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Situational Analysis in Responding to Emerging and Re-Emerging Epidemics: A Case Study of Dodoma City in Tanzania

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Abstract

Background information: Currently the World is experiencing numerous calamities due to various causes such as pathogens in terms of epidemics and change of weather patterns. However the modalities of preparedness in the public health sector has slow growth. This study hypothesised that handling of epidemics in Tanzania lacks the trained staff and health facilities lack the capacity in case such scenario strike. **Materials and methods:** A cross-sectional study was conducted in Dodoma city to assess the preparedness of the health sector to handle emergencies. The study was conducted for a period of seven months (March – October, 2020 using Semi-structured questionnaire were used to collect data in health facilities of Dodoma city in Tanzania. The data were collected from health care providers whose selection was based on their willingness to participate and location of the health facilities. The study determined the preparedness of the health sector and personnel on occurrence of epidemics. **Results:** Eighty four (84) participants were involved: 61.9% mentioned an epidemic to be a disease which is emerging, 76.2% characterised epidemic as a disease with first occurrence, 23.8% as a disease with high incidence rate. 73.8%, 92.9%, 70.2% of the participants were aware that simulation, biosafety measures and team preparedness could contain epidemics, respectively. It was noted that simulation could be significant is practised effectively among health workers, team formulation and the chain of communication during outbreaks. **Conclusion and recommendation:** The capacity of the health system to respond to epidemics in Tanzania needs to be strengthened in terms of human resource and facilities; so as to facilitate periodic simulations for health personnel to handle epidemics.

Introduction

The emergence and re-emergence of epidemics of infectious diseases are raising public health concern globally. They affect the health systems, social life and create enormous economic turmoil especially in the low-medium income countries [1]. In order to undertaking such emerging infections, resource mobilisation is essential at the National level to the primary health facilities, so as to facilitate effective responses in such disease outbreaks. The availability of the institutional arrangement at all levels of the health system depicts the preparedness of any country to

handle such epidemics [1,2,3]. The preparedness involves setting of work forces and resources at all levels of the health system to combat an outbreak. These outbreaks are associated with several factors including poverty, overpopulation, poor zoo-sanitary practices and lack of access to clean and safe potable water in poor communities [1,4,5].

The occurrence of infectious diseases both in human or animals has been constantly emerging and re-emerging in the human history due to pathogen evolution and environmental changes. Due to re-occurrence of the pathogens; most diseases which cause epidemics are

More Information

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Keywords:

Dodoma,
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categorised as newly emerging and re-emerging. WHO [1] and Choi [4] defined emerging diseases as diseases occurring for the first time in the population they can be due to a new pathogen or an evolved known pathogen. The authors also define re-emerging as diseases which previously existed but re-occur even after apparent control or elimination. Such diseases are characterised by high incidence rate, morbidity, mortality and wide geographical distribution.

The occurrence of emerging infectious diseases in Tanzania has been relatively moderate as compared to her neighbouring countries, although they can't be ignored. Several authors have established the occurrence of such epidemics in the past decades through epidemiological evidences. Karimuribo et al⁵ and Kajeguka et al [6] identified evidences of viral infectious disease of public health importance which were rift valley fever, influenza H1N1, Rubella, dengue and Chikungunya. Furthermore, sero-prevalence conducted in various places confirmed sero-conversion of life threatening viral disease such as Chikungunya, yellow fever, dengue, hepatitis and different forms of influenza [7,8].

The described diseases are increasing in different communities due to various reasons such as: level of urbanisation and human demographic changes [3,7], booming international travel and trade [2,8] biological warfare and bioterrorism [19,10], deficiencies in public health infrastructure and surveillance [11,12], increased demand of animal proteins [12,13] and genetic mutation and adaptations of the pathogens "antigenic drift" [15,16]. Due to the unpredicted occurrence of epidemics globally; the government of Tanzania has put in place strategies to handle such epidemics.

Tanzania as a country has established the National referral laboratory to test for infection diseases, National Influenza Laboratory so that to initiate viral and epidemiologic influenza sentinel of Rift Valley fever and dengue fever, respectively [5,6]. Meanwhile the country is currently handling the testing and reporting of the COVID-19 infection using the modern technology under the National Laboratory. Despite all measures considered reasonable to handle the epidemics however the level of preparedness differs among health facilities [14]. Thus this study attempted to analyse the situation in one of the cities in Tanzania so as to establish the trend of emerging infectious disease

(EID) occurrence especially in human health set up, to establish the efforts made by the authorities so as to cope with occurrence of such diseases. Furthermore, the study was undertaken to evaluate the capability, opportunities, behavioural change and motivation of the health workers to handle epidemic outbreaks [8,11].

Materials and Methods

Study Area and Design

This study was carried using a cross sectional study design where structured question was used as research tool to collect the required data. The study was carried in Dodoma city council to determine the level of preparedness to handle emerging and re-emerging epidemics, from March – October, 2020.

Study Inclusion and Exclusion

The criteria for inclusion on the study were working in a health facility, disease control or prevention unit. The study excluded health workers with administrative posts, working in other treatment units such as surgery, gynaecology and pharmacology departments.

Data Collection

A structured questionnaire was administered to health professionals who were selected basing on the inclusion or exclusion criteria. The enumerators were trained on interviewing the participants before starting the exercise and the questionnaire were pre-tested data normality. The study involved 84 participants who were selected based on the inclusion criteria as well level of education and level of the health facility.

Data Analysis

The data were processed using Microsoft excel and later on analysed using SPSS. In this study the key outcome considered were chain of command among health facility workers, knowledge of the participants on epidemics, infrastructures and the contribution of the community to respond epidemics. Descriptive statistics including means, standard deviation, frequencies were calculated while Chi-square was used to determine the association among factors where *p* – value of 0.05 was considered as significant.

Results

Of the eighty five (84) health workers included in the study, majority (52.4%) were men, on the level of education majority (64,3%) were diploma holders or low level of education as shown on Table 1.

Table 1: Demographic Presentation of the Study Participants

Category	Subject	Frequency	Percentage (%)
Gender	Female	40	47.6
	Male	44	52.4
Level of education	Diploma and below	54	64.3



	Biomedical degree	30	35.7
Place of working	Health Facility	70	83.3
	Out of Health Facility	14	16.7

The participants were also asked on their knowledge and skills pertaining to the definition of epidemics. The results present that most of the respondents defined an epidemic as a disease which is emerging to their routine work in a health facility (61.9%). On the other hand, the participants anticipated that an epidemic should have high incidence rate and morbidities on the affected population; under this consideration 76.2% of the

participant agreed that a disease occurring for the first time qualifies more to be an epidemic.

Table 2 presents responses of participants understanding to state epidemics by giving examples of epidemics and tendency of epidemics occurrence. The results revealed that most participants defined epidemic as an emerging (61, 9%) and not re-emerging (disease). Cholera was mentioned most to be an epidemic (98.8%),

Table 2: Participants Definition of an Epidemic in the Study Area

Category	Subject	Frequency (n)	Percentage (%)
Defining an Epidemic	Emerging	52	61.9
	Re-emerging	32	38.1
Characteristics of epidemics	First time appearance	64	76.2
	High incidences	20	23.8
Cholera	Yes	83	98.8
	No	1	1.2
Ebola	Yes	38	45.2
	No	46	54.8
HIV/AIDS	Yes	30	35.7
	No	54	64.3
COVID-19	Yes	76	90.5
	No	8	9.5
Other types of epidemics	Yes	49	58.3
	No	35	41.7

The study also required the participants to present their level of preparedness so as to handle such outbreaks (Table 3). It was observed that simulation was the common method to demonstrate preparedness to combat an epidemic (73.8%), most of the participants

were aware of the guidelines for biosafety and biosecurity (92.9%). Concurrently most of the participants agreed that working in a team is better approach to handle epidemics (70.2%).

Table 3: Awareness of the Participants on the Preparedness to Handle Epidemics

Category	Subject	Frequency	Percentage (%)
Simulation	Yes	62	73.8
	No	22	26.2
Biosafety guidelines	Yes	78	92.9
	No	6	7.1
Preparedness Team	Yes	59	70.2
	No	25	29.8

The findings present that most of the health workers who work outside the health facility communicate with

the community leader (88.1%) such as Street or hamlet (kitongoji) chairpersons, health facility in-charge



(66.7%) and few report to the district commissioner (26.2%).

In order to combat an epidemic (emergence), chain of command is required at all levels (Table 4), the participants especially in primary health centres,

responded that village leaders (88.1%) were responsible to command the mitigation of an epidemic, the health facility in-charge and few mentioned the district commissioner.

Table 4: Chain of Command when Reporting Epidemics

Category	Subject	Frequency	Percentage (%)
Hamlet/Community Leaders	Yes	74	88.1
	No	10	11.9
Health Facility In-charge	Yes	56	66.7
	No	28	33.3
District commissioner office	Yes	22	26.2
	No	62	73.8

The participants were also requested to provide information on how they handle the patients in epidemics (Table 5). It was found that 83.3% of the participants argued against treating patients with epidemics, some suggested traditional healing, placement of patients in treatment camps with special facilities (100%) and provision of preventive education (94.0%). The participants were also requested to rank

disease outbreaks as per their understanding and experience. The results present that cholera was the highest ranked epidemic (98.8%), COVID-19 (90.5%), Ebola (45.2%) and HIV/AIDS (35.7%). It was also noted that some of the participants could present more epidemics (58.3%) while others could not mention other epidemics (41.7%).

Table 5: Treatment of Patients in Areas where there is an Epidemic

Category	Subject	Frequency (n)	Percentage (%)
Health Facility	Yes	14	16.7
	No	70	83.3
Traditional Healing	Yes	03	3.6
	No	81	96.4
Placing in Treatment camps	Yes	84	100.0
	No	0	0.0
Preventive education	Yes	79	94.0
	No	05	6.0

In order to quantify the association of the factors to either management or occurrence of epidemics statistical analysis of the results was undertaken to establish the inference as well the causal relation of the factors. The factors were categorised based on the level of education of the participants, place or status of work

either at the health facility or outside the health facility and the chain of command once an epidemic occurs in the community. Table 6 shows that level of education was not statistically significant different among participant on matter related to preparedness and describing epidemics.

Table 6: Level of Education with Respect to Epidemic Handling

Category #1	Education level	Yes (n, %)	No (n, %)	p-value
Simulation	Diploma and below	39 (46.4%)	15 (17.9%)	0.431
	Biomedical degree	23 (27.4%)	07 (8.3%)	
Guideline for managing epidemics	Diploma and below	49 (58.3%)	05 (6.0%)	0.297
	Biomedical degree	29 (34.5%)	01 (1.2%)	
Categorising an epidemics	Diploma and below	39 (46.4%)	15 (17.9%)	0.191



	Biomedical degree	25 (29.8%)	5 (6.0%)	
Team formulation	Diploma and below	40 (47.6%)	14 (16.7%)	0.216
	Biomedical degree	19 (22.6%)	11 (13.1%)	

Table 7 shows that there was statistically significant difference ($p = 0.006$) among health care who are working at the health facility compared to those who are working. There is also significant difference ($p = 0.004$) on the understanding the importance of team formulation in epidemic management among health workers.

Table 8 shows that the reporting of the epidemics is statistically significant among health workers who are working at health facility as compared to those working outside the healthy facility.

Table 7: Working Station of the Respondents with Respect to Handling Epidemics

Category #2	Location assigned	Yes (n, %)	No (n, %)	p-value
Simulation	Health Facility	54 (64.3%)	16 (19.0%)	0.006
	Out of Health Facility	08 (9.5%)	06 (7.1%)	
Guideline for managing epidemics	Health Facility	68 (81.0%)	02 (2.4%)	0.438
	Out of Health Facility	10 (11.9%)	04 (4.8%)	
Categorising an epidemics	Health Facility	54 (64.3%)	16 (19.0%)	0.113
	Out of Health Facility	10 (11.9%)	04 (4.8%)	
Team formulation	Health Facility	45 (53.5%)	25 (29.8%)	0.004
	Out of Health Facility	14 (16.7%)	0 (0.0%)	

Table 8: Chain of Communication among Health Workers in and Outside Health Facility

Category #3 – reporting chain	Status of working	Yes (n, %)	No (n, %)	p-value
Hamlet/Community Leaders	Health Facility	62 (73.8%)	08 (9.5%)	0.527
	Out of Health Facility	12 (14.3%)	02 (2.4%)	
Health Facility In-charge	Health Facility	50 (59.5%)	20 (23.8%)	0.042
	Out of Health Facility	06 (7.1%)	08 (9.5%)	
District Administration	Health Facility	15 (17.9%)	55 (65.5%)	0.034
	Out of Health Facility	07 (8.3%)	07 (8.3%)	

Discussion

A cross-section analytical study was undertaken in Dodoma city for a period of October – November, 2020 to determine the preparedness of the human resource in combating epidemics in the city. The study involved eighty four (84) respondents with different education level in the health sector, those working in or outside health facilities. The study intended as well to assess their knowledge and skills on categorising forms of epidemics as compared to the routine disease they encounter in their practices

Table 2 presents the results on the general knowledge of health personnel to differentiate epidemics and endemics where most of the respondents could differentiate an epidemic from a pandemic, could categorise the nature of an epidemic and provide relevant examples such as COVID-19, cholera, Ebola, Zika, severe respiratory influenza and others. Therefore, having the proper knowledge of epidemics

is one step to manage such disease outbreaks. This finding has been reported by Ballard et al. [15] who cemented on the need to invest in train the community health workers as they are poised to play a pivotal role in fighting epidemics at different levels especially in poor resource communities.

Furthermore Boyce & Katz [16] commented highly on the continuous training of the community health workers so that they can promote epidemic preparedness prior to massive loss of human life. Furthermore, the health care providers act as community level educators and mobilizers, contribute to surveillance systems and filling service gaps. There is a knowledge gap of the health workers on the management of the epidemics [5,16,18]. All (100%) respondents fully endorsed that during epidemics all patients should be treated in specialized camps as indicated in Table 5. The inclusion of One Health



Approach that also addresses zoonotic diseases was not mentioned.

In this study the respondents presented concern on the ways are prepared to handle disease outbreaks with their area of jurisdiction. Such preparedness is sensitised among health care providers by simulating the handling of outbreaks, available protocols and teams for handling epidemics at different levels. This is in accordance with the National Action Plan for Health Security (NAPHS) 2017-2021 of Tanzania which provides the guidance on handling outbreaks. This aspect is also in accordance with the World Health Organisation [17] guidelines on handling epidemics; CDC² described almost similar guidelines which could be simulated to protect the public against bioterrorism. However, this finding was not in favour of those presented by Kajeguka et al. [6] who noted several gaps in the disaster and epidemic preparedness in various health facility settings. The authors noted that the few highly skilled workers were assigned more administrative positions in such health facilities; thus when an epidemic breaks the teams to respond to such scenario are mainly made of junior clinical and nursing staff.

It was also noted by this study that the chain of command among workers in the health sectors varied based on differs in the aspect of their understanding. The health workers at a health facility mentioned that epidemics are always reported to the community leaders (Table 8). This difference in understanding on the chain of command may affect the effectiveness of campaigns to contain an epidemic. It can be noted that disease outbreaks are capable of spreading can spread rapidly fast such that they can cause public panic, thus lack of proper chain of communication was mentioned by the respondents could be some of the limiting factor to execute procedures for managing an epidemics. This finding concurs with Froeschl et al. [18] who elaborated that communication between the health care providers and the community is vital for prevention and social mobilisation leading to containing of the diseases.

The authors further describe that containment of an outbreak in the research area is largely through integrated disease surveillance and response strategy. Mangu et al.¹⁹ insisted that rapid response to an outbreak involves well organised processes of communication, team development and supplies so as to manage the outbreak in a minimum time possible. While Froeschl et al. [18] justified the need for integrated local, National and International stakeholders to contain epidemics. Despite the relatively low number of respondents in this study; the authors are adamant to report the results are worth reporting due to the facts that epidemics are part and parcel of human and animal health. They frequently occur and case of life, finance and socio-economic

disintegration especially in the low-medium-income countries [20].

Study Limitation

This study was limited since it evaluated preparedness to combat epidemics in human health cadre only without including the livestock personnel. The inclusion of livestock sector could add value to the data obtained because a number of human diseases originate from animals. In addition, data collection was only based on personnel working in health facilities, leaving along health personnel in other categories such as health officers, lastly the authors could not verify infrastructures and equipment present.

Conclusion

The study aimed at evaluating knowledge of health workers to handle epidemics, the channels of communication in case an outbreak, working gears and protocol for biosafety and biosecurity to contain such outbreaks. This study concludes that although the health workers in Dodoma City are aware of the approach to respond to epidemics, however the capacity to carry out such responses can hardly be attained when an epidemic strikes. The study also deduces that most of the health staff despite having the knowledge to respond to epidemics, such knowledge has not been refreshed to cope up with the advancement of technology. The study comments that the capacity to respond to epidemics should be strengthened through training of health personnel as well equipping the health facilities accordingly.

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Ethical Clearance

An ethical clearance permit was sought and granted by St. Francis University College of Health and Allied science research review committee. The consent of the participant to be included in the study was obtained by an informed consent after filling the "Consent form" to participate in the study.

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The authors self-sponsored the study.

Conflict of Interests

The author declare no interest of interest during and after conducting this work.



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