

Cardiac emergency readiness: A community-level assessment of CPR knowledge in Al-Baha

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ABSTRACT

Context: Cardiopulmonary resuscitation (CPR) is a crucial lifesaving technique in cases of cardiac arrest and should be performed by any member of the community. **Aims:** To investigate the level of knowledge regarding CPR among the general population in the Al-Baha region, Saudi Arabia. **Settings and Design:** A cross-sectional study was conducted in Al-Baha from July 1, 2023 to August 1, 2023. **Methods and Material:** Inclusion criteria were individuals aged 18 and above living in Al-Baha who consented to participate. Exclusion criteria included individuals under 18 years old, healthcare professionals, residents outside Al-Baha, individuals who refused to participate, and incomplete questionnaires. Data was collected using an anonymous self-administered validated electronic questionnaire in Arabic distributed through social media. **Statistical Analysis Used:** The Mann-Whitney *U* test, the Kruskal-Wallis test, the Shapiro-Wilk test, and the Kolmogorov-Smirnov test. Any result below 0.05 ($P < 0.05$) was considered significant. **Results:** A total of 852 were included, with 65.0% of respondents female, the largest age group was 18–30 years old (43.9%). A total of 77.5% had sufficient CPR knowledge, with an average score of 11.2 out of 18. While many knew key CPR practices, gaps in knowledge existed, such as when to start CPR (15.8%). Challenges included determining unresponsiveness (26.8%) and fear of causing harm (73.6%). Social media apps were the primary source of CPR knowledge (53.8%), but 70.0% were unaware of available CPR courses, despite 75.0% expressing interest in enrolling. **Conclusions:** Population of Al-Baha showed a good level of knowledge, however, gaps remained need to be targeted during education efforts. The preference for social media and interest in CPR courses highlight opportunities for enhancing public preparedness.

Keywords: Al-Baha Region, awareness, cardiac arrest, cardiopulmonary resuscitation, knowledge, Saudi Arabia

Introduction

Cardiopulmonary resuscitation (CPR) is an emergency procedure that helps maintain blood flow following a cardiac arrest. However, it is important to administer CPR correctly as improper execution can have consequences.^[1]

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Most sudden cardiac arrests occur at home in individuals with risk factors, such as a family history of diabetes, ischemic heart disease, heavy smoking, old age, and inactive lifestyle.^[2,3] CPR is an emergency procedure that can preserve blood circulation to the vital organs and can help save a life. Immediate CPR can double or triple the chances of survival rate after cardiac arrest, however, it could be harmful if it is performed improperly.^[4] Family physicians and healthcare professionals need to understand the community CPR knowledge level. As frontline workers in health promotion and patient well-being knowing what the community

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understands forms the basis for promoting health education and improving lifesaving skills, like CPR. This understanding can greatly improve community health results.

In Saudi Arabia, 22–40% of the population has knowledge of CPR and 10–50% have received training.^[5–7] A recent survey conducted on Al-Baha University students revealed that half (49.3%) are familiar with CPR.^[8] This research project aims to fill the gap in information regarding CPR knowledge among the population in Al-Baha and explore attitudes toward responding to incidents of arrest.

Materials and Methods

Study design

This is a cross-section study conducted in the Al-Baha region, Saudi Arabia, from July 1, 2023 to August 1, 2023. The study aims to assess the knowledge and awareness toward cardiopulmonary resuscitation among the general population.

Inclusion and exclusion criteria

The study targeted individuals ages 18 and above living in the Al-Baha region who consented to participate. The exclusion criteria for this study include individuals under 18 years old, healthcare professionals (HCPs), residents outside the Al-Baha region, participants who refuse to take part, and those with incomplete questionnaires. These criteria aim to ensure the study's focus on the targeted population within the specified region.

Data collection

Data in this study was collected by using an anonymous self-administered, reliable, and validated electronic questionnaire in Arabic distributed with the aid of data collectors through social media. The questionnaire comprised four sections: section 1: Demographic data, section 2: Assesses the knowledge of Cardiopulmonary resuscitation, section 3: Assesses the awareness toward cardiopulmonary resuscitation, and section 4: Explore the sources of knowledge.

Ethical considerations

The ethical approval was obtained from the Institutional Research Board of Al-Baha University number: REC/SUR/BU-FM/2023/57R. The participants were informed about the study aims and assured of data confidentiality, and consent was obtained from each participant before participating in the study.

Data analysis

The study employed descriptive statistics to summarize the data, presenting counts, proportions (%), and mean values with standard deviations, as appropriate. To explore the association between understanding, awareness, and attitudes toward CPR and participants' socio-demographic characteristics, statistical analyses were conducted using the Mann–Whitney *U* test and the Kruskal–Wallis test. Any value less than 0.05 ($P < 0.05$)

was considered statistically significant. Additionally, statistical collinearity was assessed using the Shapiro–Wilk test and the Kolmogorov–Smirnov test. All statistical analyses were performed using the Statistical Package for Social Sciences, version 28, ensuring robust and reliable results. To evaluate how well the public understands CPR we assigned a score of 1 for answers and 0 for ones, to each knowledge-related question. Using a Likert scale ranging from “Disagree” (scored as 1) to “Strongly Agree” (scored as 5) for attitude-related questions we calculated the scores, for each participant by adding up their individual responses. Participants who scored 50% or above were identified as having CPR knowledge while those scoring below 50% were deemed to have knowledge in this field.

Results

A total of 1049 individuals applied to participate in the study. Out of these participants, 197 individuals were excluded, resulting in a final sample size of 852 participants. The primary reasons for exclusion were individuals identified as HCPs or already enrolled in health colleges, with a total of 189 individuals falling under this category. Additionally, 8 participants chose not to participate and were therefore excluded from the study as in Figure 1.

The socio-demographic data highlights that 65.0% were identified as female ($n = 554$). When examining the age distribution, the largest cohort was found within the [18–30] years, constituting 43.9% ($n = 374$). Regarding marital status, a significant majority, 58.2% ($n = 496$), reported being married. As for family income, the majority, accounting for 47.1% ($n = 401$), fell within the [1000–5000] S.R., and no significant statistical difference was observed across these variables. The educational profile revealed that a substantial 73.5% ($n = 626$) held a university education, indicating a statistical difference ($P = 0.003$). In terms of occupation, 44.5% ($n = 379$) were gainfully employed, and this also displayed a significant statistical difference ($P = 0.0016$) as shown in Table 1.

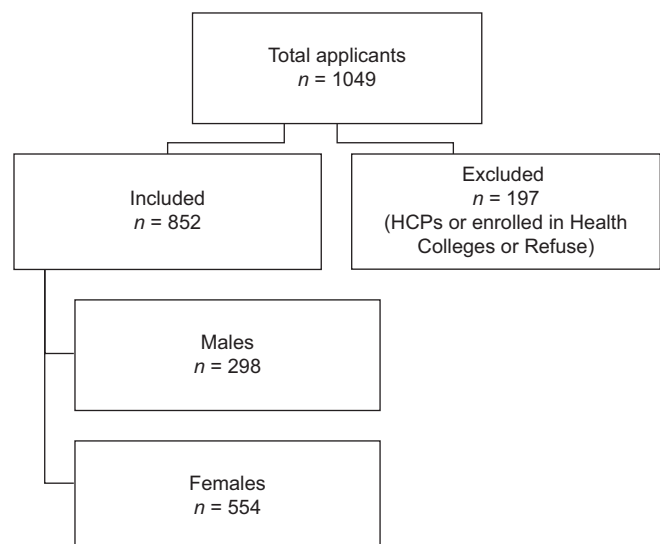


Figure 1: Flow chart of the participants

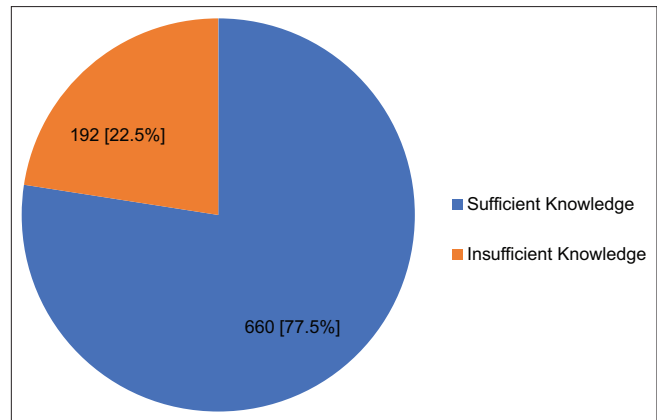
Table 1: Socio-demographic characteristics of study participants

Socio-demographic Data	Level of Knowledge						P
			Insufficient		Sufficient		
	n	%	n	%	n	%	
Gender							
Male	298	35.0%	73	24.5%	225	75.5%	0.315
Female	554	65.0%	119	21.5%	435	78.5%	
Age							
18–30 years	374	43.9%	70	18.7%	304	81.3%	0.123
31–40 years	151	17.7%	34	22.5%	117	77.5%	
41–50 years	236	27.7%	64	27.1%	172	72.9%	
51–60 years	81	9.5%	22	27.2%	59	72.8%	
61 years and above	10	1.2%	2	20.0%	8	80.0%	
Marital Status							
Single	325	38.1%	61	18.8%	264	81.2%	0.064
Married	496	58.2%	121	24.4%	375	75.6%	
Divorced or Widow	31	3.6%	10	32.3%	21	67.7%	
Educational level							
High School	157	18.4%	36	22.9%	121	77.1%	0.003
University	626	73.5%	130	20.8%	496	79.2%	
Post Graduate	60	7.0%	20	33.3%	40	66.7%	
Uneducated	9	1.1%	6	66.7%	3	33.3%	
Occupation							
Employed	379	44.5%	90	23.7%	289	76.3%	0.016
Unemployed	165	19.4%	47	28.5%	118	71.5%	
Retired	45	5.3%	12	26.7%	33	73.3%	
Student	263	30.9%	43	16.3%	220	83.7%	
Family income							
1000–5000 S.R*	401	47.1%	90	22.4%	311	77.6%	0.373
5001–10000 S.R	138	16.2%	36	26.1%	102	73.9%	
10001–15000 S.R	165	19.4%	30	18.2%	135	81.8%	
More than 15000 S.R	148	17.4%	36	24.3%	112	75.7%	

*S.R : Saudi Riyal

In assessing the overall level of knowledge about CPR among the general population, we found that 77.5% of the participants had sufficient knowledge as in Figure 2 with an average knowledge score was 11.2 out of 18, with a standard deviation of 3.5. indicating a moderate level of understanding.

A considerable proportion (76.8%) correctly identified loss of consciousness as a symptom of cardiac arrest, while 46.8% recognized the importance of initiating CPR when there is no pulse and breathing stops. Moreover, 69.1% correctly identified the optimal position for performing CPR as lying on solid ground. However, there were notable gaps in knowledge, as evidenced by responses such as 15.8% not knowing when to start CPR and 34.7% being uncertain about determining a person's lack of response. Regarding specific CPR procedures, participants generally exhibited awareness of key practices, with 55.2% correctly identifying the method to open the airway before mouth-to-mouth ventilation and 68.1% recognizing the correct technique for chest compressions. Notably, 86.5% acknowledged death as a potential complication resulting from not performing CPR as shown in Table 2.

**Figure 2: Overall level of knowledge**

Participants noted challenges in cardiac resuscitation, underlining identified unresponsiveness (26.8%) and chest compressions (20.9%). Concern for harm (35.5%) emerged as the primary difficulty in chest compressions as shown in Table 3.

In terms of experiences with heart attacks, 12.4% of participants acknowledged encountering such situations, with 59% ($n = 63$) of these instances involving family members. When questioned about actions taken during witnessed cardiac arrests, 43.4% mentioned calling an ambulance, 26.4% reported performing CPR, and 30.2% opted not to interfere. A total of 49.3% ($n = 420$) expressed the intention to call an ambulance and initiate CPR if faced with a cardiac arrest scenario. Identified barriers to intervention included a significant fear of causing harm to the victim (73.6%) and a perceived lack of experience (72.5%) as shown in Table 4.

Social media apps emerged as the predominant source of CPR knowledge, with 53.8% of participants relying on them, surpassing first aid courses, which accounted for only 26.3%. Notably, education videos were the preferred method of learning, attracting a significant preference of 67.9% among participants. Despite this, a substantial 70.0% of participants were unaware of available CPR courses in the Al-Baha region. However, there was a 75.0% expression of interest in enrolling in such courses. Reasons for not having taken CPR courses were diverse, with 40.8% attributing their lack of participation to a general lack of awareness, while 37.9% cited a shortage of time as a limiting factor as shown in Table 5.

Discussion

In the context of cardiac arrest, timing is crucial. With each minute of delayed CPR initiation, mortality rates can increase by 7–10%.^[9] Therefore, general population knowledge plays an important role in improving the survival rate among these victims. In our study, we found that the overall knowledge was 77.5% had sufficient knowledge about CPR which was higher than other studies both locally in the Al-Majma'ah Region (52.5%),^[10] Wadi Al Dawasir (42.1%),^[11]

Table 2: Assessment of Knowledge about CPR

Question	n	%
Do you have enough knowledge about CPR?		
Strongly disagree	99	11.6%
Disagree	211	24.8%
Neutral	265	31.1%
Agree	202	23.7%
Strongly agree	75	8.8%
What are the symptoms of cardiac arrest?#		
Loss of consciousness*	499	76.8%
Cessation of breathing and pulse*	406	62.5%
Cessation of breathing only*	98	15.1%
High temperature and Convulsions	98	15.1%
Complaint of chest pain.	369	56.8%
When is the best time to start CPR?		
After waiting for five minutes.	17	2.0%
After the ambulance arrives.	12	1.4%
When it is confirmed that there is no pulse and breathing stops.*	399	46.8%
I don't know.	135	15.8%
Immediately.	289	33.9%
What is the correct way to determine a person's lack of response?		
Move the injured person and address: Are you okay?*	293	34.4%
Pour cold water on the injured person.	61	7.2%
By pinching the earlobe to get a response.	202	23.7%
I don't know.	296	34.7%
What is the next step when it is confirmed that the person is unresponsive?		
Call an ambulance and begin CPR.	384	45.1%
Call an ambulance.	163	19.1%
Begin CPR immediately.	111	13.0%
Check pulse.*	159	18.7%
None of the above.	35	4.1%
What is the best position for the injured person when performing CPR?		
On a chair	33	3.9%
Lying on solid ground.*	589	69.1%
Lying on a sofa.	89	10.4%
I don't know.	141	16.5%
Where is the pulse confirmed?		
Wrist.	250	29.3%
Neck.*	508	59.6%
Thigh	12	1.4%
Foot	5	0.6%
I don't know	77	9.0%
What is the best way to open the airway before starting mouth-to-mouth ventilation?		
Tilt the head back and press the chest	93	10.9%
Tilt the head back and lift the chin up*	470	55.2%
Tilt the head up and press the neck	35	4.1%
Just open the mouth.	53	6.2%
I don't know	201	23.6%
What is the correct way to check the patient's breathing?		
Monitor the chest to see if it rises and falls while listening and feeling the air coming out of the nose and mouth*	387	45.4%
Place the hand on the nose and try to feel the breath	189	22.2%

Contd...

Table 2: Contd...

Question	n	%
Place the hand over the chest and observe its movement with breathing	126	14.8%
I don't know.	150	17.6%
What is the ratio (chest compressions/ventilation) in the case of an adult?		
10 compressions for one ventilation	156	18.3%
30 compressions for 2 ventilations*	189	22.2%
5 compressions for one ventilation	165	19.4%
I don't know	342	40.1%
What is the correct way to perform chest compressions?		
Use your hands, interlock your fingers together, and press on the left area of the chest	109	12.8%
Use your hands, interlock your fingers together, and press on the middle of your chest.*	580	68.1%
Press using one hand	15	1.8%
I don't know	148	17.4%
What is the recovery status?		
Raise the legs to the level of the heart	154	18.1%
When the injured person stands	48	5.6%
Place the injured person on one side. *	209	24.5%
Putting the victim on his stomach.	18	2.1%
I don't know	337	39.6%
What are the complications resulting from performing cardiopulmonary resuscitation?#		
Pneumothorax*	402	47.8%
Rib fracture*	626	74.4%
Intestinal perforation	301	35.8%
Hematoma	301	35.8%
What are the complications resulting from not performing CPR?#		
Death*	737	86.5%
Brain damage*	497	58.3%
High fever accompanied by convulsions	92	10.8%

#Multiple Choices, *Correct Answer

Jazan (36.04%)^[5] or internationally as in South China where only 5.3% had a perfect score on CPR skills test. This result could be attributed to the high educational level of our population and the predominant female gender.

We found that 12.4% (n = 106) of all participants had encountered a situation that required CPR, among those, 26.4% (n = 28) started CPR. In the literature, the percentage of individuals who performed CPR during a witnessed cardiac arrest varies, ranging from 3.6% in Turkey to 21.1% in Jeddah.^[7,12,13] A total of 49.3% (n = 420) of the participants stated that they would start CPR and call an ambulance in case approached someone with sudden cardiac arrest. In comparison, the literature shows that 92.9% of participants in the UK^[14] would call an ambulance while 42.4% chose to start CPR, meanwhile 72% were willing to administer CPR in Scotland.^[15] The percentage of our participants is still low and needs more action to encourage more intervention and overcome the challenges. These insights are highly relevant to primary care providers and family physicians, who play an essential role in patient education and preventative health measures.

Table 3: Challenges in cardiac resuscitation steps

	n	%
What is the most difficult step in the steps of cardiac resuscitation?		
Chest compressions.	178	20.9%
Determine the patient's unresponsiveness.	228	26.8%
Oral artificial respiration.	169	19.8%
I don't know.	277	32.5%
Why do you see this step difficult?		
Chest compression)		
It is tiring and requires effort	39	21.9%
I don't know where or how hard I pressed	38	21.3%
Adverse consequences and harm to the victim may occur.	63	35.5%
I don't have enough knowledge	38	21.3%
Why do you see this step difficult?		
Determine the patient's unresponsiveness.)		
Fear of harming the victim	39	17.1%
I don't have enough knowledge	150	65.8%
Stress and anxiety during the situation	39	17.1%
Why do you see this step difficult?		
Oral artificial respiration.)		
I don't have enough knowledge	97	57.5%
Fear of transmission.	43	25.4%
For personal reasons	29	17.1%

Table 4: Experiences with Heart Attacks and CPR

	n	%
Have you ever seen someone who had a heart attack?		
No	746	87.6%
Yes	106	12.4%
If you have ever seen someone whose heart stopped, what is the relationship between you and him?		
Stranger.	32	30.2%
friend.	11	10.4%
From family members.	63	59.4%
If you had ever seen someone whose heart had stopped, what action did you take?		
Call the ambulance.	46	43.4%
Cardiopulmonary resuscitation.	28	26.4%
I didn't interfere.	32	30.2%
If you saw someone whose heart stopped, what action would you take?		
Call an ambulance and begin CPR.	420	49.3%
Call the ambulance.	233	27.3%
Begin CPR.	108	12.7%
Waiting for help to come.	62	7.3%
No interference.	29	3.4%
What barriers might a CPR provider face?#		
Insufficient experience.	618	72.5%
Fear of legal penalties.	282	33.1%
Fear of the spread of infectious diseases.	178	20.9%
Fear of harming the infected person.	627	73.6%

#Multiple Choices

In our study, the main challenges among participants for performing CPR, were significant fear of causing harm to the victim 73.6% ($n = 627$), and a perceived lack of experience

Table 5: Sources, Strategies, for CPR knowledge

	n	%
Where did you gain your knowledge about CPR?#		
Social Media Apps	450	53.8%
First aid courses.	220	26.3%
Someone you know.	135	16.1%
I don't have any information.	237	28.3%
University/College/School	10	1.2%
Medical Movies and series	6	0.7%
In your opinion, what are the ways that can increase people's awareness of cardiopulmonary resuscitation?#		
Educational videos.	511	67.9%
Social Media Apps.	469	62.3%
Providing first-aid courses in the workplace and study.	461	61.2%
Awareness Campaigns.	496	65.9%
Have you heard about CPR courses in Al-Baha region?		
No	596	70.0%
Yes	256	30.0%
Do you have an interest in enrolling in CPR courses?		
No	213	25.0%
Yes	639	75.0%
If you have not taken CPR courses before, why not?		
I do not care.	86	10.1%
shortage of time.	323	37.9%
I had never heard of CPR before.	348	40.8%
I joined it previously.	61	7.2%
I joined it previously	23	2.7%
Remote location and difficulty of transportation	11	1.3%

#Multiple Choices

72.5% ($n = 618$). The low rates of attending CPR training courses (26.3%) could explain why our participants pointed out all these challenges. This low rate of attending CPR is comparable with other studies in Saudi Arabia as in Jazan where one study was conducted showing a low enrollment rate in CPR courses (36.04%).^[5] However, this rate is considered low in comparison to international studies like those conducted in Turkey (40.7%),^[12] Scotland (52%),^[15] Slovenia (70%),^[16] and Australia (56%).^[17] Most of these countries have obligatory CPR courses when obtaining driving licenses or for some professions like teachers. In our population, the main reason for not having taken CPR courses are general lack of knowledge about these courses (40.8%), on a study conducted in China found out that 33% never heard of CPR training.^[18]

When asked about their source of knowledge, social media apps emerged as the predominant choice 53.8%, these results are consistent with similar studies conducted locally, where the media including television, movies, and the internet is the main source of information.^[5,6,19] Social media platforms have a major impact on people and can reach a broader audience, therefore this finding presents an opportunity for primary care providers and family physicians to use these platforms by incorporating simple training programs conducted by trained personnel that could yield positive outcomes for public health and communities, especially in Saudi Arabia.

Despite its contributions to our knowledge regarding the current situation of CPR among Al-Baha population, there are some limitations worth mentioning. First, the cross-sectional design of the study ignores the casualty effect. Second, relying on self-reported data introduces the chance of recall bias as participants might not remember their knowledge or experiences accurately, additionally, focusing solely on one region in Saudi Arabia may limit how broadly we can apply these findings to areas.

Conclusion

Our study found that while the general population has moderate CPR knowledge, significant gaps exist in understanding when to initiate CPR and assess unresponsiveness. Social media was the main source of CPR knowledge, yet many were unaware of available courses. Interest in CPR training is present but lack of information and time constraints are barriers. This underscores the need for better promotion and accessibility of CPR programs to improve public preparedness for cardiac emergencies.

List of abbreviations

Abbreviation	Definition
CPR	Cardiopulmonary resuscitation
HCPs	HealthCare Professionals
S. R	Saudi Riyal

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There are no non-author contributors to acknowledge for this study.

Ethical policy and Institutional Review board statement

The ethical approval was obtained from the Institutional Research Board of Al-Baha University number: REC/SUR/BU-FM/2023/57R.

The ethical approval can be provided upon request, if necessary.

Patient declaration of consent statement

No patient data were utilized in this study. However, all participants were comprehensively briefed on the study's objectives, assured of the confidentiality of their data, and provided informed consent before participation.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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