)		70.0 (60.0-80.0)	
45 - 65	50.0 (41.7-66.7)		60.0 (50.0-80.0)	
> 65	41.7 (41.7-50.0)		55.0 (47.5-70.0)	
Educational level:				
UPSR/PMR/SPM/STPM	50.0 (41.7-58.3)	< 0.001*	60.0 (50.0-70.0	< 0.001*
Diploma	50.0 (41.7-66.7)		70.0 (60.0-80.0)	
Bachelor	66.7 (50.0-75.0)		70.0 (60.0-80.0)	
Postgraduate (Master/PhD)	66.7 (41.7-75.0)		70.0 (70.0-90.0)	
Employment status:				
Student	58.3 (50.0-75.0)	< 0.001*	70.0 (60.0-87.5)	< 0.001*
Employed in healthcare sector (e.g., hospital, clinic, pharmacy)	66.7 (58.3-75.0)		80.0 (80.0-100.0)	
Employed in a non-healthcare sector	58.3 (41.7-66.67)		70.0 (50.0-80.0)	
Unemployed	50.0 (29.2-70.83)		60.0 (40.0-80.0)	
Housewife	50.0 (29.2-70.8)		60.0 (50.0-70.0)	
Retired	50.0 (41.7-54.2)		60.0 (50.0-70.0)	

*p<0.01;**p<0.05: indicates a significant difference between groups; IQR: interquartile range (Q1-Q3); p>0.05: no significant difference; p<0.05: have significant difference

Table 5. Association of sociodemographic parameters with knowledge and attitude towards CPR

		X^2	p-value
Knowledge	Gender	1.716	0.424
	Age group	21.414	0.002*
	Education level	32.951	< 0.001*
	Employment status	48.220	< 0.001*
Attitude	Gender	5.937	0.051
	Age group	12.752	0.047**
	Education level	34.594	< 0.001*
	Employment status	66.697	< 0.001*

*p<0.01;**p<0.05: indicates a significant difference between groups;

Table 6. Respondents' responses to attitude items regarding CPR

Question	Category	N (%)
Can you provide CPR without hesitation to your family?	Yes	252 (65.5)
	No	133 (34.5)
Can you provide CPR without hesitation to strangers?	Yes	166 (43.1)
	No	219 (56.9)
Have you ever had the opportunity to perform CPR during your lifetime?	Yes	69 (17.9)
	No	316 (82.1)
Have you ever received any training in CPR?	Yes	150 (39.0)
	No	235 (61.0)
Would you be interested in attending CPR training if it were offered at no cost?	Yes	294 (76.4)
	No	91 (23.6)
Do you believe CPR can significantly increase the chances of saving a person's life in an emergency?	Yes	380 (98.7)
	No	5 (1.3)
Do you agree that only health providers should perform CPR?	Yes	67 (17.4)
	No	318 (82.6)
In your opinion, should CPR training be mandatory at school/ university/ workplace?	Yes	361 (93.8)
	No	24 (6.2)
Do you believe CPR training should be integrated into the educational curriculum at school/ universities?	Yes	365 (94.8)
	No	20 (5.2)
In your perspective, should CPR training be a requirement for job applications?	Yes	240 (62.3)
	No	145 (37.7)

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