



EVALUATION OF KNOWLEDGE, ATTITUDES, AND PRACTICE OF BASIC LIFE SUPPORT AMONG LAYPERSONS

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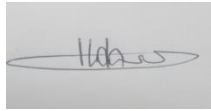
A research report submitted to the Faculty of Health Sciences, University of the Witwatersrand, in partial fulfillment of the requirements for the degree of Master of Medicine (MMED) in Emergency Medicine.

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CANDIDATE'S DECLARATION

I Dr. Michael Ibanbeteliehe Ihwo, student no. 2296644 declare that this research report is my work. It is being submitted for the degree of Master of Medicine (MMED) Emergency Medicine in the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination at this or any other University.

Signed

A rectangular box containing a handwritten signature in dark ink. The signature appears to be 'Ihwo' with a stylized flourish at the end.

on this 13th day of May 2022.

DEDICATION

This work is dedicated to God for his Grace and Mercy and to all who believe in my vision.

ABSTRACT

Background: Out-of-hospital cardiac arrest (OHCA) constitutes a significant public health challenge accounting for the majority of deaths globally. There is an improved chance of survival when bystander cardiopulmonary resuscitation (CPR) is incorporated into the OHCA chain of survival. There is a paucity of local data on the knowledge, attitudes, and practice of basic life support (BLS) among laypersons. This study aimed to evaluate the knowledge, attitudes, and practice of BLS among laypersons in a church community in Johannesburg, South Africa.

Methods: This was a prospective descriptive cross-sectional study. A self-administered questionnaire was used among the convenience sample of 205 participants. Adult worshippers of a church in South Africa who were 18 years and above were included. The study was conducted between December 06, 2020, and March 28, 2021.

Results: The mean $\pm$ SD age of the participants was 36.6 ± 12.6 , with the majority of 128 (62.4%) below 40 years. There were 104 (50.7%) females and the males were 101 (49.3%). A total of 30 (14.6%) participants had previous CPR training. Only 24 (11.7%) respondents knew all the signs of cardiac arrest, while the signs for evaluating unconsciousness and absent respiration were correctly identified by 51 (24.9%) and 114 (55.6%) participants respectively. Knowledge of CPR practical application was generally poor. The proportion of subjects who identified the correct answers are reflected as follows: compression to ventilation ratio (15.6%), compression site (11.7%), compression rate (20%), compression depth (22.9%), how to determine the adequacy of artificial breathing (31.7%), the meaning of CPR (19.1%) and function of an automated external defibrillator (AED) (11.2%). About one-third (34.1%) of the participants reported that they can perform both chest compression and mouth-to-mouth ventilation. Previous CPR training was associated with better knowledge of BLS and confidence in responding to OHCA. Overall, most of the participants stated that they would perform CPR on family members and friends without hesitation than on strangers, while 74.6% indicated a willingness to learn CPR. Age and sex generally had no significant effect on the knowledge, attitude, and skills of BLS among the respondents. The most important barrier to performing CPR was the fear of making a mistake.

Conclusion: This study reflected insufficient knowledge but positive attitudes with regard to the practice of CPR. Knowledge of BLS is better among those with previous CPR training. The fear

of making a mistake was the biggest concern for why participants will be reluctant to provide CPR. Programs, campaigns, and training targeting different segments of the community/society may improve knowledge of bystander CPR/BLS.

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Once again to the Author of life, I return all the glory

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1. CHAPTER ONE: INTRODUCTION TO THE RESEARCH REPORT

This Master of Medicine (MMED) report is presented in an article format as approved by the Faculty of Health Sciences, University of the Witwatersrand.

This is a prospective descriptive cross-sectional evaluation of the knowledge, attitudes, and practice of basic life support among adult lay worshippers of a church in Johannesburg, South Africa.

The content of an article format of the Master of Medicine research report as required by the faculty of Health Sciences is as follows:

- The research protocol
- The research report in an article format

2. CHAPTER TWO: RESEARCH PROTOCOL

2.1. Title of protocol: Evaluation of knowledge, attitudes, and practice of basic life support among laypersons

2.2. Introduction

Basic life support (BLS) is an essential aspect of emergency medical care. It encompasses the simple life-saving first aid procedures that, when properly carried out early, have the potential to improve survival rates in most emergencies. BLS is a set of activities that includes 1) recognition of signs of sudden cardiac arrest, heart attack, stroke, and foreign body airway obstruction, and 2) subsequent activation of the emergency medical service (EMS), 3) performing cardiopulmonary resuscitation (CPR) if required, as well as 4) defibrillation with an automated external defibrillator (AED)¹. The main components of CPR include chest compressions and rescue breathing. The cornerstone of BLS in a cardiac arrest victim is early identification, activation of the emergency response system, and intervention by performing immediate CPR which helps to sustain perfusion to the heart and brain until a defibrillator and advanced medical care arrive ².

Life-threatening emergencies including cardiac arrest can occur anywhere, either in or out-of-hospital. Sudden unexpected cardiac arrest accounts for the majority of deaths globally with survival rates varying significantly from one region to another³. Out-of-hospital cardiac arrest (OHCA) is a major public health concern: over 356,000 out-of-hospital cardiac arrests occur in the United States(US) annually with a fatality rate of about 90 %, the majority of which occur at home, followed by in public places and then nursing homes⁴. In Europe, sudden OHCA accounts for 350,000 deaths annually. Studies among different segments of the South African population revealed a high prevalence of risk factors for cardiovascular diseases, which suggests the risk for sudden cardiac arrest⁵. According to a report by *Statistics South Africa*, sudden cardiac arrest ranked among the ten leading underlying causes of death in South Africa in 2016⁶.

The metaphorical 'chain of survival' links several actions that if rapidly performed following a cardiac arrest, have the greatest potential to reduce mortality. The first link involves early recognition of signs of cardiac arrest, activation of the emergency response system, and

immediate bystander CPR. In one instance there was a two-fold increase in survival following OHCA when bystander CPR was performed⁷. When bystander CPR is incorporated with other links in the chain of survival, a survival rate of 50% can be achieved⁸. A study conducted on a Danish rural Island demonstrated an increase in the rate of bystander CPR and an improvement in overall survival rate from 0% to 5.4% from witnessed OHCA following a community-wide CPR training program⁸. In another study, the survival to hospital discharge following OHCA was 9.5% and 28.4% when EMS and bystanders were the first responders' respectively⁹. The number of bystanders who witnessed cardiac arrests was shown to be triple that witnessed by EMS providers⁴. When immediate CPR is performed by bystanders the time window for successful defibrillation is prolonged. The earlier the defibrillation is performed, the better the chance of survival¹⁰. The survival of a patient with sudden cardiac arrest decreases by 7-10% for every minute delay without CPR¹. With CPR the decay in ventricular fibrillation is more gradual, with a 3-4% decrease in survival per minute. This emphasizes the importance of improving the lay public's knowledge and practice of CPR.

Despite this overwhelming evidence about the pivotal importance of bystander CPR, it has been shown by several studies conducted in both urban and suburban communities that the rate of bystander CPR following an OHCA varies between 30% and as low as less than 10%⁸. Several studies, mostly in developed countries, have been conducted to determine the level of public knowledge, attitude, and practice of BLS among different groups. A study in Slovenia showed that 70% of participants had received training in CPR more than ten years before the study but less than 50% of the entire cohort displayed adequate knowledge of CPR¹¹. In Belgium, the rate of knowledge and awareness of BLS among teachers was 78%. This was a reflection of the government's policy which made it mandatory for every teacher to know CPR¹². An interactive survey conducted in 2008 in the United States showed that 60% of the lay public was familiar with CPR, while 39.2% of participants in a non-medical population in Saudi Arabia had adequate knowledge of BLS^{9, 13}. There have been efforts in some countries to improve the knowledge of the public about BLS, since this knowledge may determine successful outcomes¹⁴. The prevalence of BLS training varies globally. Studies conducted in different countries revealed the following proportion of the population that have received BLS training: West Australia

64.1%(2002), Washington DC 78% (2011), Turkey 40.3% (2015), Poland 75% (2000), and Japan 58% (2008)¹².

The attitude and practice of BLS among the lay public have been explored by some investigators. A study conducted in Jordan showed that the majority of participants were willing to perform CPR on family members; however, their major concern was the fear of making mistakes⁹. Other factors that contributed to the unwillingness to perform CPR include: fear of causing harm to the victim, being apprehensive about mouth-to-mouth breathing as well as contracting contagious diseases. Fear of the victim's reaction after regaining consciousness following mouth-to-mouth breathing, inadequate knowledge or training, fear of litigation, lack of confidence, and lack of skill were also identified as limiting factors ^{8, 13}.

Different strategies including mass training, use of the mass media as well as video self-instruction have been adopted as educational tools to reach a large number of laypeople to improve their knowledge and psychomotor skills of BLS⁷. Television and movies were identified as the most common sources of information about BLS⁹.

Several factors have been shown to affect the level of knowledge, attitude, and practice of BLS among the lay public. A greater number of adults aged 40 years and above were identified to know hands-only CPR compared to the younger age group in a study conducted in an academic suburban emergency department in the US⁷. In contrast, another study conducted through telephone calls in Vienna, Austria in 2014 showed a decrease in the knowledge and willingness to perform BLS with increasing age¹⁵. In the same survey, there was a documented decrease in the willingness to perform BLS and to use an AED among the female participants compared to their male counterparts. However, it has also been shown elsewhere that factors such as age, sex, marital status, or level of education do not affect the level of knowledge of BLS¹³.

The variations in survival to hospital discharge from one location to another in the United States following an OHCA were identified to be due, at least in part, to the differences in the rate of layperson CPR among these regions⁴. To contribute significantly to the chain of survival following an OHCA, the lay public needs an adequate amount of knowledge and the right attitude towards basic life support. Evaluating the knowledge, attitude, and practice of BLS

among the lay public are thus important to identify areas that require intervention with the aim of improving the first link of the OHCA chain of survival and the overall outcome of OHCA. However, there is no published study on the level of knowledge, attitude, and practice of BLS among laypersons in South Africa despite the documented high prevalence of risk factors for cardiovascular diseases in the country. This study aims to evaluate the knowledge, attitude, and practice of BLS in a lay community in Johannesburg.

2.3. Study objectives

1. To describe the demographic characteristics of study participants.
2. To measure the level of knowledge, attitude, and practice of BLS among the study participants.
- 3 To compare the relationship between the demographic characteristics of participants and their level of knowledge, attitude, and practice of BLS.

2.4. Methods

2.4.1. Study design

This research will be a prospective descriptive cross-sectional study

2.4.2. Study population and sample

2.4.2.1. Study site The study will be conducted at the Holy Trinity Catholic Church, Braamfontein. The Church is situated on the western side of the City of Johannesburg in Braamfontein, and the South-Eastern corner of the campus of the University of the Witwatersrand.

2.4.2.2. Study population The present parish population is made up of approximately 600 families with a total population of over two thousand drawn from all over Johannesburg as well as the universities in Johannesburg. The study population will be adults who worship at the

Church. A convenience sampling method with a minimum sample size of 200 will be used. All eligible participants will be approached for the study during the study duration and only consenting participants will be provided the questionnaires.

2.4.2.3. Selection criteria:

Inclusion criteria

All subjects aged 18 years and above who attend the Holy Trinity Catholic Church in Braamfontein.

Only subjects who provide written informed consent to participate.

Exclusion criteria

Any subjects who are medical or paramedical personnel, or health sciences students

2.4.3. Materials and technique

The members of the church will be informed about the research by the Parish priest during the Mass. All participants who meet the inclusion criteria will be eligible for study recruitment. The potential participants will be approached at the Church premises after each Sunday Mass of the Holy Trinity Catholic Church, Braamfontein, which occurs at 7.30 am, 9.30 am, and 6.00 pm every Sunday over four weeks. A detailed individual explanation of the study will be provided through a written informed consent document before administering the questionnaire. Those who agree to participate will sign the informed consent form and be recruited into the study. A self-administered questionnaire will be used to obtain data to explore the objectives of the study. The questionnaire will be provided to all consenting participants by the researcher and two other research assistants who will be trained for the study by the researcher. The questionnaire will be collected from the participants immediately following completion.

The questionnaire will be divided into two parts. Part one will obtain data on the demographic characteristics of the participants; Part two will seek information on the level of knowledge, attitude, and practice of BLS. This part of the questionnaire consists of 30 questions; 9 questions (1-4, 20, 23, 28-30) were designed by the researcher, while 21 questions were

selected from three sources and modified to capture the objectives of the study and make it suitable for the targeted participants. Questions 13-15,19,24 and 27 were adapted from two validated questionnaires^{12, 16}, while questions 5-12,16-18,21,22,25-26 were incorporated from a questionnaire that was designed based on the latest American Heart Association (AHA) guidelines on BLS¹⁷.

2.5. Statistical analysis

Data from the questionnaire will be entered into Microsoft Excel and imported into Stata Version 15 (StataCorp Ltd, Texas, USA) for formal analysis. Descriptive analysis will be conducted reporting mean and standard deviation for continuous parametric variables and median with interquartile range (IQR) for non-parametric continuous variables. Proportions and percentages will be reported for categorical variables.

We will compare the relationship between demographic characteristics of participants and their level of knowledge, attitude, and practice of BLS using Student's t-test for continuous variables and Pearson's Chi-square test for categorical variables. A P-value of < 0.05 will be considered significant throughout. The analysis will be performed using Stata version 15.

2.6. Ethical consideration

Confidentiality of participants will be maintained during the study. The study will be completely anonymous, and no identifiers will be required. Data will be coded and entered into a password-protected computer, only accessible to the researcher. Informed consent would be formally obtained. This will be done after informing each participant about the objectives and anticipated benefits of the study. There will be no penalty for those who refuse to consent to the study. Ethical clearance from the Human Research Ethics Committee (HREC) of the University of the Witwatersrand and written permission from the Parish Priest of Holy Trinity Catholic Church, Braamfontein will be obtained before collecting data for this study.

2.7. Timing

The duration of this survey is expected to be six months. This will include the period for data collection, analysis, and write-up.

2.8. Funding

The estimated budget for this research is approximately three thousand rands (R 3,000) which includes the cost of transportation, stationery, photocopying, and binding. All funding will be provided by the researcher.

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3. CHAPTER THREE: RESEARCH REPORT

3.1. Title: Evaluation of knowledge, attitudes, and practice of basic life support among laypersons

3.2. Introduction

Out-of-hospital cardiac arrest (OHCA) constitutes a significant global public health challenge. An annual OHCA incidence of 110.8 per 100 000 population has been reported in Europe, and between 67 to 170 per 100 000 in the United States of America (USA)^{1, 2}. The survival rates of OHCA vary between regions but average at approximately 10%^{1, 3}. Although there are limited data on the epidemiology of OHCA in sub-Saharan Africa (SSA), Yuyun et al reported that cardiovascular diseases (CVDs) accounted for 37% of all non-communicable diseases (NCDs) and 13% of all deaths in SSA⁴. They also suggested that in a few decades, CVDs and other NCDs will overtake communicable diseases as the most frequent cause of death in SSA. An incidence rate of 24.2 per 100 000 population of sudden cardiac deaths with OHCA accounting for 58.6% of these cases was reported by a study conducted in Douala, Cameroun⁵. According to Statistics South Africa, risk factors for sudden cardiac arrest (SCA) such as diabetes, hypertensive diseases, ischaemic heart diseases, and other heart diseases were among the ten leading underlying natural causes of death in South Africa between 2015 and 2017⁶. Other studies have also demonstrated a high prevalence of CVD and SCA risk factors in South Africa^{7, 8}.

Bystanders play a significant role in improving survival and neurological outcome following OHCA. The metaphorical “chain of survival” links several basic life support (BLS) actions that if rapidly performed following a cardiac arrest (CA), have the greatest potential to reduce mortality. The first component of the chain of survival entails “prearrival care” defined here as a basic first responder, first aid interventions initiated by bystanders before trained emergency medical providers arrive on scene⁹. These actions include early recognition of signs of CA and activation of the emergency response system (ERS), immediate bystander CPR, and use of an automated external defibrillator (AED). When these actions are appropriately implemented by bystanders, this results in more than a two-fold increase in OHCA survival^{10, 11}. The additional use of an AED can further improve survival since, in shockable CA dysrhythmias, CPR without an AED shock is never successful¹². However, in most low-to-middle income countries, the AED

may not be available in most public places, therefore, early bystander CPR is essential in these locations, to buy some time to perfuse the myocardium. The survival of a patient with SCA from ventricular fibrillation (VF) decreases by 7-10% for every minute delay to shock when no CPR is provided¹³. When immediate CPR is performed, the time window for successful defibrillation is prolonged as compressions sustain the amplitude of the VF.

Despite overwhelming evidence reinforcing the pivotal importance of bystander CPR, the rate of its implementation remains low¹⁴. The global rate of bystander CPR varies greatly and is reported to be between 1-74%^{15, 16}. The differences in bystander CPR implementation might be *inter alia*, due to ignorance regarding its usefulness and unavailability of the AED. A study conducted in Cameroun reported that despite 86.2% of OHCA being witnessed by laypersons, only 7.4% received bystander CPR⁵. In South Africa, a retrospective review of OHCA cases seen by emergency medical service (EMS) personnel in the Johannesburg metropolitan area over 7 years showed that despite 68% of OHCA being witnessed, bystander CPR was only provided in 36% of cases¹⁷.

The proportion of laypersons who have undergone CPR training varies from country to country^{16, 18-22}. The training in communities has increased the awareness of its usefulness and implementation rate with subsequently improved survival from OHCA^{3, 9, 21, 23}. Since OHCA is largely witnessed by bystanders, there is a high potential for saving lives if a larger proportion of the population has good CPR knowledge, skills, and training. Several international studies have been conducted to ascertain the general level of knowledge and attitudes of laypersons with regards to BLS following CA^{9, 24-26}. Although data emanating from South Africa are limited, Ojifinni et al reported poor knowledge but a positive attitude (willingness to learn CPR) with regards to CPR among student-teachers in a South African University²². Several studies have explored the influence of age and sex on the knowledge, attitude, and practice of CPR and barriers mitigating the initiation of CPR^{20, 26-33}. However, to date, there are no studies on the knowledge, attitudes, and practice of bystander CPR among church worshippers in South Africa.

Given the high prevalence of risk factors for CVDs and SCA as well as a high rate of witnessed OHCA but low bystander CPR rate in South Africa, it is valuable to regularly assess the level of

knowledge and attitudes regarding BLS among laypersons. This could help to identify barriers preventing them from providing CPR and interventions to improve it. This study aimed to evaluate the knowledge, attitude, and practice of BLS among laypersons in a large church community in Johannesburg, South Africa.

3.3. Materials and Methods

This study was a prospective descriptive cross-sectional questionnaire-based study conducted between December 06, 2020, and March 28, 2021, using a convenience sample of 205 adults (aged 18 years and above) from a church in South Africa- the Holy Trinity Catholic Church, in Braamfontein situated on the western side of the city of Johannesburg, and the southeastern corner of the campus of the University of the Witwatersrand. The Church has a population of over two thousand, drawn from all over Johannesburg, many from Universities in the city. All those who met the inclusion criteria and gave written consent were recruited into the study.

The questionnaire comprised two parts. Part one was used to obtain data on the demographic characteristics of the participants while part two gleaned information on the level of knowledge, attitudes, and practice of BLS. Part two of the questionnaire had a total of 30 questions; nine questions (1-4, 20, 23, 28-30) were designed by the researcher. The remaining 21 questions were selected from three sources and modified to capture the objectives of the study and to suit the target population^{19, 34, 35}. The final questionnaire was modified after being pretested among 20 adult worshippers from another Catholic Church in Johannesburg. Questions 13-15, 19, 24, and 27^{34,35} were adapted from two validated questionnaires while questions 5-12, 16-18, 21-22, 25-26 were incorporated from a questionnaire based on the American Heart Association (AHA) guidelines on BLS¹⁹.

Ethics approval was granted by the Human Research Ethics Committee (HREC) of the University of the Witwatersrand (certificate clearance no. M200538). Permission to conduct the study was also granted by the parish priest of Holy Trinity Catholic Church, Braamfontein, Johannesburg, South Africa.

3.4. Data analysis

Data were entered into an electronic data spreadsheet (Microsoft^(R) Excel^(R)), and Stata version 16 (StataCorp Ltd, College Station, TX) was used for analysis. Description of the socio-demographic characteristics was performed reporting mean $\pm$ standard deviation (SD) for the continuous variables and percentages for categorical variables. Pie charts and bar graphs were constructed to describe categorical variables. Participants were described and compared based on the identification of cardiac arrest, knowledge of practical skills of CPR, and their skills on BLS stratified by previous CPR training, age group, and sex using Pearson's chi-squared and Fisher's exact tests where appropriate. A two-sided p -value of <0.05 was considered statistically significant.

3.5. Results

Out of 220 questionnaires administered, 205 (93.2%) were fit for analysis. Fifteen (6.8%) of the questionnaires were excluded: six due to incomplete data and nine did not meet inclusion criteria. The mean $\pm$ SD age of the participants was 36.6 ± 12.6 , with the majority of 128 (62.4%) below 40 years. The cohort was split evenly between sexes: 104 (50.7%) of the participants were females. One hundred and one (49.3%) participants were single and most of the participants received schooling beyond primary school (181, 88.3%) (Table 3.1).

Table 3.1: Demographic characteristics of the participants

Characteristics	N=205
Age in years, mean $\pm$ SD ^a	36.6 $\pm$ 12.6
Age group in years, n (%)	
< 40	128 (62.4)
$\geq$ 40	77 (37.6)
Sex, n (%)	
Female	104 (50.7)
Male	101 (49.3)
Marital status, n (%)	
Single	101 (49.3)
Married	78 (38.1)
Divorced	21 (10.2)

Widowed	5 (2.4)
Educational level, n (%)	
Primary school	24 (11.7)
Secondary school	65 (31.7)
Diploma	43 (21.0)
University	40 (19.5)
Postgraduate	33 (16.1)
Occupation, n (%)	
Government sector	18 (8.8)
Private sector	52 (25.4)
Self-employed	59 (28.8)
Student	36 (17.6)
Unemployed	31 (15.0)
Retired	9 (4.4)

^aSD (Standard deviation)

CPR training

Figure 3.1 shows the proportion of participants who had undertaken CPR training. About 30 (14.6%) of the participants had previous CPR training. Of those that were trained, most of them received the training in the last 1-2 years (n = 12 (41.4%)) (Figure 3.2).

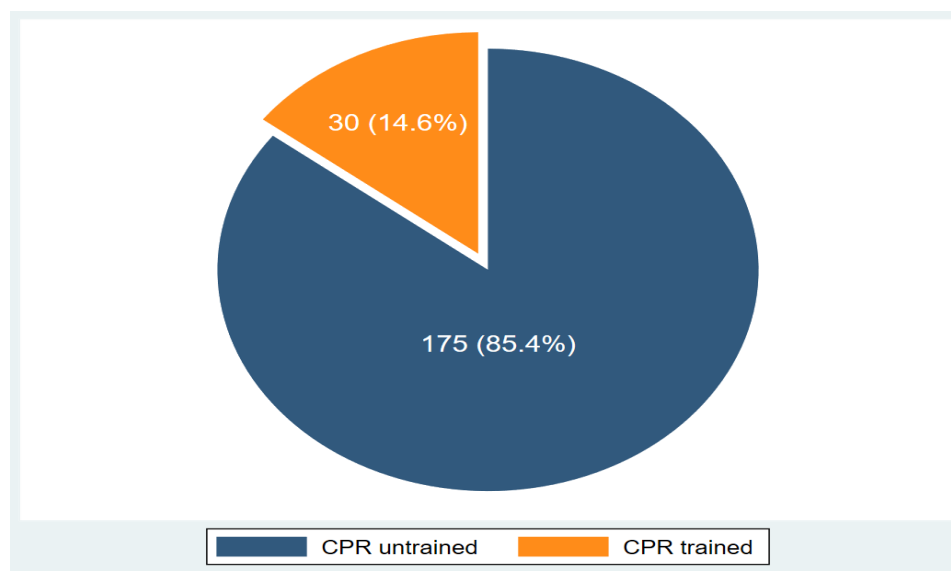


Figure 3.1: Pie chart showing the proportion of participants regarding cardiopulmonary resuscitation training.

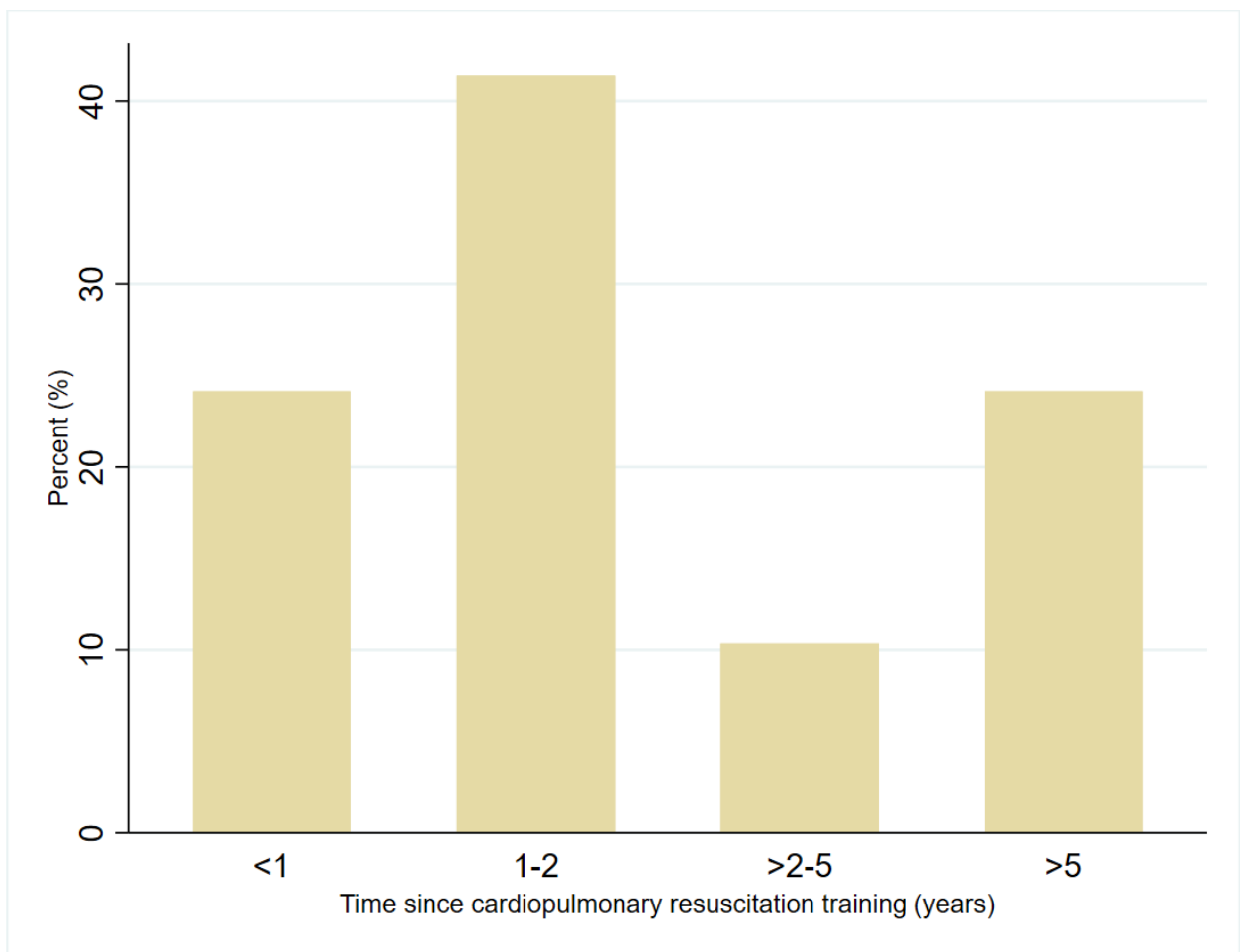


Figure 3.2: Percent of study participants according to the duration of last cardiopulmonary resuscitation training

Recognition of cardiac arrest

Table 3.2 below compares the response of the participants regarding the recognition of cardiac arrest signs, how to evaluate the loss of consciousness, and absence of respiration based on CPR training, age, and sex. Only 24 (11.7%) participants were aware of all the signs to identify CA, however, a large proportion of participants knew at least one sign (77.6%), while more than half (56.1%) could identify up to two signs of CA. Loss of consciousness as the single most essential sign of CA was stated by 61.5% of the participants. Regarding evaluation for unconsciousness and absent respiratory effort, 24.9% and 55.6% of participants respectively were able to identify all the correct options. A large proportion of participants were able to identify at least one action used to check for signs of unconsciousness (82.4%) and absence of respiration (83.9%). More CPR-trained participants listed at least two CA signs (73.3% vs 53.1%, $p=0.040$). Those with previous CPR training were significantly more likely to identify ‘no pulse’ (76.7% vs 42.9%, $p<0.001$) as a sign of CA. There was no significant knowledge difference in the age of the participants in identifying signs of CA, and how to assess for absent respiration and loss of consciousness. Although females were more knowledgeable in identifying all the signs of CA ($p=0.036$), however, when asked how to check for these signs, no statistically significant sex difference was found.

Table 3.2: Identification of Cardiac arrest among participants stratified by previous cardiopulmonary resuscitation training, age, and sex

Findings	Total	CPR training			Age group			Sex		
		CPR trained	CPR untrained	P-value	<40 years	≥ 40 years	P-value	Female	Male	P-value
	N=205 (%)	N=30 (%)	N=175 (%)		N=128 (%)	N=77 (%)		N=104 (%)	N=101 (%)	
Loss of consciousness				0.820			0.842			
No	79 (38.5)	11 (36.7)	68 (38.9)		50 (39.1)	29 (37.7)		38 (36.5)	41 (40.6)	0.551
Yes	126 (61.5)	19 (63.3)	107 (61.1)		78 (60.9)	48 (62.3)		66 (63.5)	60 (59.4)	
Gasp/ not breathing				0.328			0.186			
No	92 (44.9)	11 (36.7)	81 (46.3)		62 (48.4)	30 (39)		49 (47.1)	43 (42.6)	0.513
Yes	113 (55.1)	19 (63.3)	94 (53.7)		66 (51.6)	47 (61)		55 (52.9)	58 (57.4)	
No pulse				0.001			0.731			
No	107 (52.2)	7 (23.3)	100 (57.1)		68 (53.1)	39 (50.6)		53 (51)	54 (53.5)	0.720
Yes	98 (47.8)	23 (76.7)	75 (42.9)		60 (46.9)	38 (49.4)		51 (49)	47 (46.5)	
Not moving				0.014			0.843			
No	169 (82.4)	20 (66.7)	149 (85.1)		105 (82)	64 (83.1)		81 (77.9)	88 (87.1)	0.082
Yes	36 (17.6)	10 (33.3)	26 (14.9)		23 (18)	13 (16.9)		23 (22.1)	13 (12.9)	
Those who				0.001*			0.347			

knew 1 of the indications correctly										
No	46 (22.4)	0 (0)	46 (26.3)		26 (20.3)	20 (26)		23 (22.1)	23 (22.8)	0.910
Yes	159 (77.6)	30 (100)	129 (73.7)		102 (79.7)	57 (74)		81 (77.9)	78 (77.2)	
Those who knew 2 of the indications correctly				0.040			0.163			
No	90 (43.9)	8 (26.7)	82 (46.9)		61 (47.7)	29 (37.7)		48 (46.2)	42 (41.6)	0.510
Yes	115 (56.1)	22 (73.3)	93 (53.1)		67 (52.3)	48 (62.3)		56 (53.8)	59 (58.4)	
Those who knew 3 of the indications correctly				0.215			0.148			
No	130 (63.4)	16 (53.3)	114 (65.1)		86 (67.2)	44 (57.1)		63 (60.6)	67 (66.3)	0.392
Yes	75 (36.6)	14 (46.7)	61 (34.9)		42 (32.8)	33 (42.9)		41 (39.4)	34 (33.7)	
Those who knew all the 4 indications correctly				0.360			0.649			
No	181 (88.3)	25 (83.3)	156 (89.1)		112 (87.5)	69 (89.6)		87 (83.7)	94 (93.1)	0.036
Yes	24 (11.7)	5 (16.7)	19 (10.9)		16 (12.5)	8 (10.4)		17 (16.3)	7 (6.9)	
Loss of consciousness evaluation										
No response to call				0.004*			0.336			
No	74 (36.1)	4 (13.3)	70 (40)		43 (33.6)	31 (40.3)		39 (37.5)	35 (34.7)	0.671
Yes	131 (63.9)	26 (86.7)	105 (60)		85 (66.4)	46 (59.7)		65 (62.5)	66 (65.3)	
No response to touch				0.087			0.741			
No	69 (33.7)	6 (20)	63 (36)		42 (32.8)	27 (35.1)		38 (36.5)	31 (30.7)	0.376
Yes	136 (66.3)	24 (80)	112 (64)		86 (67.2)	50 (64.9)		66 (63.5)	70 (69.3)	
No movement				0.304			0.573			
No	120 (58.5)	15 (50)	105 (60)		73 (57)	47 (61)		56 (53.8)	64 (63.4)	0.167
Yes	85 (41.5)	15 (50)	70 (40)		55 (43)	30 (39)		48 (46.2)	37 (36.6)	
Those who knew 1 of the assessment correctly				0.034*			0.09			
No	36 (17.6)	1 (3.3)	35 (20)		18 (14.1)	18 (23.4)		17 (16.3)	19 (18.8)	0.643
Yes	169 (82.4)	29 (96.7)	140 (80)		110 (85.9)	59 (76.6)		87 (83.7)	82 (81.2)	
Those who knew 2 of the assessment correctly				0.129			0.634			
No	73 (35.6)	7 (23.3)	66 (37.7)		44 (34.4)	29 (37.7)		37 (35.6)	36 (35.6)	0.992
Yes	132 (64.4)	23 (76.7)	109 (62.3)		84 (65.6)	48 (62.3)		67 (64.4)	65 (64.4)	
Those who knew the 3 assessments correctly				0.011			0.958			
No	154 (75.1)	17 (56.7)	137 (78.3)		96 (75)	58 (75.3)		79 (76)	75 (74.3)	0.779
Yes	51 (24.9)	13 (43.3)	38 (21.7)		32 (25)	19 (24.7)		25 (24)	26 (25.7)	
Respiratory Evaluation										
No chest or belly movement				0.735			0.272			
No	60 (29.3)	8 (26.7)	52 (29.7)		34 (26.6)	26 (33.8)		31 (29.8)	29 (28.7)	0.863
Yes	145 (70.7)	22 (73.3)	123 (70.3)		94 (73.4)	51 (66.2)		73 (70.2)	72 (71.3)	
No air coming from the nose/mouth				0.005*			0.99			

No	64 (31.2)	3 (10)	61 (34.9)		40 (31.3)	24 (31.2)		36 (34.6)	28 (27.7)	0.287
Yes	141 (68.8)	27 (90)	114 (65.1)		88 (68.8)	53 (68.8)		68 (65.4)	73 (72.3)	
^b No steam coming up in front of the mouth of the victim				0.565			0.613			
No	127 (62)	20 (66.7)	107 (61.1)		81 (63.3)	46 (59.7)		66 (63.5)	61 (60.4)	0.651
Yes	78 (38)	10 (33.3)	68 (38.9)		47 (36.7)	31 (40.3)		38 (36.5)	40 (39.6)	
Those who knew 1 of the assessment correctly				0.056*			0.071			
No	33 (16.1)	1 (3.3)	32 (18.3)		16 (12.5)	17 (22.1)		20 (19.2)	13 (12.9)	0.215
Yes	172 (83.9)	29 (96.7)	143 (81.7)		112 (87.5)	60 (77.9)		84 (80.8)	88 (87.1)	
Those who knew the 2 assessments correctly				0.187			0.732			
No	91 (44.4)	10 (33.3)	81 (46.3)		58 (45.3)	33 (42.9)		47 (45.2)	44 (43.6)	0.815
Yes	114 (55.6)	20 (66.7)	94 (53.7)		70 (54.7)	44 (57.1)		57 (54.8)	57 (56.4)	

CPR (Cardiopulmonary resuscitation), *P value (Fisher's exact test), OR (odds ratio), CI (confidence interval), ^b(wrong answer)

Knowledge of practical CPR application

The responses of participants concerning their knowledge of practical CPR applications as stratified by previous CPR training, age, and sex is highlighted in Table 3.3 below. Overall, the number of participants who knew the meaning of CPR (19.1%), compression to ventilation ratio (15.6%), compression site (11.7%), compression rate (20%) and depth (22.9%), and the function of the AED (11.2%) were remarkably low. Few participants knew the meaning of chest compression, how to determine when mouth-to-mouth breathing is adequate and what to do when in doubt whether a person is in cardiac arrest. Interestingly, more than half (53.2%) of the participants knew at least one correct EMS telephone number in case of an OHCA and 74.1% of them knew the correct position to place a victim when performing chest compression. The results also indicated that participants with previous CPR training were significantly more knowledgeable in almost all the areas of practical CPR application knowledge. Age and sex had no significant impact on CPR application knowledge.

Table 3.3: Knowledge of practical skills of cardiopulmonary resuscitation stratified by CPR training, age, and sex

Items	Total	CPR training			Age group			Sex		
		CPR trained	CPR untrained	P-value	<40 years	≥ 40 years	P-value	Female	Male	P-value
	N=205 (%)	N=30 (%)	N=175 (%)		N=128 (%)	N=77 (%)		N=104 (%)	N=101 (%)	
Meaning of CPR				<0.001			0.638			0.641
Correct	39 (19.1)	18 (60.0)	21 (12.1)		23 (18.1)	16 (20.8)		21 (20.4)	18 (17.8)	
Incorrect	165 (80.9)	12 (40.0)	153 (87.9)		104 (81.9)	61 (79.2)		82 (79.6)	83 (82.2)	
What to do first if you witness someone who suddenly collapses				0.601			0.383			0.328
Correct	80 (39)	13 (43.3)	67 (38.3)		47 (36.7)	33 (42.9)		44 (42.3)	36 (35.6)	
Incorrect	125 (61)	17 (56.7)	108 (61.7)		81 (63.3)	44 (57.1)		60 (57.7)	65 (64.4)	
What to do if you are in doubt about whether the person is not awake and not breathing?				0.046			0.664			0.872
Correct	76 (37.1)	16 (53.3)	60 (34.3)		46 (35.9)	30 (39)		38 (36.5)	38 (37.6)	
Incorrect	129 (62.9)	14 (46.7)	115 (65.7)		82 (64.1)	47 (61)		66 (63.5)	63 (62.4)	
Emergency telephone number				0.017			0.575			0.449
Correct	109 (53.2)	22 (73.3)	87 (49.7)		70 (54.7)	39 (50.6)		58 (55.8)	51 (50.5)	
Incorrect	96 (46.8)	8 (26.7)	88 (50.3)		58 (45.3)	38 (49.4)		46 (44.2)	50 (49.5)	
Meaning of chest compression				<0.001			0.105			0.544
Correct	89 (43.4)	23 (76.7)	66 (37.7)		50 (39.1)	39 (50.6)		43 (41.3)	46 (45.5)	
Incorrect	116 (56.6)	7 (23.3)	109 (62.3)		78 (60.9)	38 (49.4)		61 (58.7)	55 (54.5)	
Compression/v entilation ratio				<0.001			0.685			0.497
Correct	32 (15.6)	15 (50)	17 (9.7)		21 (16.4)	11 (14.3)		18 (17.3)	14 (13.9)	
Incorrect	173 (84.4)	15 (50)	158 (90.3)		107 (83.6)	66 (85.7)		86 (82.7)	87 (86.1)	
Compression site				0.760*			0.181			0.609
Correct	24 (11.7)	4 (13.3)	20 (11.4)		12 (9.4)	12 (15.6)		11 (10.6)	13 (12.9)	
Incorrect	181 (88.3)	26 (86.7)	155 (88.6)		116 (90.6)	65 (84.4)		93 (89.4)	88 (87.1)	
Compression rate				<0.001			0.614			0.78
Correct	41 (20)	15 (50)	26 (14.9)		27 (21.1)	14 (18.2)		20 (19.2)	21 (20.8)	
Incorrect	164 (80)	15 (50)	149 (85.1)		101 (78.9)	63 (81.8)		84 (80.8)	80 (79.2)	

Compression depth				<0.001			0.905			0.167
Correct	47 (22.9)	15 (50)	32 (18.3)		29 (22.7)	18 (23.4)		28 (26.9)	19 (18.8)	
Incorrect	158 (77.1)	15 (50)	143 (81.7)		99 (77.3)	59 (76.6)		76 (73.1)	82 (81.2)	
Victim's position during compression				0.007*			0.093			0.723
Correct	152 (74.1)	28 (93.3)	124 (70.9)		100 (78.1)	52 (67.5)		76 (73.1)	76 (75.2)	
Incorrect	53 (25.9)	2 (6.7)	51 (29.1)		28 (21.9)	25 (32.5)		28 (26.9)	25 (24.8)	
Adequacy of artificial breaths				<0.001			0.171			0.785
Correct	65 (31.7)	18 (60)	47 (26.9)		45 (35.2)	20 (26)		34 (32.7)	31 (30.7)	
Incorrect	140 (68.3)	12 (40)	128 (73.1)		83 (64.8)	57 (74)		70 (67.3)	70 (69.3)	
Function of AED				<0.001			0.125			0.140
Correct	23 (11.2)	13 (43.3)	10 (5.7)		11 (8.6)	12 (15.6)		15 (14.4)	8 (7.9)	
Incorrect	182 (88.8)	17 (56.7)	165 (94.3)		117 (91.4)	65 (84.4)		89 (85.6)	93 (92.1)	

CPR (Cardiopulmonary resuscitation), AED (Automated external defibrillator), ^a missing (n=1), *Fisher's Exact test

Ability to perform CPR skills

The response of participants regarding their ability to perform CPR is shown in table 3.4. The majority of participants stated that they can conduct chest compression (n=122, 59.5%), however, fewer participants can effectively open the airway (n=36, 17.6%), perform mouth-to-mouth ventilation (n=67, 32.7%), both mouth-to-mouth ventilation and chest compression (n=70, 34.1%) and are confident to perform CPR effectively (n=56, 27.3%). There was no significant age or sex difference in the responses, however, CPR trained participants had significantly higher positive responses concerning their ability to perform CPR.

Table 3.4: Classification of participants on their skills in Basic life support stratified by CPR training, age, and sex

Actions	Total	CPR training			Age group			Sex		
		CPR trained	CPR untrained	P-value	<40 years	≥ 40 years	P-value	Female	Male	P-value
	N=205 (%)	N=30 (%)	N=175 (%)		N=128 (%)	N=77 (%)		N=104 (%)	N=101 (%)	
Effectively open the airway				<0.001			0.575			0.17
No	169 (82.4)	13 (43.3)	156 (89.1)		107 (83.6)	62 (80.5)		82 (78.8)	87 (86.1)	
Yes	36 (17.6)	17 (56.7)	19 (10.9)		21 (16.4)	15 (19.5)		22 (21.2)	14 (13.9)	
Perform				<0.001			0.238			0.373

mouth-to-mouth-ventilation										
No	138 (67.3)	7 (23.3)	131 (74.9)		90 (70.3)	48 (62.3)		73 (70.2)	65 (64.4)	
Yes	67 (32.7)	23 (76.7)	44 (25.1)		38 (29.7)	29 (37.7)		31 (29.8)	36 (35.6)	
Perform chest compression				0.013			0.156			0.05
No	83 (40.5)	6 (20)	77 (44)		47 (36.7)	36 (46.8)		49 (47.1)	34 (33.7)	
Yes	122 (59.5)	24 (80)	98 (56)		81 (63.3)	41 (53.2)		55 (52.9)	67 (66.3)	
Perform both mouth-to-mouth ventilation and chest compression				<0.001			0.694			0.459
No	135 (65.9)	6 (20)	129 (73.7)		83 (64.8)	52 (67.5)		71 (68.3)	64 (63.4)	
Yes	70 (34.1)	24 (80)	46 (26.3)		45 (35.2)	25 (32.5)		33 (31.7)	37 (36.6)	
Able to perform CPR effectively				0.003			0.108			0.167
No	149 (72.7)	15 (50)	134 (76.6)		98 (76.6)	51 (66.2)		80 (76.9)	69 (68.3)	
Yes	56 (27.3)	15 (50)	41 (23.4)		30 (23.4)	26 (33.8)		24 (23.1)	32 (31.7)	
Willingness to learn CPR				0.029*			0.391			0.809
No	21 (10.2)	7 (23.3)	14 (8.0)		14 (10.9)	7 (9.1)		12 (11.5)	9 (8.9)	
Not sure	31 (15.1)	2 (6.7)	29 (16.6)		16 (12.5)	15 (19.5)		15 (14.4)	16 (15.8)	
Yes	153 (74.7)	21 (70.0)	132 (75.4)		98 (76.6)	55 (71.4)		77 (74)	76 (75.2)	

*CPR (Cardiopulmonary resuscitation), *Fisher's Exact test

Attitudes towards CPR

Figure 3.3 shows the number of participants who had witnessed CA. More than one-third (45.3%) of the participants reported that they had witnessed CA. More participants were willing to perform CPR on a family member (96.6%) or friend (79%) than on strangers (44.4%) (Figure 4). A high proportion of the participants (74.7%) indicated a willingness to learn CPR. Age ($p=0.391$) and sex ($p=0.809$) had no significant impact on the willingness of participants to learn CPR (Table 3.4).

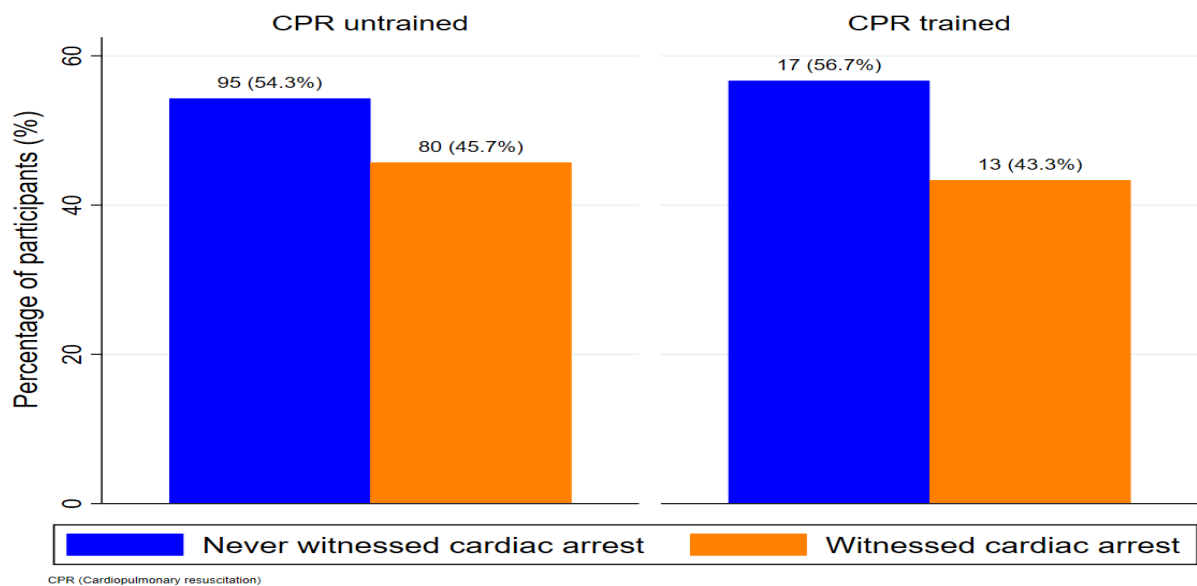


Figure 3.3: Those who witnessed cardiac arrest by CPR training

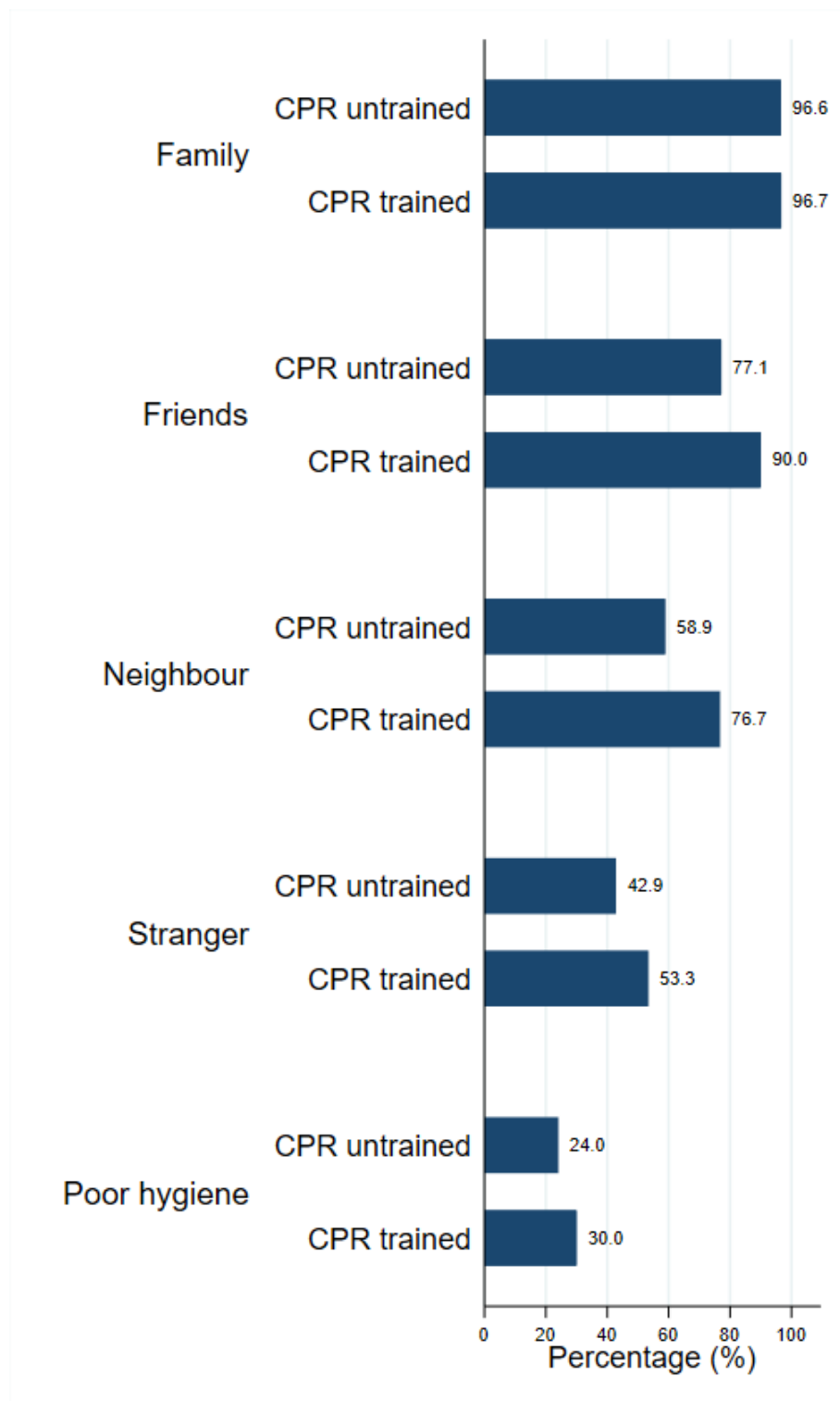


Figure 3.4: Willingness to perform CPR for certain categories of people stratified by CPR training

Concerns regarding CPR

The most important concerns for performing CPR on family members/relatives and strangers in order of priority were 1) fear of making a mistake, 2) contracting a contagious disease, and 3) causing harm to organs.

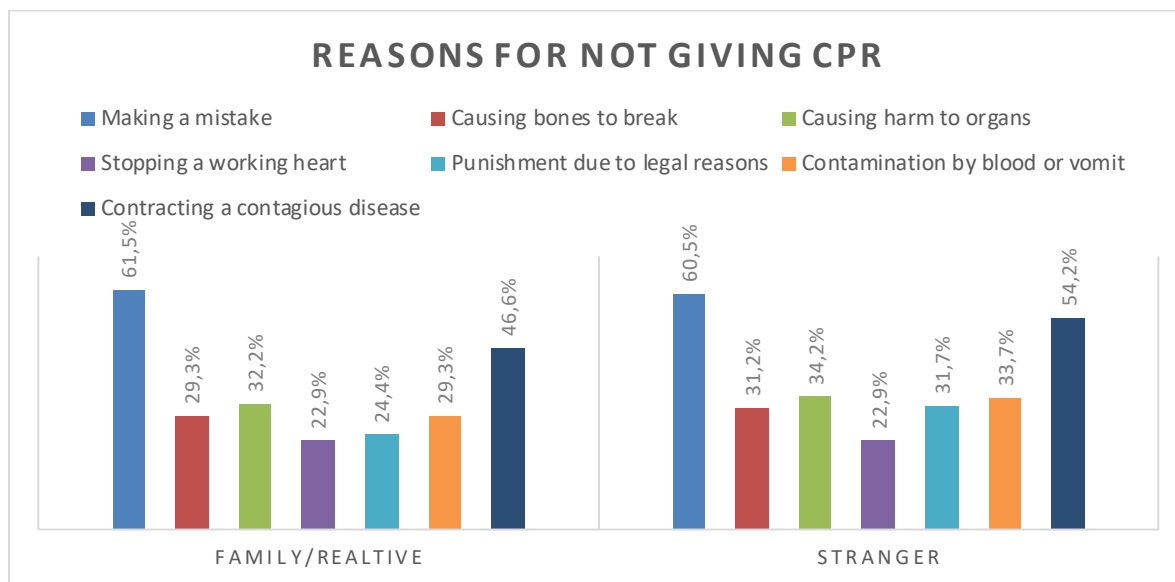


Figure 3.5: Reasons why participants will not be willing to give CPR

3.6. Discussion

The early components of the OHCA chain of survival for laypersons include (1) early identification of signs of CA and activation of the ERS, (2) immediate bystander CPR, and (3) early use of an AED. These have been shown to improve survival from OHCA when effectively carried out^{10, 11}. In this study, the knowledge of the participants was evaluated on each of these components; attitudes and barriers towards BLS in the event of a witnessed CA were also investigated, as were the effects of CPR training and demographic characteristics such as age and sex on this knowledge.

Regarding CPR training, the current study showed that less than a quarter (14.6%) of participants had previous CPR training. A lower rate (8.9%) was reported by Ojifinni et al in a study conducted among student-teachers in a tertiary institution in South Africa²². However, higher rates have been reported in some international studies: China 34.8%¹⁶, Slovenia 69.4%²⁵, New Zealand 74%²⁰, Ukraine 53%¹⁸, and Jordan 29%¹⁹. There appears to be a need to increase public CPR training in South Africa to meet international norms and standards.

Failure to identify a person in CA contributes to low rates of bystander CPR. This study showed that only 24 (11.7%) participants could identify all the signs of CA. Notably, more than three-quarters of participants (77.6%) knew at least one sign, while more than half (56.1%) were able to identify up to two signs of CA. This was higher than a similar study in Slovenia where only 1.2% and 29.8% of subjects could list all the signs of CA and knew at least one sign of CA respectively²⁵. The ostensibly better performance in this study may be because the questionnaire contained multiple-choice questions and participants could correctly have guessed some answers, unlike the Slovenian study where participants were asked to list the answers without being presented with options. The present Johannesburg study revealed that loss of consciousness accounted for the highest response rate as a sign of CA (61.5%), followed by gasping/absent breathing(55.1%), and then absent pulse (47.8%). In contrast, two previous studies reported that absent breathing was more frequently identified than the loss of consciousness and absent pulse^{19, 25}. In addition, it was observed that absent pulse accounted for the highest response rate (76.7%) for signs of CA by those with previous CPR training. This is incongruent with current ILCOR, AHA, and ERC guidelines for lay rescuer CPR where pulse checks have not been recommended for many years, due to the likely risk of error, and may cause delays with the initiation of compressions³⁶. Despite CPR-trained participants identifying more CA signs when compared to those without CPR training, the findings suggest that both the quality and currency of CPR training play a vital role in the recognition of patients with CA.

The high proportion of the participants that could identify one method to use in evaluating the individual signs of CA was similar to previous studies^{19, 25}. This result indicates that there is some general, passive incidental knowledge about signs of CA among the study population, thus laypersons may be able to correctly recognize CA if they know which signs to look for.

After successfully identifying a person in CA, laypersons must then be able to follow this up by providing effective CPR given its importance in OHCA. In this study, knowledge about practical CPR skills was very poor. However, CPR-trained participants were significantly more knowledgeable than those without CPR training, which is comparable to other studies^{19, 25}.

Although more than half of the participants knew an appropriate EMS number to call in case of a CA, only 39% would appropriately call the EMS. This was lower compared to what was reported in another study where 53% of the respondents would activate the EMS at the appropriate time²⁵. A mean response time of nine minutes for both public and private EMS was reported by a 2009 study in South Africa, thus, emphasizing the importance of early activation of EMS¹⁷. This result reinforces that strong emphasis is placed on the significance of early activation of EMS following OHCA and should be included as an important component of public education. This is especially important due to the paucity of public access AEDs available in South African communities.

Although more than half (59.5%) of the participants stated that they can correctly perform chest compressions, their knowledge of the practical application of chest compression was very poor. Less than one-third of the participants stated that they can confidently provide CPR. Participants with previous CPR training reported greater ability to execute various CPR skills when compared to those without, further highlighting the importance of current, high-quality CPR training.

Several studies have investigated the impact of age and sex on laypersons' CPR knowledge. While Urban et al noted in their study that participants aged 40 years and above had better knowledge of hands-only CPR³², several studies have also shown that younger participants exhibited better knowledge of CPR^{29, 33}. However, similar to the current study, some studies found no relationship between age and knowledge of CPR^{26, 27, 30}. This research showed that female participants identified more signs of CA than males. However, there was no significant difference among the sexes when practically checking for the signs of CA ($p=0.779$ and $p=0.815$ for those who knew all the correct options on how to evaluate for loss of consciousness and absent respiration respectively). This finding was supported by other studies where sex had no significant impact on knowledge of CPR^{26, 27, 30}.

Given the critical role of bystander CPR in OHCA survival, understanding the attitudes and barriers to initiating immediate CPR is essential to developing a system of care that has the potential to reduce mortality and improve outcomes in OHCA. A high proportion of participants (45.3%) had witnessed sudden CA when compared to another study¹⁹. Given this finding and another Johannesburg study that similarly revealed a high prevalence of witnessed OHCA, there is a compelling need to improve the CPR knowledge and skills of laypersons through quality training so that they can effectively respond to OHCA¹⁷. Similar to previous studies, the majority of the participants would rather provide CPR to family members and friends than to strangers^{18, 19, 22, 37}. Some identified reasons why bystanders may be reluctant to provide CPR have been explored. Some studies identified inadequate knowledge and skills, and fear of making mistakes, as the most important concerns regarding the initiation of bystander CPR^{18, 19, 29, 38}. These results correlate with the findings of this study. On the other hand, fear of legal liability was reported as the most significant barrier in another study that was conducted among student-teachers in South Africa²². CPR training has been shown to improve the knowledge and confidence of laypersons in providing CPR, thus, reducing the fear of making a mistake^{12, 16}. Interestingly, a significant proportion of the participants (74.7%) are willing to learn CPR. This correlates with the findings of another study conducted in South Africa²². This can provide a good foundation for initiating programs aimed at improving the knowledge and skills of CPR among laypersons within the South African population.

A limitation of this study is that it was conducted at a single site and so generalization of the findings should be applied with caution. However, the fact that the population is comprised of diverse people, from different locations in Johannesburg, and different backgrounds, suggests that the findings from this cohort may reflect the status quo in the larger South African urban community.

3.7. Conclusions

Inadequate knowledge and skill are associated with low rates of bystander-initiated CPR. While this study showed insufficient knowledge about CPR, there was a positive attitude towards CPR among the participants. Knowledge is significantly better in subjects with prior CPR training, implying that with instruction on CPR, the current knowledge may significantly improve, which may translate into more bystander-initiated CPR. Given the willingness of participants to be trained, different modes of training for layperson CPR should be proactively explored and implemented.

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APPENDIX ONE: DATA COLLECTION TOOL (QUESTIONNAIRE)

PART 1. Demographic information:

1.01 Please state your age:

1.02 Please select your sex: Male () Female ()

1.03 Please select your marital status: Married () Single () Divorced () widow/widower ()

1.04 Please select your highest educational qualification completed: Primary school ()
Matriculation () Diploma () University () Post graduate () other please specify.....

1.05 Please select your occupation: Governmental sector () Private sector ()

Self-employed () Retired () Student () Unemployed ()

Other please specify.....

PART 2. KNOWLEDGE, ATTITUDE, AND PRACTICE OF BASIC LIFE SUPPORT

2.01 What does CPR stand for? [Please don't Google!].....

2.02 Do you know how to provide CPR? Yes () No ()

2.03 Have you ever seen CPR being done? Yes () No ()

If yes, where? In real life () On TV () other please specify.....

2.04 Have you received any training in CPR? Yes () No ()

If yes,

i) How long ago?.....

ii) where did you receive the training?.....

iii) Was it a formally certified course?.....

iv) How long was the course?.....

v) Did you practice on a CPR manikin?.....

2.05 How would you know when to give someone CPR? (You can choose more than one option). Please circle the arrow/s of the options you choose.

- Loss of consciousness (sudden collapse and cannot be wakened)
- Not breathing or making only gasping sounds
- Cannot feel a pulse
- The individual is not moving
- I do not know

- Other please list.....

2.06 How can loss of consciousness be determined? (You can choose more than one option)

- No response when called
- No response when touched
- Not moving at all
- I don't know
- Other please list.....

2.07 How can the absence of breathing be determined? (You can choose more than one option)

- No chest or belly movement
- No airflow is felt when the hand or face is placed close to the mouth/nose of the victim
- Not steaming up a mirror placed in front of the mouth of a victim
- I don't know
- Other please list.....

2.08 What do you think “chest compression” means?

- To apply continuous steady pressure on the chest
- To push hard and fast on the chest at certain intervals with the heels of the hands
- To cut open the chest wall and directly squeeze the heart at certain intervals with the hands

- I have no idea

2.09 What is the recommended ratio of chest compressions and breaths during CPR?

- 5 compressions to 1 breath
- 15 compressions to 2 breaths
- 30 compressions to 2 breaths
- Other please specify

2.10 Where would you place your hands to do chest compressions?

- Upper part of the breastbone
- Middle of the breastbone
- Lower part of the breastbone
- Other please specify.....

2.11 What is the correct chest compression rate? Choose the best answer

- 130-150 times per minute
- 100-120times per minute
- 50-70 times per minute
- I do not know
- Other please specify.....

2.12 How much force must be applied during chest compression?

- Enough that the rib cage moves down 1 to 2 cm
- Moderate force, such that the rib cage moves down 5 to 6 cm
- High force, such that the rib cage moves down 6 to 10 cm
- As much force as possible
- To break ribs
- Other please specify.....

2.13 In what position must the victim be so that chest compression is performed?

- Laid on his/ her back, on a flat, rigid surface, with his/her head slightly inclined backward
- In any position
- The same position in which he/ she is found
- I don't know
- Other please state.....

2.14 How would you make sure you provide adequate artificial breaths to an unconscious person?

- As it is not included in CPR, I will not do it
- By blowing as much as I can into the mouth or nose, a bit like blowing up a balloon
- Two breaths into the mouth until the chest rises
- By blowing rapidly into the person's mouth or nose until I can no longer breathe myself

2.15 Would you ever perform chest compressions, without mouth-to-mouth breathing?

Yes () No () Why.....

2.16 Have you ever been present when someone has collapsed and stopped breathing? Yes () No ()

If yes, what was their relationship with you? (You can choose more than one option)

- A family member
- A friend or acquaintance
- A stranger

2.17 If any of the following people suddenly collapsed and stopped breathing, for whom would you give breaths and chest compressions?

You can choose more than one option

- Someone from the family
- Your friend

- Your neighbour
- A stranger
- A person who has poor personal hygiene
- Other please specify.....

2.18 What would you do first if you witness someone who suddenly collapses and stops breathing? Choose one option

- I would check their pulse and then begin to give chest compression only
- I would check their pulse and then give both chest compression and mouth to mouth breaths
- I would call an ambulance
- I would call somebody or call for help
- I would just watch and leave
- Other please specify

2.19 What would you do if you are in doubt about whether the person is not awake and not breathing?

- Wait for an ambulance to arrive, and then let the personnel make the decision
- Position the person to lie on his/her left side and wait for assistance to arrive
- Wait for five minutes and then try shaking the person again
- If in doubt, I would begin CPR
- Other please specify.....

2.20 What telephone number would you call right now, if someone was to collapse, and was not responsive and not breathing? (Please don't Google).....

2.21 What concerns may prevent you from giving chest compressions to your friends or relatives?

- Making a mistake
- Causing bones to break
- Causing harm to organs
- Stopping a working heart
- Punishment due to legal reasons
- Contamination by blood or vomit
- Contracting a contagious disease
- Other please specify.....

2.22 What concerns may prevent you from giving chest compressions to a stranger? You can choose more than one option.

- Making a mistake
- Causing bones to break
- Causing harm to organs
- Stopping a working heart
- Punishment due to legal reasons
- Contamination by blood or vomit
- Contracting a contagious disease
- Other please specify.....

2.23 Would you perform mouth-to-mouth breathing on a family member without personal protective equipment? Yes () No () Why.....

2.24 Would you perform mouth-to-mouth breathing on a stranger without personal protective equipment? Yes () No () Why.....

2.25 If you are confronted with a person who is unresponsive and not breathing, which of the Basic Life Support skills can you apply confidently?

(You can choose more than one option)

- I can open the airway
- I can ventilate/conduct mouth-to-mouth breathing (kiss of life)

- I can give chest compressions
- I can both conduct mouth-to-mouth breathing and give chest compressions
- I do not know

2.26 What is an AED? (Please don't use Google)

(You can choose more than one option)

- I have never heard of it
- I have heard of it before but have not seen it
- It is a device supporting breathing
- It is a device to restart a heart that has stopped working

2.27 To what extent do you feel able to perform CPR?

- I am completely unable
- I am very uncertain and would probably not be able to help
- I know the theory but not what to do in practice
- I feel well prepared and will take action if a person collapses and stop breathing

2.28 Does anyone in your family suffer from heart disease?.....

2.29 Would you like to learn CPR? Yes () No () Not sure ()

**2.30 Do you know where to do this training or how to find out more about it? Yes () No ()
Not sure ()**

THANK YOU FOR YOUR TIME! I SINCERELY APPRECIATE YOUR HELP WITH MY STUDY.

APPENDIX TWO: CONSENT FORM /STUDY INFORMATION

TOPIC: EVALUATION OF KNOWLEDGE, ATTITUDES, AND PRACTICE OF BASIC LIFE SUPPORT AMONG LAYPERSONS

Good day Sir/Madam,

I, Dr. Michael Ihwo am researching on "Evaluation of Knowledge, attitude, and practice of basic life support among laypersons". Research is a process used in seeking new knowledge. In this study, we want to determine the knowledge and attitude of lay people about cardiac arrest and to identify what actions they will take in this situation. The other purpose is to increase awareness of the issue. This study involves Research and not routine care and will contribute to the education of our society and the development of medical science. The research is for my Master of Medicine (MMED) degree in Emergency Medicine at the University of Witwatersrand.

I am inviting you to take part in this research study. The research is a prospective descriptive cross-sectional study. It involves the use of a self-administered questionnaire to obtain data needed to explore the objectives of the study. A hard copy of the questionnaire will be distributed during and after the Mass to adult members (aged 18 years and above) of the Holy Trinity Catholic church, Braamfontein, and collected immediately following the completion by the researcher and research assistants. If you are a medical /paramedical personnel or a health science student, then you are exempted from the study.

The Questionnaire is divided into two parts. Part one will obtain data on your demographic characteristics, while part two will seek information on your level of knowledge, attitude, and practice of basic life support. This will take between 10 to 20 minutes to complete.

There are no risks or direct benefits involved in participating in the study, however, your participation will contribute to the education of our society and the development of medical science.

Participation is voluntary and refusal to participate will involve no penalty. You are therefore not required to provide any reason for refusing to participate in the study. Confidentiality will be maintained during this study. The study is completely anonymous (your name is not required).

Data will be coded and entered into a password-protected computer only accessible to the researcher and his supervisors. All data collected in the course of the study will be securely retained for two (2) years, if a scientific publication arises from the study and six (6) years if there is no publication. Thereafter it will be destroyed accordingly.

Evaluating the knowledge, attitude, and practice of Basic Life Support among the lay public will help to identify areas that require intervention with the aim of improving the first link of the out-of-hospital cardiac arrest chain of survival and the overall outcome of out-of-hospital cardiac arrest. After the study is completed, the outcome will be made available if you are interested.

Contact details of researcher: email- mikil78@yahoo.com; cell phone number-0738399566

Contact details of HREC administrator and chair:

Chairperson: Professor Clement Penny; telephone number- 0117172301; email- Clement.Penny@wits.ac.za

Secretariat: telephone number-0117172700/ 1234; email- Zanele.Ndlovu@wits.ac.za,

Rhulani. Mukansi@wits.ac.za

Thank you for reading this study information sheet.

May 2020.

If you agree to participate in this study, please sign in the space below:

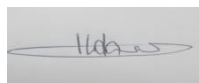
Signature of participant..... Date.....

APPENDIX THREE: WITS PLAGIARISM STATEMENT

I **DR. MICHAEL IBANBETELIEHE IHWO (Student number: 2296644)**, a Master of Medicine (MMED) in Emergency Medicine student at the Division of Emergency Medicine, University of the Witwatersrand declare that:

- I am aware that plagiarism (the use of someone else's work without their permission and/or without acknowledging the source) is wrong.
- I confirm that the work submitted by me for assessment for the above programme is my unaided work except where I have explicitly indicated otherwise.
- I have followed the required conventions in referencing the thoughts and ideas of others.
- I confirm that I understand that my work may at any time be submitted to an electronic plagiarism detection system.
- I understand that the University of the Witwatersrand will not award me the desired degree if there is a belief or evidence that this is not my unaided work or that I have failed to acknowledge the source of the ideas or words in my writing.

Signature:



Date: 13th May 2022

APPENDIX FOUR: ETHICAL CLEARANCE CERTIFICATE

UNIVERSITY OF THE
WITWATERSRAND
JOHANNESBURG



R14/49 Dr Michael Ihwo et al

HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)
CLEARANCE CERTIFICATE NO. M200538 MED20-04-118

NAME: Dr Michael Ihwo et al
(Principal Investigator)
DEPARTMENT: Emergency Medicine
Holy Trinity Catholic Church
PROJECT TITLE: Evaluation of knowledge, attitude and practice
of basic life support among lay persons
DATE CONSIDERED: 29/05/2020
DECISION: Approved unconditionally
CONDITIONS:
SUPERVISOR: Mr Martin Botha
APPROVED BY: 
Dr C Penny, Chairperson, HREC (Medical)
DATE OF APPROVAL: 05/06/2020

This clearance certificate is valid for 5 years from date of approval. Extension may be applied for.

DECLARATION OF INVESTIGATORS

To be completed in duplicate and **ONE COPY** returned to the Research Office Secretary in Room 301, Third floor, Faculty of Health Sciences, Phillip Tobias Building, 29 Princess of Wales Terrace, Parktown, 2193, University of the Witwatersrand. I/we fully understand the conditions under which I am/we are authorized to carry out the above-mentioned research and I/we undertake to ensure compliance with these conditions. Should any departure be contemplated, from the research protocol as approved, I/we undertake to resubmit the application to the Committee. **I agree to submit a yearly progress report.** The date for annual re-certification will be one year after the date of convened meeting where the study was initially reviewed. In this case, the study was initially reviewed May and will therefore be due in the month of May each year. Unreported changes to the application may invalidate the clearance given by the HREC (Medical).

Principal Investigator Signature

Date

PLEASE QUOTE THE PROTOCOL NUMBER IN ALL ENQUIRIES

APPENDIX FIVE: APPROVAL FROM THE PARISH PRIEST OF THE STUDY SITE

(30,164 unread) - mikil78@yahoo.com - Yahoo Mail

<https://mail.yahoo.com/d/search/name=frnobot%62540trinityjhb.co.za&emailAddresses=frnobot...>

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Permission to conduct a research Yahoo/Inbox

frnobot@trinityjhb.co.za Wed, Oct 14, 2020 at 10:51 AM To: mikil78@yahoo.com

Dear Dr Michael

Greetings! I write this email to grant you the permission to conduct your research among the members of the Catholic Church at Holy Trinity Parish, Braamfontein.

I hope that the parishioners will be of great help to your research.

Wishing you all the best

Regards

Fr. Robert SJ

Thank you. Received, thank you. Acknowledged.

frnobot@trinityjhb.co.za .za

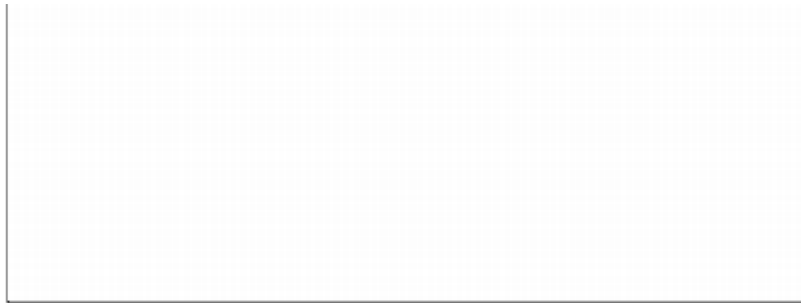
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1 of 2

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APPENDIX SIX: TURNITIN REPORT



dr. mike -2296644

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