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Healthcare facilities' level of preparedness response on COVID-19 preventive measures in selected regions of Tanzania: A perspective of healthcare workers

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ABSTRACT

Background: After the first patient of COVID-19 was announced by the Ministry of Health in Tanzania from Arusha region, the hottest discussion in the community was the fear on how our health facilities were prepared against the spread of coronavirus disease. **Objective and significance:** This study aims at assessing healthcare facilities level of preparedness response on preventive measures against COVID-19 in selected regions of Tanzania through the contributions of healthcare workers. This study will add value in building capacity to fight COVID-19 pandemic and possibly any other pandemic of similar significance in the future. **Methods:** Analytical cross-sectional study design which applied quantitative research strategy was conducted from August to October 2022. A total of 596 healthcare workers were involved in the study from 40 healthcare facilities in Dar es Salaam, Mwanza, Arusha, and Dodoma regions of Tanzania. Descriptive statistics were analyzed by a statistical package SPSS version 26 (IBM Corp., Armonk, NY) giving frequencies, percentages, and significant association between variables. **Results:** Overall level of preparedness was poor at 52%, only 25% of preventive measures were good prepared and 23% moderately prepared. Availability of hand washing station with soap and water to ensure hand hygiene for healthcare workers was most prepared by 87.1% while designated ambulance facility for transporting patients from isolation area to other COVID-19 referral facilities was less prepared by 30.4% in this study. **Conclusion:** The preparedness responses was poor in selected regions of Tanzania which cause less capacity to fight against COVID-19 whenever it emerges.

Introduction

Coronavirus disease 2019 (COVID-19) is an example of a currently emerging infectious disease, and it is a global health and societal emergency respiratory disease that is caused by a novel coronavirus and was first detected in December 2019 in Wuhan, China [1]. Primarily in December 2019, the health authorities in Wuhan China, recognized a cluster of pneumonia cases of unknown etiology associated with the city's South China Seafood Market [2]. Then, a subsequent test showed a novel coronavirus, SARS-CoV-2, as an etiology of this huge outbreak [3]. Since March 11,

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2020, the day the novel COVID-19 outbreak was declared by the World Health Organization (WHO) as a COVID-19 pandemic, it has caused substantial morbidity and mortality globally and has become a priority of global society because of the severe impact it exerts in all dimensions [2].

In Sierra Leone the study found that, healthcare facilities are not well prepared to adequately respond to COVID-19 break [4]. Fear of healthcare workers towards COVID-19 pandemic is reinforced by inadequate work place safety and inadequate hospital infection prevention and control policy [5,6].

The Ministry of Health, Community Development, Gender, Elderly and Children (MoHCDEC) of Tanzania announced the first case of COVID-19, from the victim who happened to be a female traveller aged 46 years who departed the country on 3 March 2020 to Belgium and had visited Denmark and Sweden between 5th and 13th March 2020 dates [7]. After the first patient was announced by the Ministry of Health in Tanzania from Arusha region, fear grew in the community for everyone and every household was struggling on how to protect themselves from COVID-19. The Government began issuing various directives aimed at reducing transmission including closing primary and secondary schools, colleges and universities as well as preventing unnecessary gatherings. On the side of health facilities, fear was also spread to healthcare workers as they feared on how they might protect themselves from COVID-19 infection while caring for patients. The hottest discussion in the community was the fear on how our health facilities were prepared against the spread of corona virus especially when the infections seemed to be a serious case in developed countries.

The infection transmission trend concerning COVID-19 was parallel announced in both Tanzania main land and Zanzibar by the respective Ministers, on 31st March, and the first COVID-19 death was recorded in Dar es Salaam. Furthermore, on 20th April, over 3 COVID-19 deaths with an explosion of 87 new cases were recorded while spread over to various regions where 33 cases were found in Dar es Salaam alone [8].

Until April 24th 2020, the Government authorities announced 284 cases of COVID-19, among them 256 were in stable condition, seven in special care, 37 recoveries, and 10 deaths, while Dar-es-salaam City was leading in number of infected cases, followed by Mwanza, Arusha, and Dodoma regions [1]. When the Government of Tanzania decided to stop announcing new cases of COVID-19's related morbidity and mortality on 4th May 2020, the public remained with many unanswered questions about the trend of the pandemic [9].

Therefore, researching in this area in regions of Dar es Salaam, Dodoma, Mwanza and Arusha where COVID-19 transmission grew higher compared to other regions in the country, will contribute to the existing level of knowledge, strengthen healthcare policy and enhance good utilization of available but limited resources.

Materials and methods

Study design and study population

The study used analytical cross-sectional study design which applied quantitative research strategy and the survey conducted from August to October, 2022. Targeted population for this study was health professional workers from selected public hospitals, health centres and dispensaries in Dar es Salaam, Arusha, Mwanza and Dodoma regions of Tanzania. Health care professional workers included doctors, nurses, pharmacists, laboratory personnel, and other health support staff.

Inclusion and exclusion criteria

Only government owned health facilities were involved and staff who were able to fill a consent form and agree to participate in the study. Private owned health facilities, student healthcare workers who were in short term field practices during data collection, and staff who were not able to fill a consent form and not agreed to participate in the study were not involved.

Sample size and sampling procedures

Krejcie and Morgan's formula [10] for calculating a sample size of a known population was used to calculate sample size in each area because the number of healthcare workers in those areas were easily identified. A total of 596 healthcare workers were involved in the study from 40 healthcare facilities in four regions of Tanzania: 172 from Dar es Salaam, 134 from Mwanza, 138 from Arusha and 152 from Dodoma. A multi-stage sampling procedure was carried out in phases, the study areas were purposively selected due to their potential and alarm of COVID-19 prevalence [1]. Dar es Salaam, Dodoma, Mwanza and Arusha regions were selected because of the high prevalence compared to other

regions in Tanzania. In health facilities, purposively sampling was used to select respondent who were dedicated to care for COVID-19 patients if dedication was done in the particular health facility and simple random sampling was used to select other healthcare workers in a particular health facility.

Validity and reliability

Prior to data collection, a pre-test of the data collection tool was done to 25 healthcare workers from two health facilities in Dodoma city with similar characteristics to targeted population of this study in order to see how the targeted population is going to understand the data collection tool. Data completeness and accuracy was checked and gaps identified were modified by the researchers and tested by Cronbach's alpha coefficient, item testing >0.7 was regarded as reliable and those <0.7 were either modified or removed from the questionnaire.

Data collection and analysis

Self-administered questionnaires were prepared to collect primary data from the respondents.

The quantitative data collected through questionnaires were coded, categorized and ordered according to the emerged categories of the responses. The coded data were entered into a statistical package SPSS version 26 (IBM Corp., Armonk, NY) and analyzed statistically using descriptive statistical techniques giving frequencies and percentages for categorical variables. Also, significant association between variables was analyzed by using cross tabulation analysis and factors influencing level of preparedness was analyzed by multinomial logistic regression.

Scoring and defining level of preparedness response on preventive measures

The overall preparedness response of implemented and currently functioning preventive measures were categorized by using Bloom's cut-off point, as good if the score was between 80 and 100%, moderate if the score was between 60 and 79%, and the score less than 60% represented poor preparedness [11].

Ethical clearance

An approval to conduct this study was sought from the Open University of Tanzania (OUT) prior to the study for ethical clearance. Permission was obtained from the authorities at district level from District Medical Officer (DMO) office in all areas of study and at facilities level where the study was scheduled to be conducted. Informed consent was given to the health care providers who participated in the study and ensured confidentiality throughout the study.

Result

Socio-demographic characteristics of participants

This study involved 596 healthcare workers, whose socio-demographic characteristics included: sex, age in years, field profession, highest level of education, if the participant was dedicated in COVID-19 team to care for infected patients in healthcare facilities and service experience in years of each participant. As seen in t**able (1),** sex distribution involved 329 (55.2%) female and 267 (44.8%) males; participants aged between 30-39 years were higher than others 212 (35.6%). Nurses' category in terms of distribution of field profession were higher 184 (30.9%) than in the other categories. Regarding the distribution of highest level of education, the level of diploma had the largest number of participants with 256 (43.0%). Distribution of participants in four regions of study were 172 (28.9%) from Dar es salaam, Mwanza 134 (22.5%), Arusha 138 (23.2%) and Dodoma 152 (25.5%). Demographic characteristics of participants based on healthcare facilities hospital category were higher 307 (51.5%) than health center 185 (31.0%) and dispensary 104 (17.4). Health facilities that provide services to outpatients and inpatients involved many participants 433 (72.7%) than outpatients only (27.3%). Based on the situation of caring patients at healthcare facilities during the first wave of COVID-19, 34 (57.2%) participants were involved from health facilities that served all patients.

Healthcare facilities' preparedness responses in combating COVID-19

In this study, participants responded if preventive measures preparedness responses were either implemented and currently functioning; implemented but currently not functioning; not implemented or not sure. Availability of hand washing station with soap and water to ensure hand hygiene for healthcare workers was the most implemented and currently functioning at 519 (87.1%), followed by availability of sanitizers 512 (85.9%), and availability of guidelines for biomedical waste management 493 (82.7%). Designated ambulance facility for transporting patients from isolation area to other COVID-19 referral facilities was less implemented and currently functioning 181 (30.4%), followed by the availability of facilities needed for handling dead

bodies of confirmed COVID-19 cases from Ministry of Health at 203 (34.1%) then, housekeeping policy for isolation area to care for COVID-19 patients was 243 (40.9%), and written guideline and maintaining records of all visitors entering patient's rooms with COVID-19 by 243 (40.9%). A detailed preparedness responses of all variables are well elaborated in **table (2)**.

The average of 58.5% of participants said that preventive measures were implemented and currently functioning; 22.1% reported that preventive measures were implemented but currently not functioning; 10.1% replied that not implemented and 9.3% of participants were not sure with the implementation status as shown in **figure (1)**. The percentage score of only implemented and currently functioning preventive measures from the participants was used to categorize the overall level of preparedness responses. As shown in **figure (2),** the level of preparedness responses was poor at 52%, as 25% of preventive measures were good prepared, and 23% were moderately prepared.

Association of predictor variables and preparedness response of COVID-19

In this study, significant relationship between predictor variables and level of preparedness response in implemented and currently functioning preventive measures of COVID-19 was computed by bivariate analysis. All personnel-related independent variables (sex, age, field profession, level of education and service experience) have no significant relationship with level of preparedness response, all have *p*-value > 0.05 as shown in **table (3).** Facility-related independent variables (dedicated team for COVID-19, region, category of the healthcare facility, situation of caring COVID-19 patients) have significant relationship with level of preparedness response, all have *p* -value < 0.05 except one variable (type of patients served in facility) with a *p*-value of 0.054 which is > 0.05 as shown in **table (3)**.

Factors influencing healthcare facilities' level of preparedness response against COVID-19

Multinomial logistic regression was conducted to examine the combined influence of setting and socio-demographic characteristics (Predictor variables) on healthcare facilities' preparedness response categories of implemented and currently functioning preventive measures of COVID-19. The moderate and poor categories were contrasted against good preparedness response as the reference category.

Logistic regression results shown in **table (4)** indicate that when the moderate category was contrasted against the good category, age in years and healthcare workers dedicated in COVID-19 team significantly predicted membership in the moderate knowledge category. Age of 30 – 39 and 40 – 49 years exerted effect with odds increased by factor of 5.9 (OR = 5.884, 95% CI, 1.322-26.177) and 3.6 (OR = 3.624, 95% CI, 1.088-12.071) respectively.

Also, when the poor category was contrasted against the good category, healthcare workers dedicated in COVID-19 team, region, category of healthcare facility and situation of caring COVID-19 patients in facility during the first wave of COVID-19 significantly predicted membership in the poor level of preparedness category. Healthcare workers dedicated in COVID-19 team and participants from Arusha region were significantly affected by factors of 0.1 (OR = 0.062, 95% CI, 0.006-0.646) and 0.3 (OR = 0.252, 95% CI, 0.132-0.479) respectively. Hospital category of healthcare facilities and healthcare facilities served only COVID-19 patients during the first wave of COVID-19 also affected significantly by factors 0.2 (OR = 0.151, 95% CI, 0.058-0.391) and 0.3 (OR = 0.34, 95% CI, 0.161-0.722) respectively.

Table 1. Socio-demographic characteristics of participants (N=596).

Predictor variables	Valid response	Frequency (N)	Percentage (%)
Sex	Male	267	44.8
	Female	329	55.2
Age in years	18 – 29	209	35.1
	30 – 39	212	35.6
	40 – 49	111	18.6
	50 and above	64	10.7
Field profession	Clinician (doctor)	157	26.3
	Nurse	184	30.9
	Pharmaceutical personnel	90	15.1
	Laboratory personnel	87	14.6
	Supportive staff	78	13.1
Highest level of education	Primary school	21	3.5
	Secondary school	42	7.0
	Certificate	109	18.3
	Diploma	256	43.0
	Bachelor's degree	155	26.0
	Master's degree	13	2.2
Dedicated in COVID-19 team to care COVID-19 patients	Yes	222	37.2
	No	357	59.9
	No dedicated team	17	2.9
Service experience in years	Less than 1	86	14.4
	1 – 5	203	34.1
	6 – 10	120	20.1
	11 – 15	73	12.2
	16 – 20	44	7.4
	Above 20	70	11.7
Region	Dar es salaam	172	28.9
	Mwanza	134	22.5
	Arusha	138	23.2
	Dodoma	152	25.5
Category of your healthcare facility	Hospital	307	51.5
	Health center	185	31.0
	Dispensary	104	17.4
Type of patients served at your facility	Outpatients only	163	27.3
	Outpatients and inpatients	433	72.7
Situation of caring COVID-19 patients in healthcare facilities	Cared COVID-19 patients only	93	15.6
	It served all patients	341	57.2
	It referred patients with COVID-19 symptoms	162	27.2

Table 2. Percentage distribution of healthcare facilities' preparedness responses in combating COVID-19 in selected regions of Tanzania (N=596).

Area of implementation	Valid responses			
	Implemented and currently functioning	**Implemented but currently not functioning**	**Not implemented**	**Not sure**
	N (%)	N (%)	N (%)	N (%)
Area for triage and care for COVID-19 patients	266 (44.6)	218 (36.6)	72 (12.1)	40 (6.7)
Staff dedicated to care COVID-19 patients	327 (54.9)	158 (26.5)	75 (12.6)	36 (6.0)
Training staff dedicated to care COVID-19 patients	354 (59.4)	137 (23.0)	63 (10.6)	42 (7.0)
Providing regular training to all healthcare workers regarding COVID-19 (at least once a year)	307 (51.5)	114 (19.1)	109 (18.3)	66 (11.1)
Training cleaning staff in keeping area dedicated to care COVID-19 patients and infection control practices	267 (44.8)	117 (19.6)	116 (19.5)	96 (16.1)
Screening strategy for healthcare workers to protect them from COVID -19	344 (57.7)	139 (23.3)	65 (10.9)	48 (8.1)
Adoption of universal masking policy for all healthcare workers, patients and visitors	294 (49.3)	283 (47.5)	7 (1.2)	12 (2.0)
Availability of IPC guidelines to avoid infection to healthcare workers, visitors and other patients	385 (64.6)	149 (25.0)	26 (4.4)	36 (6.0)
Availability of sanitizers	512 (85.9)	76 (12.8)	6 (1.0)	2 (0.3)
Hand washing station with soap and water to ensure hand hygiene for healthcare workers	519 (87.1)	72 (12.1)	3 (0.5)	2 (0.3)
Hand washing station with soap and water to ensure hand hygiene for visitors and patients	461 (77.3)	129 (21.6)	2 (0.3)	4 (0.7)
Regular hand hygiene audits and provision of feedback to healthcare workers (at least once a year)	338 (56.7)	163 (27.3)	37 (6.2)	58 (9.7)
Surveillance system for health-care-associated infections	407 (68.3)	79 (13.3)	39 (6.5)	71 (11.9)
Isolation of patients with suspected Covid 19 upon arrival at the healthcare facility	329 (55.2)	169 (28.4)	55 (9.2)	43 (7.2)
COVID-19 laboratory testing in your healthcare facility	464 (77.9)	46 (7.7)	56 (9.4)	30 (5.0)
Alert to all healthcare workers if a Covid 19 infected patient is being cared within the healthcare facility	425 (71.3)	113 (19.0)	24 (4.0)	34 (5.7)
Policy on limiting visitors' movement in health facility	318 (53.4)	235 (39.4)	17 (2.9)	26 (4.4)
Any housekeeping policy for isolation area for COVID-19 patients	243 (40.9)	225 (37.8)	64 (10.7)	63 (10.6)
Guidelines for biomedical waste management	493 (82.7)	45 (7.6)	17 (2.9)	41 (6.9)
Disinfecting biomedical waste before disposal	396 (66.4)	46 (7.7)	51 (8.6)	103 (17.3)
Centralized piped supply of Oxygen in ICUs	286 (48.0)	108 (18.1)	134 (22.5)	68 (11.4)
Designated ambulance facility for transporting patients from isolation area to other COVID-19 referral facilities	181 (30.4)	148 (24.8)	163 (27.3)	104 (17.4)
Written guideline available for handling dead bodies of confirmed COVID-19 cases from ministry of health	203 (34.1)	94 (15.0)	129 (21.6)	169 (28.4)
Maintaining records of all visitors entering patient's rooms with COVID-19	244 (40.9)	97 (16.3)	116 (19.5)	139 (23.3)

Table 3. Bivariate analysis of the predictor variables and overall level of preparedness response in implemented and currently functioning preventive measures of COVID-19 in the selected regions of Tanzania (N=596).

Predictor variables	Valid response	Overall level of preparedness response			Total	Chi-square	*P*-value
		Good (N=152)	Moderate (N=136)	Poor (N=308)			
		N (%)	N (%)	N (%)	N (%)		
Sex	Male	69 (11.6)	65 (10.9)	133 (22.3)	267 (44.8)	0.841	0.657
	Female	83 (13.9)	71 (11.9)	175 (29.4)	329 (55.2)		
Age in years	18 – 29	65 (10.9)	47 (7.9)	97 (16.3)	209 (35.1)	11.883	0.157
	30 – 39	46 (7.7)	50 (8.4)	116 (19.5)	212 (35.6)		
	40 – 49	21 (3.5)	28 (4.7)	62 (10.4)	111 (18.6)		
	50 and above	20 (3.4)	11 (1.8)	33 (5.5)	64 (10.7)		
Field profession	Clinician (doctor)	29 (4.9)	38 (6.4)	90 (15.1)	157 (26.3)	11.049	0.199
	Nurse	47 (7.9)	47 (7.9)	90 (15.1)	184 (30.9)		
	Pharmaceutical personnel	22 (3.7)	21 (3.5)	47 (7.9)	90 (15.1)		
	Laboratory personnel	26 (4.4)	16 (2.7)	45 (7.6)	87 (14.6)		
	Supportive staff	28 (4.7)	14 (2.3)	36 (6.0)	78 (13.1)		
Highest level of education	Primary school	7 (1.2)	4 (0.7)	10 (1.7)	21 (3.5)	10.462	0.401
	Secondary school	9 (1.5)	8 (1.3)	25 (4.2)	42 (7.0)		
	Certificate	37 (6.2)	28 (4.7)	44 (7.4)	109 (18.3)		
	Diploma	59 (9.9)	61 (10.2)	136 (22.8)	256 (43.0)		
	Bachelor degree	37 (6.2)	31 (5.2)	87 (14.6)	155 (26.0)		
	Master degree	3 (0.5)	4 (0.7)	6 (1.0)	13 (2.2)		
Dedicated in COVID-19 team to care COVID-19 patients	Yes	69 (11.6)	52 (8.7)	101 (16.9)	222 (37.2)	17.964	**0.001***
	No	82 (13.8)	84 (14.1)	191 (32.0)	357 (59.9)		
	No dedicated team	1 (0.2)	0 (0.0)	16 (2.7)	17 (2.9)		
Service experience in years	Less than 1	23 (3.9)	17 (2.9)	46 (7.7)	86 (14.4)	13.102	0.218
	1 – 5	65 (10.9)	48 (8.1)	90 (15.1)	203 (34.1)		
	6 – 10	26 (4.4)	28 (4.7)	66 (11.1)	120 (20.1)		
	11 – 15	10 (1.7)	17 (2.9)	46 (7.7)	73 (12.2)		
	16 – 20	11 (1.8)	11 (1.8)	22 (3.7)	44 (7.4)		
	Above 20	17 (2.9)	15 (2.5)	38 (6.4)	70 (11.7)		
Region	Dar es salaam	42 (7.0)	37 (6.2)	93 (15.6)	172 (28.9)	21.294	**0.002***
	Mwanza	28 (4.7)	32 (5.4)	74 (12.4)	134 (22.5)		
	Arusha	52 (8.7)	36 (6.0)	50 (8.4)	138 (23.2)		
	Dodoma	30 (5.0)	31 (5.2)	91 (15.3)	152 (25.5)		
Category of your healthcare facility	Hospital	99 (16.6)	78 (13.1)	130 (21.8)	307 (51.5)	25.327	**0.000***
	Health center	36 (6.0)	40 (6.7)	109 (18.3)	185 (31.0)		
	Dispensary	17 (2.9)	18 (3.0)	69 (11.6)	104 (17.4)		
Type of patients served at your facility	Outpatients only	37 (6.2)	29 (4.9)	97 (16.3)	163 (27.3)	5.839	0.054
	Outpatients and inpatients	115 (19.3)	107 (18.0)	211 (35.4)	433 (72.7)		
Situation of caring COVID-19 patients in healthcare facilities	Cared COVID-19 patients only	34 (5.7)	24 (4.0)	35 (5.9)	93 (15.6)	17.258	**0.002***
	It served all patients	92 (15.4)	75 (12.6)	174 (29.2)	341 (57.2)		
	It referred patients with COVID-19 symptoms	26 (4.4)	37 (6.2)	99 (16.6)	162 (27.2)		

***** $p<0.05$ is statistically significant

Table 4. Multinomial logistic regression odds ratios of factors influencing healthcare facilities' preparedness response in implemented and currently functioning preventive measures of COVID-19.

Predictor variables	Good preparedness (Reference) vs Moderate preparedness				Good preparedness (Reference) vs Poor preparedness			
	AOR	95% C.I.for EXP(B)		*P*-value	AOR	95% C.I.for EXP(B)		*p*-value
		Lower	Upper			Lower	Upper	
Sex								
Male	1.145	0.668	1.963	0.622	0.959	0.595	1.546	0.863
Female	Reference							
Age in years								
18 – 29	4.619	0.922	23.146	0.063	2.162	0.519	9.003	0.289
30 – 39	5.884	1.322	26.177	**0.02***	3.167	0.845	11.868	0.087
40 – 49	3.624	1.088	12.071	**0.036***	1.881	0.657	5.384	0.239
50 and above	Reference							
Field profession								
Clinician (doctor)	2.206	0.845	5.76	0.106	1.857	0.814	4.237	0.142
Nurse	1.664	0.698	3.965	0.251	1.239	0.585	2.623	0.576
Pharmaceutical personnel	1.639	0.604	4.447	0.332	1.811	0.767	4.279	0.176
Laboratory personnel	1.062	0.378	2.987	0.909	1.495	0.627	3.564	0.364
Other health support staff	Reference							
Level of education								
Primary school	1.063	0.126	9.003	0.955	0.949	0.138	6.507	0.957
Secondary school	0.742	0.107	5.145	0.763	0.978	0.163	5.857	0.981
Certificate	0.622	0.111	3.5	0.59	0.461	0.09	2.375	0.355
Diploma	0.74	0.14	3.921	0.723	0.762	0.157	3.706	0.736
Bachelor degree	0.61	0.113	3.285	0.565	1.01	0.207	4.939	0.99
Master degree	Reference							
Dedicated in COVID-19 team								
Yes	[b]	-	-	-	0.062	0.006	0.646	**0.02***
No	[b]	-	-	-	0.103	0.01	1.064	0.056
Dedication was not done	Reference							
Service experience in years								
Less than 1	0.277	0.051	1.505	0.137	0.446	0.097	2.048	0.299
1 – 5	0.254	0.056	1.15	0.075	0.279	0.071	1.102	0.069
6 – 10	0.346	0.081	1.475	0.151	0.447	0.119	1.682	0.234
11 – 15	0.716	0.185	2.78	0.63	0.979	0.289	3.32	0.972
16 – 20	0.63	0.178	2.235	0.475	0.65	0.209	2.023	0.457
Above 20	Reference							
Region								
Dar es salaam	0.949	0.446	2.019	0.892	0.744	0.388	1.426	0.373
Mwanza	1.081	0.496	2.353	0.845	0.767	0.389	1.512	0.443
Arusha	0.675	0.329	1.384	0.283	0.252	0.132	0.479	**0.000***
Dodoma	Reference							
Category of your healthcare facility								
Hospital	0.388	0.126	1.192	0.098	0.151	0.058	0.391	**0.000***

Health center	0.568	0.194	1.667	0.303	0.486	0.198	1.192	0.115
Dispensary	Reference							
Type of patients receiving healthcare at your facility								
Outpatients only	0.429	0.178	1.034	0.059	0.504	0.24	1.056	0.069
Outpatients and inpatients	Reference							
Situation of caring Covid-19 patients at your facility during the first wave of Covid-19								
It served only Covid-19 patients	0.506	0.222	1.154	0.105	0.34	0.161	0.722	**0.005***
It served all patients	0.6	0.301	1.198	0.148	0.758	0.414	1.388	0.369
It referred patients with Covid-19 symptoms	Reference							

***** *P*<0.05 is statistically significant, degree of freedom (df) = 1, CI=Confidence Interval, AOR=Adjusted Odds Ratio, [b]N/A results were not considered due to maximum variation caused by zero odds in reference categorical variable.

Figure 1. Average healthcare facilities preparedness response of COVID-19 preventative measures.

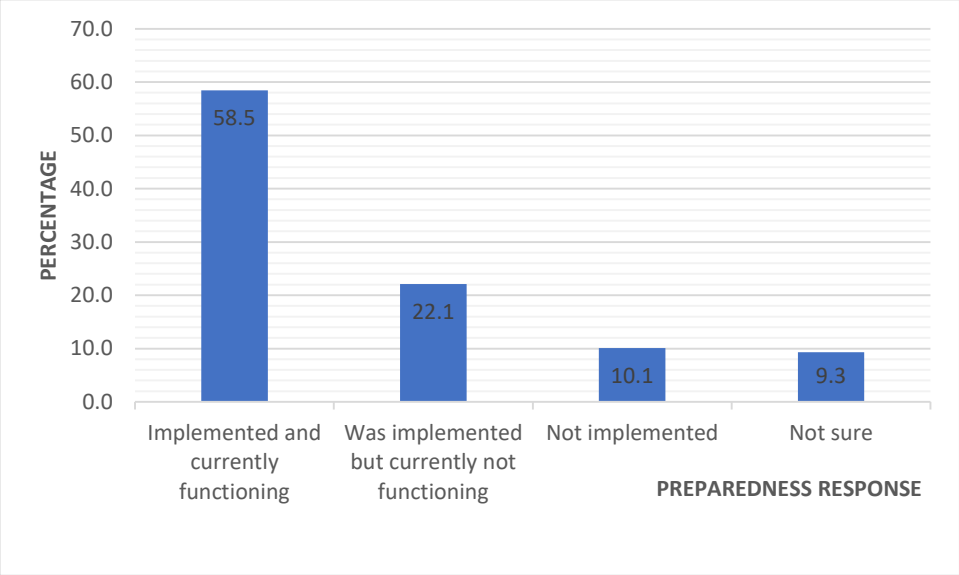
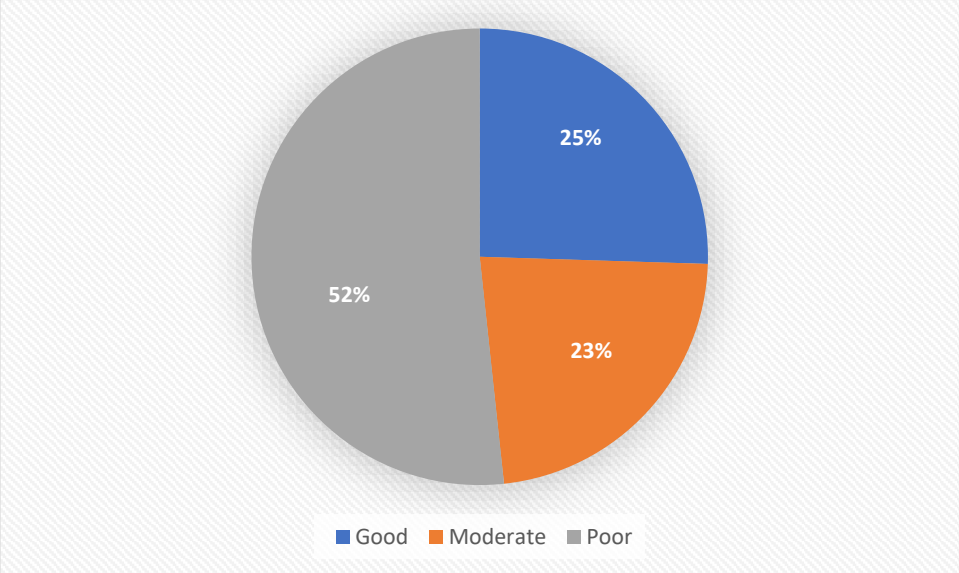


Figure 2. Overall level of healthcare facilities preparedness response for implemented and currently functioning preventative measures of COVID-19.



Discussion

The results from this study shows that good preparedness responses of at least 80% is only in three preventive measures which are the availability of hand washing station with soap and water to ensure hand hygiene for healthcare workers 519 (87.1%); availability of sanitizers about 512 (85.9%) and availability of guidelines for biomedical waste management 493 (82.7%) as seen in table (3). Average response for all preventive measures were as follows: 58.5% of participants said that the variables were implemented and currently functioning; 22.1% were implemented but currently not functioning; 10.1% reported that they were not implemented and 9.3% of participants were not sure with the implementation status as shown in figure (1). When the poor category level of preparedness responses contrasted against the good category by multinomial logistic regression, healthcare workers dedicated in COVID-19 team, Arusha region, hospital category of healthcare facility and healthcare facilities served only COVID-19 patients during the first wave of COVID-19 affected significantly by factors 0.1, 0.3, 0.2 and 0.3 respectively.

This study reveals that the level of preparedness responses was poor at 52%, with only 25% of preventive measures categorized as good prepared, and 23% were moderately prepared. Therefore, Tanzania would not be able to have great success in the fight against COVID-19 pandemic due to inadequate preparedness in terms of preventive measures in place as well as functional ability of the facilities. For instance, the area for triage and care for COVID-19 patients was implemented and currently functioning by 44.6%, training cleaning staff in keeping area dedicated to care for COVID-19 patients and infection control practices by 44.8% is similar with many studies [12-14] which revealed that, healthcare workers (HCWs) received insufficient training and education on Infection Prevention and Control (IPC) and they needed more education and training. Delay of government response can be a big reason that has caused the failure to comply with the provision of proper education on COVID-19 in the current study. Although these findings are different with other studies [15,16] which reported good government preparedness responses in China and resulted to positive outcomes of fighting the pandemic and provided hope for the rest of the world, a situation attributed by the Chinese government's early commitment in combating COVID-19.

Moreover, another study [17] in Ethiopia reported that HCWs away from their professional education, they did not receive any training or orientation on IPC in the prior year or were not sure whether they had received training. In South Africa, some HCWs stated that training was only available for administrators, not frontline healthcare workers [18]. Such a situation is not very far from what is observed in this study. The situation may also be a reason for poor preparedness in Tanzania as reported in number of preventive measures. Education and training are recommended as a core component for effective IPC programmes by the WHO and it should be in place for all HCWs using team- and task-based strategies, including bedside and simulation training [19]. Multifaceted approach (e.g. education, training, observation, feedback, easy access to hand hygiene supplies, dedication of financial resources, praises by superior, strong hospital leadership, prioritization to IPC needs, collaborating with a private advertising firm in a marketing campaign and active participation at institutional level) is highly suggested to reduce hospital associated infections by improving compliance among HCWs with IPC measures [12,20,21] while in this study they were not well prepared which may cause serious recurring of the pandemic in Tanzania.

Other preventive measures found with poor implementation responses are adoption of universal masking policy for all healthcare workers, patients and visitors was observed at 49.3%; housekeeping policy for isolation area to care for COVID-19 patients by 40.9%; centralized piped supply of Oxygen in ICUs by 48%, this can cause serious death among patients with severe infections which is in line with the study in Sierra Leone [4] which reported that, close to two-thirds of HCWs also mentioned that their healthcare facilities lack ventilators to manage patients with severe respiratory symptoms. Designated ambulance facility for transporting patients from isolation area to other COVID-19 referral facilities was reported at 30.4%, written guideline available for handling dead bodies of confirmed COVID-19 cases from Ministry of Health was 34.1% and maintaining records of all visitors entering patient's rooms with COVID-19 by 40.9%. These results are similar with the study conducted in Egypt [22] which revealed that, half of the participants did not agree that the available

reporting system in their institutions is efficient in the prevention against the disease. Although this is contrasting with the study in China which reported good epidemic preparedness and management of records [15]. China provides hope for the rest of the world and reminds other countries that even the most severe situations can be turned around. Also, the study in Saudi Arabia [23] reported that, a number of extreme measures on social movement, social and religious gatherings, travelling were well prepared before the first COVID-19 case reported in the country and before reaching 100 cases. In addition, Middle East Respiratory Syndrome (MERS) epidemics helped Saudi Arabia to have better alerted public health system and infection control policies and measures. Saudi Arabia has improved in terms of clinical and scientific research on epidemics, but it has yet a long way to go in building its appropriate biocontainment laboratories and moving into better governance of research and development. Other countries including Tanzania should learn from Saudi Arabia by working on the shortcomings that emerged during the fight against COVID-19 for better results in the future.

The results of the current study gives an attention that, it is not easy to fight against COVID-19 pandemic effectively and efficiently if the disease continues to emerge, the situation will worsen healthcare facilities in Tanzania due to limited preparedness responses since many implemented measures were suspended for a short time. Similar observations in Egypt reported that breaking the infection control rules or exhausted infrastructure, lack of resources to fulfil infection control needs is an attributing factor to the spread of infections in the hospitals' settings [22].Many factors affect the spread of any infectious disease, including health facilities related factors as global supply shortages of PPEs like wearing a surgical mask, and a gown, gloves, face shield, goggles and visors or lack of clear infection control strategies.

Our results shows that, there is no satisfactory long-term implementation that Tanzania as country is prepared for a pandemic disease whenever it emerges. Although delayed government response, inadequate infrastructures, and lack of biosafety and biosecurity awareness have also contributed to the transmission and spread of COVID-19 disease [24]. Other studies [5,6] further revealed that, the fear of healthcare workers towards COVID-19 pandemic is reinforced by inadequate work place safety and inadequate hospital infection prevention and control policy. Consequently, majority of the participants strongly agreed that there was high possibility of getting the infection in the hospitals. Lack of awareness about COVID-19 preventive measures, the lack of testing kits, ventilators, and other equipment cause healthcare workers to be exposed and become infected, laboratory workers must have sufficient knowledge and experience about how to handle emerging pathogens safely and securely which help in preventing deaths among severe cases [25,26].

Another study conducted in Tanzania [27] showed that health worker infection prevention and control compliance was inadequate in the outpatient settings, an observation which is similar to what obtained in this study. Improvements in provision of supplies and preventive measures are urgently needed in the face of the current pandemic. This is supported by another study [5] that, most countries have facilitated the transmission and spread of the disease due to inadequate preventive and/or mitigating strategies and many countries failed to prevent the epidemic in the beginning by delaying preventive measures. The study in Sierra Leone [4] found related results that, HCWs are of the view that their healthcare facilities are not well prepared to adequately respond to COVID-19 break. Majority stated that their healthcare facilities lack adequate personal protective equipment (PPEs) such as gloves, N95 mask or surgical mask, face shield and disposal gowns. But these findings are not similar with the study in China [16] which revealed that, the Chinese government has taken serious comprehensive and nationwide response measures to fight against the spread of COVID-19 and has achieved positive results on the basis of empirical evidence. Delay of government responses in Tanzania can be directly related with the overall poor preparedness responses of the pandemic.

Conclusion

The results concludes that poor level of preparedness by 52%, only 25% of preventive measures were good prepared and only 23% moderate prepared. Therefore, Tanzania would not be able to have great success in the fight against COVID-19 pandemic due to inadequate response of preventive measures that were implemented and currently functioning while waves of COVID-19 are still recurring. It will not be easy to fight against COVID-19 pandemic effectively and efficiently, if the disease continues to emerge, the situation will worsen healthcare facilities in Tanzania due to

limited preparedness responses and many implemented measures were suspended for a short time.

Recommendations

Healthcare facilities should strengthen regular training of healthcare workers is highly recommended as a way of ensuring adequate healthcare service delivery every time in this era of emerging infectious diseases like COVID-19 pandemic.

Healthcare facilities should strengthen disease surveillance programmes for health-care-associated infections.

The Government of Tanzania should develop good policies and guidelines aimed at preventing health-care-associated infections in response to COVID-19 and other infectious diseases.

The government's early response in fighting emerging diseases like COVID-19.

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