# Knowledge, attitude, practice, and associated factors of health professionals towards cardiopulmonary resuscitation at Ayder Comprehensive Specialized Hospital, 2023, Tigray, Ethiopia

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**Background:** Cardiopulmonary resuscitation (CPR) is a crucial medical technique that is performed manually to preserve intact brain function. Early initiation of CPR manoeuvres and activation of the chain of survival are key factors in the prognosis of patients with cardiorespiratory arrest (CRA). Inadequacy in any step of CPR due to a lack of knowledge or skill is associated with a poor return of spontaneous circulation and a decreased survival rate.

**Objective:** To assess the knowledge, attitude, practice, and factors associated with health towards CPR at Ayder Comprehensive Specialized Hospital 2023.

**Methods:** Institution-based cross-sectional study was conducted to assess the knowledge, attitude, and practice of health professionals towards cardiopulmonary CPR in Ayder Comprehensive Specialized Hospital Of Tigray, Ethiopia from 1 May to 30 August 2023. Data were collected using structured questionnaires by Two BSC anaesthesia staff and One MSc. as supervisor. A stratified random sampling technique was used to select the study participants. The Data were entered and analyzed using SPSS version 23. Variables with $P$ value less than 0.20 were fitted into multivariate logistic regression. Descriptive statistics such as frequencies, median, interquartile range, percentages, tables, graphs and charts were used to present the results.

**Result:** A total of 262 Of 277 healthcare providers were included in the study, with a response rate of 93.3%. Knowledge, attitude, practice of health professionals towards CPR was 22.5%, 39% and 31.5%, respectively. MSc degree in level of education [adjusted odds ratio (AOR): 8.561 95% CI = 2.109–34.746], CPR training (AOR: 2.157, 95%, 1.005, 4.631), and Work experience 6–10years and more than 10 (AOR = 0.195, 95% CI, 0.071–0.539) and AOR = 0.148 195 95% CI, 0.017, 1.285) were significantly associated with knowledge. The Anaesthetist and Medical doctors were 5.5 times (AOR, 5.50, 95% CI 1.263–23.93) and 2.125 times (AOR: 2.125, 95% CI, 0.865–5.216) respectively more likely to have favourable attitude than the midwives. Regarding to practice participants with CPR training (AOR: 1.804 95% CI = 0.925–3.518), good knowledge (AOR: 2.766 95% CI = 1.312–5.836) and favourable attitude (AOR: 1.931, 95% CI = 0.995–3.749) were significantly associated with safe practice.

**Conclusion and recommendation:** The overall level of health professionals, knowledge, attitude, practices, and factors associated towards CPR in Ayder Comprehensive Specialized Hospital at Tigray, Ethiopia were insufficient, favourable and safe enough. Regular CPR training is recommended to increase the knowledge, attitude, and practice of healthcare professionals towards CPR.

**Keywords:** attitudes, cardiac arrest, cardiopulmonary resuscitation, knowledge, practices

## Introduction

Cardiopulmonary resuscitation (CPR) is a crucial medical technique performed to manually preserve intact brain function until additional steps are taken to restore normal spontaneous breathing and blood circulation in a person experiencing cardiac arrest. It is administered to people who are believed to be in

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cardiac arrest and consists of rescue breathing and chest compression[1, 2].

Cardiopulmonary arrest is a major public health problem that accounts for 15–20% of all deaths. Cardiac arrest can occur at any time and is an emergency condition. Medical professionals who encounter this emergency can perform CPR before any further assistance reaches the scene and can help save lives[3].

Since the development of modern CPR, several nations in cooperation with professional bodies or associations (European Resuscitation Council, American Red Cross, American Heart Association, Australian Resuscitation Council, the Heart and Stroke Foundation of Canada, the Resuscitation Council Southern Africa and Resuscitation Councils among many others) have used CPR as a standard first-line management for a variety of acute life-threatening medical conditions where death is likely if immediate intervention is not carried out.

Early initiation of CPR manoeuvres and activation of the chain of survival are key factors in the prognosis of patients with cardiorespiratory arrest (CRA). Therefore, it is important to understand and master CPR techniques, as they are the main determinants of success rates in CRA care- irrespective of the setting in which they are performed[4].

CPR is avital life-saving skill for medical workers working in emergency rooms and other healthcare settings. Several factors, including patient's baseline status and the length of CPR, affect clinical outcomes. The effective delivery of CPR greatly improves patient outcomes in cases of cardiac arrest[5].

To perform high-quality CPR, timely recognition of arrest and initiation of chest compressions along with the correct depth and rate of compressions as well as adequate chest recoil is essential. Inadequacy in any step of CPR due to a lack of knowledge or skill is associated with a poor return of spontaneous circulation and a decreased survival rate. Proper resuscitation with defibrillation as early as possible and proper post–cardiac arrest care are necessary to improve the survival rate and neurological outcomes of patients with cardiac arrest[6].

Basic life support (BLS) followed the simple airways, breathing and circulation (ABC) form of resuscitation. However, there has recently been a paradigm shift from the ABC form of resuscitation to the circulation airways and breathing (CAB) method of resuscitation. The emphasis of CAB is to initiate resuscitation by establishing circulation through chest compressions, clear airways and breathing[7].

CPR is a life-saving technique that can improve survival rates and outcomes of patients who experience cardiac arrest. Worldwide more than 135 million cardiovascular deaths occur annually. Globally, the incidence of in- and out-of-hospital cardiac arrest ranges from 20 to 140 per 100 000 people, and survival ranges from 2 to 11%. Cardiac arrest is one of the most lethal public health problems in the United States and Europe[8-10].

A study conducted in Botswana showed that many people visit PHC centres because of medical emergencies, rather than preventive healthcare services. In this study, the performance of nurses during CPR provision of CPR are affected by all nursing competencies, including clinical judgment, clinical reasoning, critical thinking, knowledge and skills, advocacy, caring practices, and the availability of resources[11].

In Ethiopia, cardiac arrest is the leading cause of death and disability; however, there are no established CPR training

**HIGHLIGHTS**

- Knowledge, attitude, and practice of health professionals towards cardiopulmonary resuscitation (CPR) were 22.5%, 39%, and 31.5%, respectively.
- MSc degree in level of education [adjusted odds ratio (AOR): 8.561 95% CI=2.109–34.746], CPR training (AOR: 2.157, 95%, 1.005, 4.631), and work experience 6–10 years and more than 10 (AOR =0.195, 95% CI, 0.071–0.539) and AOR =0.148 195 95% CI, 0.017, 1.285) were significantly associated with knowledge.
- Regarding to practice participants with CPR training (AOR: 1.804 95% CI=0.925–3.518), good knowledge (AOR: 2.766 95% CI=1.312–5.836), and favourable attitude (AOR: 1.931, 95% CI=0.995–3.749) were significantly associated with safe practice.

schedules. Previous studies have shown that health professionals (HPs) often have inadequate knowledge, attitudes, and practices (KAP) towards CPR [3]. However, few studies have been conducted to assess the KAP of HPs towards CPR and the factors influencing it in Ethiopia[12, 13].

A study conducted in our hospital at Ayder back in 2021 on the Knowledge and Practice towards CPR among Health Professionals showed that those who had more years of experience had poor knowledge on cardiopulmonary resuscitation. Similarly, when the age of the participants increased the knowledge-related questions were poorly addressed.

However, there were no statistically significant differences between the sexes of the participants. However, participants who had received job training (in-service) on cardiopulmonary resuscitation had better knowledge ($\chi^2 = 11.925$, $P = 0.001$) and practice ($\chi^2 = 17.575$, $P = 0.002$) than participants who had received training during pre-service education[14]. But since then, health professionals have faced a difficult situation due to the war, which lasted for more than more than 2 years.

This study aimed to assess the proficiency of health professionals in providing CPR and to identify the factors that positively or negatively affect their knowledge, attitude, and practice towards CPR.

## Methods

### Study setting

The investigation conducted at the Ayder Comprehensive Specialized Hospital.in, which is one of largest hospitals the in Tigray. It provides comprehensive health services to patients in all regions of Ethiopia. It provides services such as surgical, gynaecological, obstetric, medical, paediatrics, minor and major operations, and ophthalmologic and diagnostic facilities. It has a capacity of more than 500 inpatient beds, 9 operating theatres, and more than 1500 health professionals in different fields of study. This manuscript is a thesis work for the partial fulfilment of the MSC degree under anaesthesia. This study was registered at www.researchregistry.com with Research Registry UIN: research registry.\…\Desktop\research registry. doc and reported according to STROCSS criteria[15]

### Study design and Period

This institutional-based cross-sectional study was conducted at Ayder Comprehensive Specialized Hospital from 1 May to 30 August 2023.

### Source population

All health professionals working at Ayder Comprehensive Specialized Hospital.

### Study population

Selected health professionals working in the operation theatre, PACU, ICU, Emergency and Obstetric ward of-Ayder Comprehensive Specialized Hospital who fulfilled the inclusion criteria were included in the study.

### Study variables

Dependent variables: Knowledge, Attitude, and Practice. The Independent variables were- age, sex, marital status, salary, religion, experience / year of service, CPR training, educational level and profession.

### Inclusion criteria

Health professionals working on Emergency, OR, PACU, ICU and Obstetric ward

### Exclusion criteria

None of administrative staff, supporter staffs, laboratories or pharmacists were believed to be involved in ACLS and BLS

### Sample size determination

The actual sample size was calculated using a single population proportion formula of

$$n = \frac{Z^2\alpha/2 * p(1-p)}{d^2}$$

$$n = \frac{(1.96)^2 * 0.78(0.22)}{(0.05)^2}$$

$$n = 264$$

Where; $n$= Sample size

P= Proportion of the health professional participants on research.

1–P= proportion of the population

d= Maximum acceptable difference (Margin of error = 5%)

Zα/2= the critical value at 95% confidence level of certainty (1.96).

Then, by considering at a non-response rate 5%, the final sample size= 264+13=277

### Sampling technique

Stratified sampling followed by a simple random sampling technique was employed to reach the study participants, and the quota of each stratum was calculated using proportional allocation-: $ni = \left(\frac{n}{N}\right)Ni$

i = 1,2,3,....where k is he number of strata

$ni$ = sample size of the $i^{th}$ stratum $Ni$ = population size of the $i^{th}$ stratum

$n = \Sigma ni$ = total sample size; N = ΣNi = total population size

### Data collection procedures

The study was conducted using a self-administered questionnaire or a format prepared in English. The prepared fieldwork manuals and questionnaires were then sent to the data collectors and supervisors. The questionnaire was adapted from three previous studies, based on the 2015 AHA guidelines[16-18]. During data collection, Two Bachelor Science and One Master Science of anaesthetist were involved as data collectors and supervisors, respectively.

### Data quality assurance

During data collection, regular supervision and follow-up were performed by the investigator and cross-checked daily for completeness and consistency. Once the data were collected and checked for completeness, consistency, and accuracy, they were sorted, categorized and summarized. The data were then entered into the computer using the developed data entry format, coded for each category of variables and cross-checked for errors.

### Data processing and analysis

Data were cleaned and checked for completeness. The data were collected using structured questionnaires. Data were analyzed using SPSS version 23. Descriptive statistics were used to summarize the data and tables and graphs were used to assist in data presentation. Each variable was entered into bivariate analysis, and variables with P value less than 0.2 were fitted to multivariate logistic regression analysis to identify factor associations, strength of association was measured at 95% CI and odds ratio.

## Results

### Sociodemographic characteristics of health professionals Ayder Comprehensive Specialized Hospital; 2023

A total of 262 of the 264 healthcare providers were included in the study, with a response rate of 99.2%. The highest participants in this study were Males with 157 (59.9%). Whereas The middle value of the distribution of age was 30 and the middle 50% distribution of age ranges 28–32. With regard to profession 115 (43.9%) were nurses followed by Medical doctors, Midwives, and Anaesthetists with 84 (32.1%), 43 (16.4%), and 20 (7.6%), respectively. Above half of (55.7%) of the respondents have BSc degree in their level of education. Regarding to their work experience, 51.5% of health professionals had less than or equal to 5 years followed by 6–10years (39.7%) and more than 10years (8.8%) of work experience. majority of health professionals 161 (61.5%) are with not CPR training (Table 1).(Figs. 1,2).

### Knowledge of Health professionals about CPR at Ayder Comprehensive Specialized Hospital; 2023

Only 59 (22.5%) of the study participants had good knowledge of CPR of the 24 correct answers the median knowledge score of the health professionals' towards CPR was 11 [interquartile range (IQR) = 7] (Fig. 3)

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**Sociodemographic characteristics of health professionals at Ayder Comprehensive Specialized Hospital; 2023, (N = 262).**

| Variables | Categories | Frequency (Percentage), *n* (%) |
|---|---|---|
| Sex | Male | 157 (59.9) |
| | Female | 105 (40.1) |
| Age of health professionals (years) | 24–30 | 159 (60.7) |
| | 31–35 | 78 (29.8) |
| | > 36 | 25 (9.5) |
| Marital status | Single | 154 (58.8) |
| | Married | 108 (41.2) |
| Religion | Orthodox | 250 (95.4) |
| | Protestant | 6 (2.3) |
| | Muslim | 6 (2.3) |
| Profession | Medical doctor | 84 (32.1) |
| | Anaesthetist | 20 (7.6) |
| | Nurse | 115 (43.9) |
| | Midwifery | 43 (16.4) |
| Level of education | Diploma | 13 (5) |
| | BSc degree | 146 (55.7) |
| | MSc degree | 19 (7.3) |
| | Resident | 84 (32) |
| Work experience (years) | < 5 years | 135 (51.5) |
| | 6–10 years | 104 (39.7) |
| | > 10 years | 23 (8.8) |
| Training on CPR | Yes | 101 (38.5) |
| | No | 161 (61.5) |

CPR, cardiopulmonary resuscitation.

### Knowledge level by profession of health professionals at Ayder Comprehensive Specialized Hospital; 2023

With regard to profession 64.3% of the anaesthetist had good knowledge. Majority of medical doctors, Nurses and Midwives had poor knowledge with 80.7%, 85% and 90%, respectively (Fig. 4).

### Factors associated with knowledge of health professionals towards CPR at Ayder Comprehensive Specialized Hospital; 2023

In the unadjusted bivariate logistic regression analysis, variables such as age, profession, education level, work experience, and CPR training guidelines were significant. However, only the level of education, Work experience and CPR-trained health professionals were significantly associated with good knowledge at (< 0.05) in the multivariate logistic regression (Table 2). Accordingly, health professionals with work experience of 6–10 and more than 10 years, respectively, were 80.5% and 85.2% less likely to have knowledge than the health professionals with less than or equal to 5years of work experience. Also the study revealed that the likelihood of having good knowledge towards adult CPR among those who had CPR training was 2.157 times higher than those who did not have taken CPR training (AOR: 2.157 , 95%, 1.005, 4.631). Similarly the odds of having good knowledge towards adult CPR were 8.561 times (AOR: 8.561, CI 95% 2.109, 34.746) higher among health professionals who had MSc. degrees compared with health professionals who had diploma (Table 2).

### Attitude of health professionals towards CPR at Ayder Comprehensive Specialized Hospital; 2023

Of the study participants, 160 (61%) had unfavourable attitude. Among the 65 participants, the median attitude score of health professionals towards adult CPR was 49 (IQR) (Fig. 5).
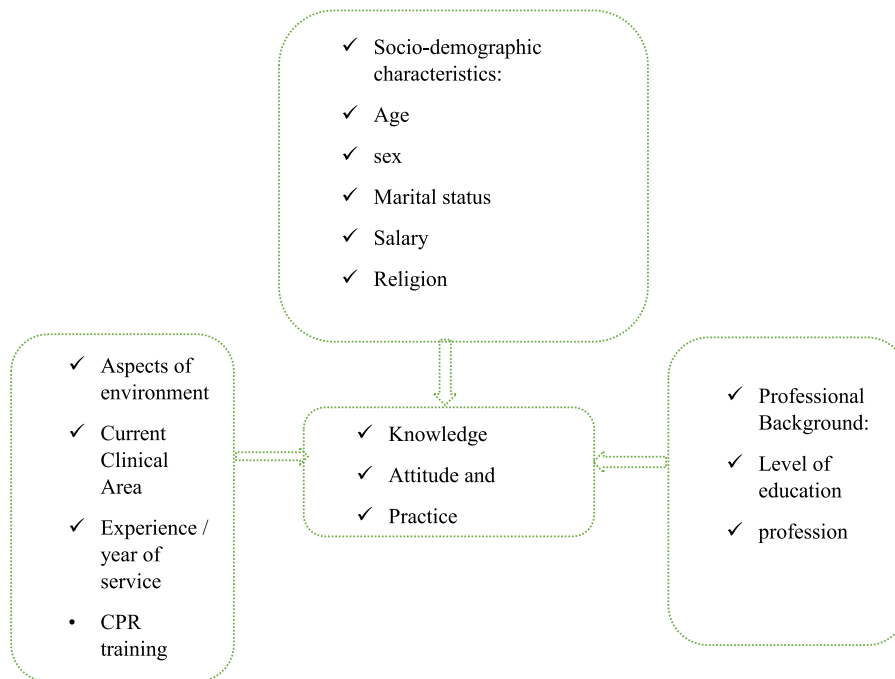


**Figure 1.** Conceptual framework adopted from the literature review for knowledge, attitude practice and associated factors of health professionals in critical care towards cardiopulmonary resuscitation at Ayder Comprehensive Specialized Hospital; 2023. CPR, cardiopulmonary resuscitation.
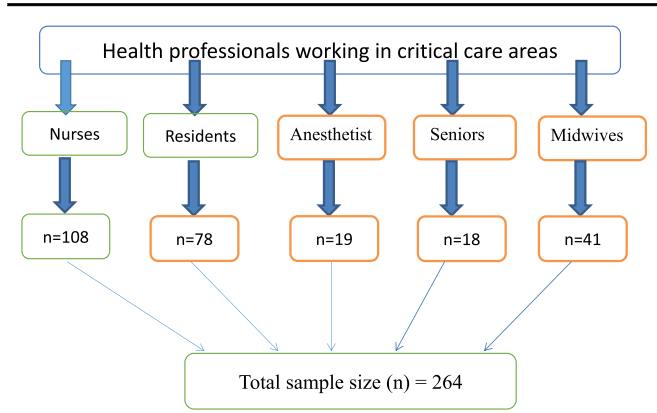
**Figure 2.** Schematic presentation of sampling procedure.



**Figure 4.** Knowledge level by profession of health professionals at Ayder Comprehensive Specialized Hospital; 2023.

### Attitude level by profession of health professionals at Ayder Comprehensive Specialized Hospital; 2023

Based on profession, 16 (78.6%) of the anaesthetists and 31 (34.4%) of Medical Doctors had better attitudes towards adult CPR compared with other professions (Fig. 6). In addition those who had an MSc degree in their level of education had a higher attitude than others (Fig. 6).

### Factors associated with attitude of health professionals towards CPR

In the bivariate logistic regression analysis, variables such as sex, age, profession, education level, and work experience were significant. Then, values at $P$ less than 0.2 were entered into multivariate logistic regression. However, only Profession was significantly associated with favourable attitudes in the multivariate logistic regression analysis. Accordingly the anaesthetist was 5.5 times (AOR: 5.50, 95%, CI: 1.263–23.93) more likely to have favourable attitude than the midwives and medical doctors were also 2.125 times (AOR: 2.125, 95%, CI: 0.865–5.216) more likely to have Favourable Attitude than the midwives (Table 3).

### Practice of health professionals towards CPR

Among the study participants the overall level of health professionals' safe practices was 31.3%. Of the 11 practice questions
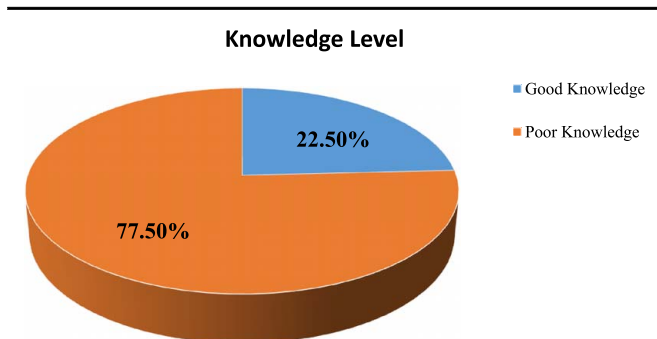
the median score of the study participants was 7.5 (IQR = 2) (Fig. 7).

### Practice level by profession of health professionals at Ayder Comprehensive Specialized Hospital; 2023

Based on profession, 9 (64.3%) of the anaesthetists and 24 (41.4%) of Medical Doctors had better attitudes towards adult CPR compared with other professions (Fig. 8).

### Factors associated with Practice of health professionals towards CPR

In the bivariate logistic regression analysis sex, profession, work experience, CPR training, and knowledge and attitude had $P$ value less than 0.2 then were then subjected to multivariate logistic regression. Only profession, CPR training, work experience, knowledge and attitude were significant $P$ less than 0.05. However, in the multivariate logistic regression CPR training (AOR: 1.804, 95%, CI: 0.925–3.518), Good knowledge (AOR: 2.766, 95%, CI: 1.312–5.836) and favourable attitude (AOR: 1.931, 95%, CI: 0.995–3.749) were significantly associated with safe practice (Table 4)



**Figure 3.** Knowledge of health professionals about cardiopulmonary resuscitation at Comprehensive Specialized Hospital, at Ayder Comprehensive Specialized Hospital; 2023.
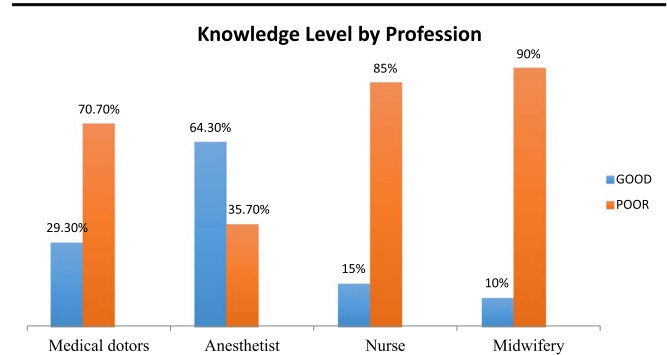


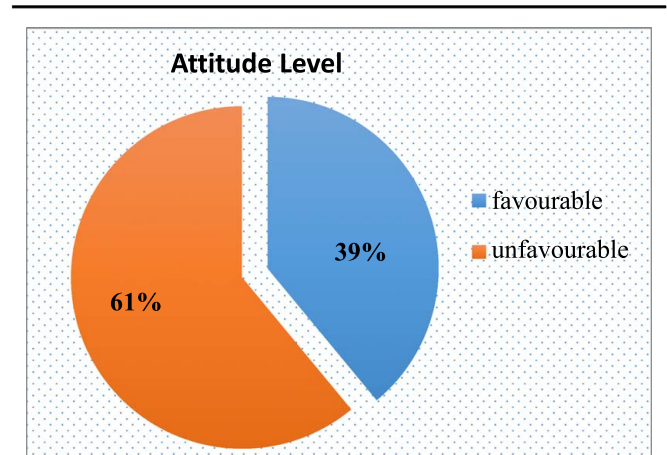**Figure 5.** Attitude of health professionals about cardiopulmonary resuscitation at Ayder Comprehensive Specialized Hospital; 2023
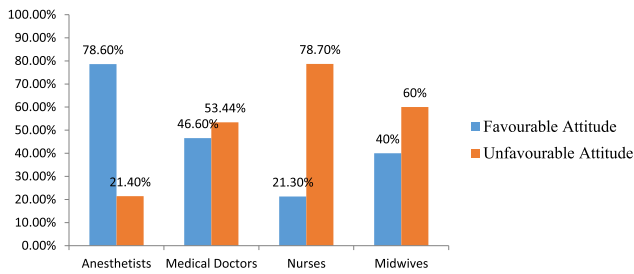
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**Figure 6.** Attitude level by profession of health professionals at Ayder Comprehensive Specialized Hospital; 2023..



**Figure 7.** Practice of health professionals about cardiopulmonary resuscitation at Ayder, University Comprehensive Specialized Hospital, Tigray, Ethiopia, 2023 ($N = 262$)

## Discussion

The current study revealed that the knowledge of health professionals towards cardiopulmonary resuscitation was 22.5%. This finding is lower compared with other studies conducted in Babcock University Teaching Hospital in Ilishan-Remo, Ogun State, Nigeria which was 74.9%, Amhara region referral hospitals, northwest Ethiopia, which was 38.6% and South Africa in 2018 which was 50%[18-20]. A possible explanation for this variation might be that the current study was conducted with different health professionals, wares the above-mentioned studies were conducted only among nurses. In addition, the current study used a smaller sample size than those used previous studies.

However, in this study, knowledge level of health professionals was higher than that studies conducted among anaesthetists in Addis Ababa Ethiopia in 2017 which was 6.7%)[21]. A possible explanation might be that most of the participants (84%) were BSc holders. The study also used the highest cut-off point (84%) as a pass mark to determine the level of knowledge.

In the current study work experience was strongly associated with participants' knowledge towards CPR, with health professionals with less than or equal to 5 years of work experience having significantly higher knowledge scores than those with more experience. This result agrees with a study conducted in North, Kerala India in 2016[17]. This might be because, without sufficient training and practice, a significant amount of theoretical information will be forgotten after 12 months and there will no adequate theoretical practical skills will remain[22].

However, contradictory findings were reported in a study conducted in Bahirdar[23] and Gondar[24]. This might be because individuals with long clinical experience had a high probability of getting CPR cases, leading them to read, search for, and understand CPR.

CPR training was significantly associated with professionals' knowledge towards HCPs. The study participants who had received CPR training were more knowledgeable than their counterparts were. This finding is in line with a study conducted in Pakistan 2021[6], India 2016[17], Upper Egypt 2020[25] and in Ethiopia[24, 26,16, 23]. This might be because health professionals who had taken regular CPR training acquired up-to-date information about CPR and there would not be fading in knowledge; as a result, they had good knowledge of CPR.

In this study, the attitude level of health professionals towards CPR was 39%. This result is almost in line with the results from Nigeria 2020[18] which was 35.6% and Debremarkos 2021[16] which was 35.8. On the other , this result was lower when compared in a study conducted in Pakistan 2021 which was
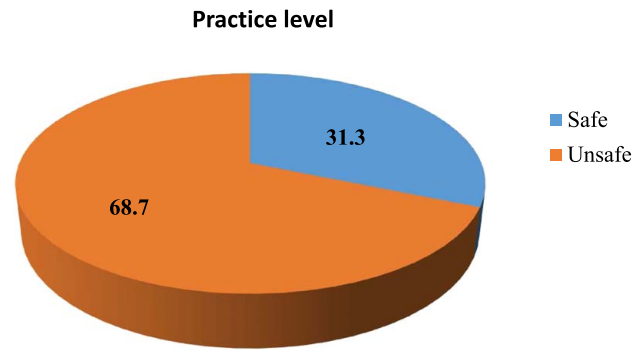
93.8%)[6]. A possible explanation might be the lack of training, emotional and psychological impact due to the war in the region and the lack of healthcare resources.

Both Anaesthetists and Medical Doctors had better attitude towards adult CPR than other professionals. This finding was consistent with that reported by Gonder[24]. This could be due to clinical experience, exposure to cardiac arrest, and the level of responsibility.

The current study revealed 31.3 the practice of health professionals towards CPR was 31.3%. The results of this study were lower when compared to those studies conducted in Nigeria in 2020 which was 65.2%[18]. This difference could be attributed to differences in the educational curriculum, study setting, study period, and accessibility of technology. However this rate was higher than the studies done in Debremarkos which was 11.1%[16]. This difference could be due to discrepancies in training, the availability of CPR facilities, and exposure to CPR.

Health professionals with CPR training had safer practices than to their counterparts. This finding is in agreement with that of a study conducted in India in 2015[27]. This could be explained the fact that many studies have documented the importance of training in individual psychomotor skills.

Similarly study participants deemed to have good knowledge were significantly associated with good practices. This result is consistent with that a study conducted by Debremarkos in 2016[20]. This might be because a good knowledge of CPR increases self-confidence in their ability to practice CPR successfully there by increasing their proficiency.
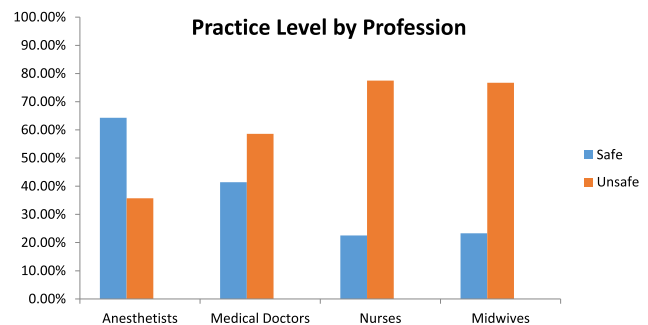


**Figure 8.** level by profession of health professionals at Ayder Comprehensive Specialized Hospital; 2023.

**Table 2**

**Bivariate and multivariate logistic regression of factors affecting knowledge of health professional towards CPR at Ayder Comprehensive Specialized Hospital; 2023.**

| | Knowledge categories | | | | |
|---|---|---|---|---|---|
| Variables | Good, n (%) | Poor, n (%) | Crude OR (95% CI) | Adjusted OR (95% CI) | P |
| Age of health professionals (years) | | | | | |
| 24–30 | 46 (28.9) | 113 (71.1) | 1 | 1 | |
| 31–35 | 11 (14.1) | 67 (85.9) | 0.377 (0.154, 0.922) | 0.468 (0.148–1.478) | 0.551 |
| > 36 | 1 (4) | 24 (96) | 0.152 (0.019, 1.189) | 0.282 (0.029–2.791) | 0.282 |
| Profession | | | | | |
| Midwifery | 4 (9.3) | 39 (90.7) | 1 | 1 | |
| Anaesthetist | 13 (65) | 7 (35) | 16.20 (3.21–81.695) | 5.041 (0.739–34.401) | 0.098 |
| Nurse | 17 (14.8) | 98 (85.2) | 1.588 (0.415, 6.074) | 2.380 (0.516–10.979) | 0.266 |
| Medical doctor | 25 (29.8) | 59 (70.2) | 3.732 (.997, 13.969) | 5.270 (0.343–80.884) | 0.232 |
| Level of education | | | | | |
| Diploma | 1 (7.7) | 12 (92.3) | 1 | 1 | |
| BSc Degree | 21 (14.4) | 125 (85.6) | 3.732 (0.997, 13.969) | 1.132 (0.458–2.798) | 0.787 |
| MSc Degree | 12 (63.2) | 7 (36.8) | 16.200 (3.212, 81.695) | 8.561 (2.109–34.746) | **0.002***|
| Resident | 25 (29.8) | 59 (70.2) | 1.588 (0.415, 6.074) | 1.988 (0.209, 18.879) | 0.275 |
| Work experience (years) | | | | | |
| ≤ 5 | 46 (34.1) | 89 (65.9) | 1 | 1 | |
| 6–10 | 12 (11.5) | 99 (88.5) | 0.242 (0.103–0.566) | 0.195 (0.071, 0.539) | **0.001***|
| > 10 | 1 (4.3) | 22 (95.7) | 0.129 (0.016, 1.02) | 0.148 (0.017, 1.285) | **0.046***|
| Training on CPR | | | | | |
| No | 17 (16.8) | 84 (83.2) | 1 | 1 | |
| Yes | 51 (31.7) | 110 (68.3) | 2.243 (1.107, 4.543) | 2.157 (1.005, 4.631) | **0.048***|

*Statistically significant at (P< = 0.05); 1: reference group;
CPR, cardiopulmonary resuscitation; OR, odds ratio.
Bold value indicate P< 0.05 and it is adjusted OR.

**Table 3**

**Bivariate and Multivariate logistic regression of factors affecting attitude of health professional towards CPR at Ayder Comprehensive Specialized Hospital; 2023.**

| | Attitude categories | | | | |
|---|---|---|---|---|---|
| | Favourable, n (%) | Unfavourable, n (%) | Crude OR (95% CI) | Adjusted OR (95% CI) | P |
| Sex | | | | | |
| Male | 69 (43.9) | 88 (56.1) | 1.710 (0.918, 3.186) | 1.439 (0.700, 2.959) | 0.305 |
| Female | 33 (31.4) | 72 (68.6) | 1 | 1 | |
| Age of health professionals (years) | | | | | |
| 26–30 | 73 (45.9) | 86 (54.1) | 1 | 1 | |
| 31–35 | 26 (33.3) | 52 (66.7) | 0.588 (0.298, 1.158) | 0.855 (0.405, 1.805) | 0.682 |
| > 36 | 3 (12) | 22 (88) | 0.156 (0.034, 0.719) | 0.222 (0.042, 1.158) | 0.074 |
| Profession | | | | | |
| Medical doctor | 39 (46.4) | 45 (53.6) | 1.722 (0.704, 4.211) | 2.125 (0.865, 5.216) | **0.048***|
| Anaesthetist | 16 (80) | 4 (20) | 5.500 (1.263, 23.939) | 5.500 (1.264, 23.940) | **0.023***|
| Nurse | 25 (21.7) | 90 (78.3) | 0.404 (0.163, 1.001) | 0.404 (0.163, 1.001) | 0.056 |
| Midwifery | 17 (39.5) | 26 (60.5) | 1 | 1 | |
| Level of education | | | | | |
| Diploma | 3 (23.1) | 10 (76.9) | 1 | 1 | |
| BSc Degree | 43 (29.5) | 103 (70.6) | 1.458 (0.286–7.429) | 1.612 (0.290, 8.949) | 0.673 |
| MSc Degree | 12 (63.2) | 7 (36.8) | 5.60 (0.814–38.512) | 1.343 (0.127–14.115) | 0.951 |
| Resident | 39 (46.4) | 45 (53.6) | 4.018 (0.768–21.008) | 4.018 (0.768–21.008) | 0.772 |
| Work experience (years) | | | | | |
| ≤ 5 | 68 (50.4) | 67 (49.6) | 1 | 1 | |
| 6–10 | 72 (69.2) | 32 (30.8) | 0.440 (0.231, 0.837) | 0.707 (0.272, 1.837) | 0.504 |
| > 10 | 3 (13) | 20 (87) | 0.142 (0.030, 0.663) | 0.355 (0.058, 2.181) | 0.250 |

*Statistically significant at (P< = 0.05); 1: reference group;
CPR, cardiopulmonary resuscitation; OR, odds ratio.
Bold value indicate P< 0.05 and it is adjusted OR.

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**Table 4**

**Bivariate and multivariate logistic regression of factors affecting practice of health professional towards CPR at Ayder Comprehensive Specialized Hospital; 2023.**

| | Practice categories | | Crude OR (95% CI) | Adjusted OR (95% CI) | P |
|---|---|---|---|---|---|
| | Safe, *n* (%) | Unsafe, *n* (%) | | | |
| Sex | | | | | |
| Male | 38 | 71 | 1.418 (0.790–2.927) | 1.140 (0.557–2.336) | 0.720 |
| Female | 20 | 53 | 1 | 1 | |
| Profession | | | | | |
| Medical doctor | 24 | 34 | 2.319 (0.858–6.269) | 1.956 (0.567–6.742) | |
| Anaesthetist | 9 | 5 | 5.914 (1.484–23.564) | 2.468 (0.49–12.394) | 0.273 |
| Nurse | 18 | 62 | 0.887 (0.326–2.413) | 0.897 (0.307–2.624) | 0.843 |
| Midwifery | 7 | 23 | 1 | 1 | |
| Work experience (years) | | | | | |
| ≤5 | 35 | 59 | 1 | 1 | |
| 6–10 | 22 | 50 | 0.742 (0.404–1.494) | 1.624 (0.646–4.084) | 0.303 |
| >10 | 1 | 15 | 0.112 (0.015–0.930) | 0.310 (0.034–2.793) | 0.296 |
| Training | | | | | |
| Yes | 29 | 41 | 2.024 (1.071–3.825) | 1.804 (0.925–3.518) | **0.049***|
| No | 29 | 83 | 1 | 1 | |
| Knowledge | | | | | |
| Good | 22 | 19 | 3.377 (1.642–6.946) | 2.766 (1.312–5.836) | **0.008***|
| Poor | 36 | 105 | 1 | 1 | |
| Attitude | | | | | |
| Favourable | 31 | 43 | 2.163 (1.146–4.080) | 1.931 (0.995–3.749) | **0.047***|
| Unfavourable | 27 | 81 | 1 | 1 | |

*Statistically significant at (*P* <0.05); 1: reference group;
CPR, cardiopulmonary resuscitation; OR, odds ratio.
Bold value indicate *P* < 0.05 and it is adjusted OR.

Additionally health professionals with a favourable attitude tended to be significantly associated with safe practices. This result is in line with that of a study conducted in India in 2022[28]. A possible reason could be that a positive attitude plays a crucial role in health professional's willingness to engage in CPR.

## Strength and limitation of study

The strength of this study it was conducted included different health professionals, data were gathered by trained anaesthesia service provided, double-checked by investigator, adequate questionnaire were used to assess KAP of health professionals, the data were a primary data obtained directly from the health professionals, whereas the limitation of this study was, response rate for the specialists was 0%, which would have been better if they were included in the study, for the practice ,it was only questionnaire-based study, it would have been better if simulation was included.

## Conclusion

The Overall level of knowledge, attitude practices and factors associated towards CPR at Ayder Comprehensive Specialized Hospital; 2023 were insufficient, favourable and sufficiently safe. Level of education (Msc degree) and less work experience of health professionals were significantly associated with good knowledge. However, CPR- trained health professionals were significantly associated with both good knowledge and safe practice. Regarding attitudes only Anaesthetists and medical doctors were significantly associated with favourable attitudes.

## Recommendation

Regular CPR training is recommended to increase the knowledge, attitude, and practice of healthcare professionals towards CPR. In addition, updating CPR guidelines and providing access to healthcare professional are crucial. Similarly recruiting of health professionals have a higher level of education in specific areas. Finally, similar studies that include the level of professional skills in simulation-based or real cardiac arrest cases are recommended.

## Ethics approval and consent to participate

Ethical clearance and approval were obtained from the Ethical Review Committee, anaesthesia department, and the Mekelle University. Permission to conduct this research was obtained from the Ayder Comprehensive Specialized Hospital. The study was conducted based on the parents' wishes by obtaining informed oral consent. There was no coercion, incentives to participate in the study. Finally, the confidentiality of the information was secured.

## Consent

Written informed consent was obtained from the patient for publication and any accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

## Conflicts of interest disclosure

The authors declare that they have no competing interests.

## Research registration unique identifying number (UIN)

The research is registered at http://www.researchregistry.com with UIN number 9861.\Desktop\researchregistry.docx.

## Guarantor

All authors.

## Data availability statement

The collected data from the Comprehensive specialized hospital for this study are available in soft copies as SPSS and in data collection tools as hard copies with the corresponding author.

## Provenance and peer review

We hereby state that this work is original, has not been published or accepted for publication, and is not under consideration for publication in another journal.

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