

Community Factors Associated with Repeated Cholera Outbreaks in Chegutu Town, Zimbabwe

Caroline Muringazuva Makovere*, Hamidi Ismail

School of Government, College of Law, Government and International Studies, Universiti Utara Malaysia, Sintok Kedah, Malaysia

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Abstract Cholera remains a major public health threat in developing countries and communities where safe water and sanitation facilities are inadequately available. The disease is becoming endemic in Zimbabwe and Chegutu town hasn't been spared. The study was set to examine community factors associated with repeated cholera outbreaks in Chegutu town. A quantitative cross-sectional study was conducted to assess knowledge, experiences, and hygiene practices. Kobo collect was used for data collection and Epi Info Version 7 for analysis. A total of 385 participants were selected from five residential areas in Chegutu town. Seventy-two percentages were females, 41.30% were in the 18-35 age group whilst 21% were in the 50+ age group. Statistically significant factors associated with repeated cholera outbreaks were, being in the 18-35 age group OR 0.24(0.15-0.42) *p* value 0.00002, being 50+ OR 1.83(1.05-3.16) *p* value 0.03, knowing what cholera was OR 2.74(1.53-4.88) *p* value 0.0005, having attained primary school OR 2.03(1.02-4.03) *p* value 0.04, being widowed or divorced 2.21(1.05-4.60) *p* value 0.03, and staying in Pfupajena OR 0.50(0.04-5.62) *p* value 0.0001. Risky practices included not boiling untreated water 71%, not washing hands after handling waste 51%, not washing hands before preparing food 26%, and not washing fruits before eating 32%. Seventy-eight percentages were using contaminated water, 14% drinking unsafe water and 18% not cooking food thoroughly. Major risk factors associated with repeated cholera outbreaks were community unhygienic practices including drinking unsafe water, using contaminated water and not having a culture of handwashing. Targeted community's health awareness

should be strengthened.

Keywords Cholera, Chegutu Community, Risky Factors Contributing Factors, Significant Factors

1. Introduction

Cholera remains a major public health threat in developing countries and communities where safe water and sanitation facilities are inadequately available [1]. The World Health Organization (WHO) estimates that worldwide, annually, there are 1.3 million to four million cholera cases, with 21 000 to 143 000 deaths, and more than 94 percent of the cases are reported in Africa, [2]. Zimbabwe has a population of 15, 1 million people and 31,2 percentages have no access to proper sanitation facilities, [3,4]. Cholera is then becoming endemic in Zimbabwe with the country experiencing large widespread outbreaks in 2008 to 2009 [5], and Chegutu was not spared [6]. After the 2009 cholera outbreak, there was a dramatic decrease in cholera reports in the country but resurfaced in Chegutu 2012 and 2018 showing that the disease remains a public health threat. The 2018 outbreak had a case fatality rate less than 1%. [7]. Identified risk factors for cholera outbreaks include environmental factors, limited healthcare facilities and economic factors [1]. The disease is highly infectious characterized by profuse watery diarrhoea, with high case fatalities if untreated [2]. In Zimbabwe cholera response and surveillance are guided by

the Public Health Act and the Integrated Disease Surveillance and Response (IDSR). These two systems call for case-based reporting of all cases declaring one case of cholera as an outbreak [8]. Through these systems surveillance data on cholera and other priority diseases are compiled at the primary health care up to the National level down to primary health care. Observational records show that most cholera outbreaks originate in coastal regions, indicating a strong association between environment and the disease and less on the individual to community's role in repeated cholera outbreaks [9]. The disease was primarily linked to insufficient access to safe water and proper sanitation [7]. Despite addressing environmental problems leading to past cholera outbreaks, the disease continued to resurface. The study sought to analyse the role the community plays in repeated cholera outbreaks in Chegutu town, Zimbabwe.

2. Materials and Method

The study was conducted in 2020 to analyse the community role in repeated cholera outbreaks in Chegutu urban area. Using the calculated minimum sample size of 383 people, a quantitative study with a total of 385 participants was conducted. These were recruited from Kaguvi, Heroes, Hintonville, Pfupajena and Western residential areas of Chegutu urban. Data was collected using a questionnaire installed in KoBoCollect software which is a remote method of data collection. This tool allows data collection offline using mobile devices and data submission to an online server which can be accessed using data through a registered email and in this case the data was using the main researchers email address. The questionnaire was structured into four sections namely A, B, C and D in order

to answer the research, set objectives. A Likert questionnaire scale survey was used to assess the respondent's hygiene practices. The collected quantitative data using cell phones through KoBo was analysed using Epi Info 7 statistical package and figures and tables were used in data presentation. Descriptive statistics was conducted followed by bivariate analysis and finally univariate analysis to determine independent variables. Logistic regression was done to identify the independent factors associated with repeated cholera outbreaks in Chegutu town

3. Results

A total of 385 participants were selected into the study from five residential areas in Chegutu town. Females contributed to 72.21% of all participants and 41.30% of all participants were in the 18-35 age group. The 50+ age group contributed to 21% of the total participants whilst 41% were in the 18-35 age group. On the religious background of participants, it was found that 90percent were Christians, sixteen percent were Muslims, five percent Tradition and seventeen percent were neither of the given religions. Fifty percentages of the participants were not employed. On educational level at least 95% of the participants had reached a certain level of education (see Figure 1). Sixty-eight percentages of the participants had at least reached secondary level of education, whilst 22% had only primary school level. However, 5% of the participants had no any educational level.

Table 1 summarises the demographic findings of the study. The participants were asked whether they experienced the last two cholera outbreaks.and results showed that 80% confirmed experiencing the outbreaks see Figure 2.

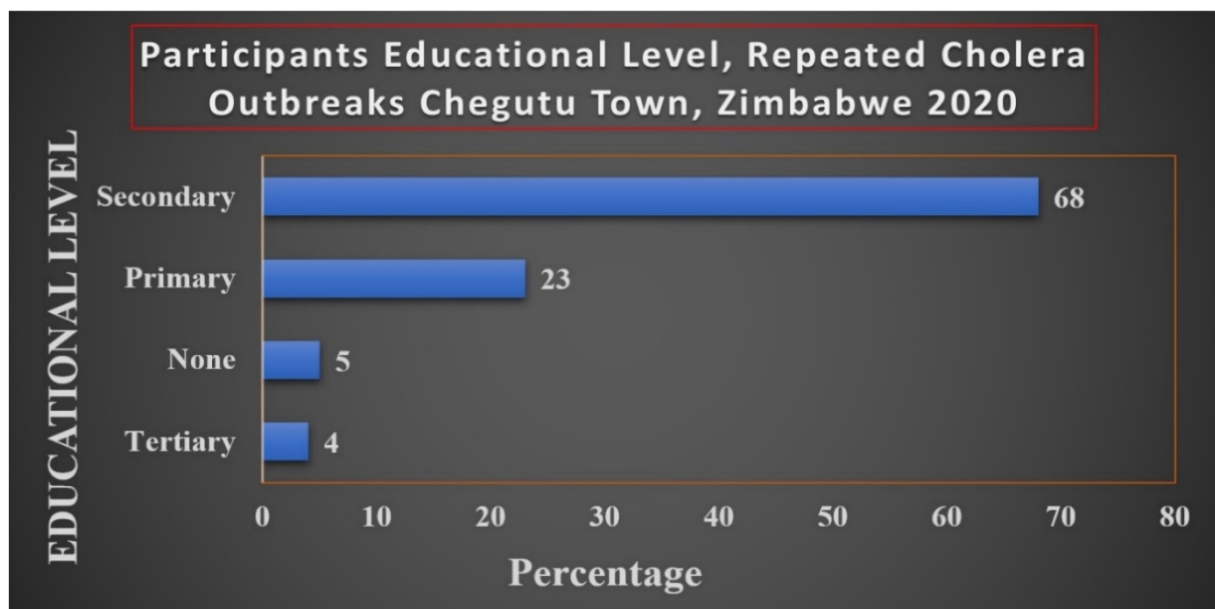


Figure 1. Participants Educational Level

Table 1. Demographic Characteristics of Participants, Chegutu 2020

*Statistically significant factor

Variable	Subcategory	Experienced Cholera		OR(95%CI)	p value
		Yes 308 (80%)	No 78 (20%)		
Sex	Female	216	62	0.61 (0.33-1.1)	0.1
	Male	92	16		
Age Group (years)	18-35	106	53	0.24(0.15-0.42)	0.00001*
	36-49	124	21	1.83(1.05-3.16)	0.03*
	50+	78	4	6.27(2.2-17.72)	0.0001*
Education level	None	18	2	2.35(0.53-10.38)	0.24
	Primary	77	11	2.03(1.02-4.03)	0.04*
	Secondary	200	62	0.47(0.26-0.86)	0.01*
	Tertiary	13	3	1.10(0.30-3.96)	0.88
Marital Status	Married	196	57	0.64(0.37-1.12)	0.11
	Single	43	12	0.89(0.44-1.78)	0.74
	Widowed/Divorced	69	9	2.21(1.05-4.60)	0.03*
Religion	Christian	275	72	0.69(0.28-1.72)	0.4
	Muslim	14	2	2.11(0.4-9.5)	0.31
	Other	14	4	1.01(0.32-3.1)	0.98
	Traditional	5	0	0(-1--1)	0.23
Residence	Heroes	38	22	0.36(0.19-0.65)	0.0005*
	Hintonvile	10	3	0.83(0.22-3.12)	0.79
	Kaguvi	34	22	0.50(0.04-5.62)	0.5
	Pfupajena	112	13	1.93(1.08-3.43)	0.0001*
	Western	113	18	0.86(0.38-1.94)	0.02*
Income	\$50	272	70	0.81(0.36-1.83)	0.62
	\$50 - \$100	30	3	2.69(0.80-9.08)	0.09
	\$100- \$200	3	3	0.24(0.04-1.24)	0.6
	\$200 - \$500	2	1	0.50(0.04-5.62)	0.57
	<\$500	1	8	0.02(0.01-4.05)	0.29

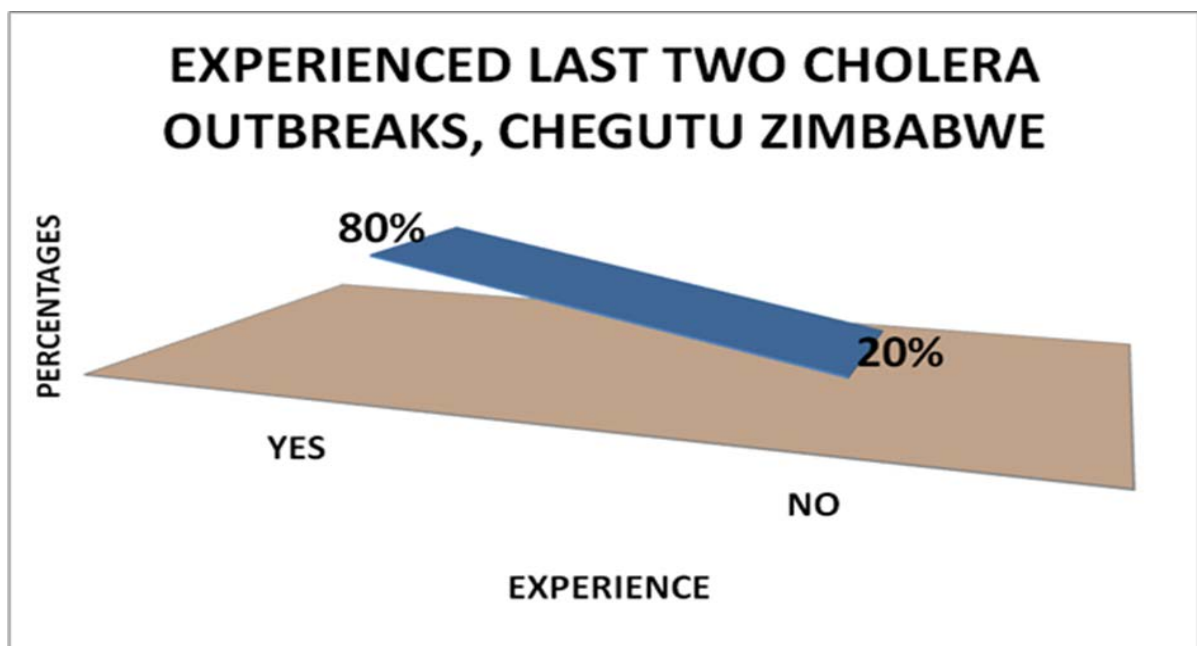


Figure 2. Cholera Experiences

More than half of the participants relied on borehole water as the main source of drinking and home use water and would queue for hours to access the water (Figure 3). On known causes of the last two cholera outbreaks 53% attributed it to lack of adequate water, 25% said it was because of cultural practices, 13% attributed it to poor hygienic conditions, 9% to supply of untreated water and 1% to unknown reasons. Eighty percentages of the respondents had experienced the last cholera outbreaks and 82.64% of all participants knew that cholera was a diarrheal disease with or without vomiting.

Hygiene practices were assessed among the participants using the Likert scale score close-ended questionnaire which provided answers with 1-5 choice as follows; 1 Not at all, 2 When necessary, 3 Neutral, 4 At times and 5 as Always. The results show that hand washing was evident from the responses given as most participants (369) 95.6% washed hands before eating whilst (284) 73.58% confirmed washing

of hands before preparing food. However, 2% confirmed to not washing hands before preparing food, 1% to not washing hands before eating and 2% to not washing hands after using the toilet. All these are risk factors to persistent cholera cases in Chegutu (Table 2).

Washing of fruits before eating was low 19% as well as boiling untreated water and more than half 52% confirmed not washing of hands after handling waste/garbage bins. Use of sanitisers was very minimal amongst the community as only 8% confirmed using hand sanitizers. Storing of water in safe and clean containers was evident as 95% confirmed storing water in clean containers. Cooking food thoroughly and served whilst still hot was evidenced by the 82% who confirmed so and 22% confirmed using contaminated water for dishwashing. Toilets were endeavored to be kept clean but however 84% complained of water challenges of keeping them in good hygienic conditions as sewage was observed in more than half of the households, (see Figures 4 and 5).



Figure 3. Borehole queue, Chegutu 2020

Table 2. Risky Practices associated with repeated cholera outbreaks amongst Chegutu community town, Zimbabwe

Practices	Not always n (%)	Always n (%)
Wash hands before preparing food	102(26)	284(74)
Wash hands before eating	17(4)	369(96)
Wash hands after using the toilet	65(17)	321(83)
Wash hands after attending a funeral	316(30)	270(70)
Wash hands after handling waste/garbage bins	197(51)	189(49)
Use hand sanitizers	355(92)	31(8)
Wash fruits before eating	125(32)	261(68)
Boil untreated water	314(71)	72(19)
Drink safe water	54(14)	332(86)
Store water in clean containers	22(5)	364(95)
Cook food thoroughly and eat whilst still hot	69(18)	317(82)
Keep toilets clean	63(16)	323(84)
Use contaminated water e.g., for dishwashing	302(78)	84(22)

TOILETS SITUATION IN KAGUVI SURBURB, CHEGUTU ZIMBABABWE



Figure 4. Toilets/Sanitation situation in Kaguvi

SEWAGE FLOWING, PFUPAJENA CHEGUTU ZIMBABABWE



Figure 5. Sewage flowing in Pfupajena

Analytic statistics (see Table 3) conducted showed that participants who were in the 18-35 age group were likely to experience cholera outbreaks and this factor was statistically significant **0.24(0.15-0.42) 0.00001**. Those in the 36-49 age group were also likely to experience the cholera outbreaks **1.83(1.05-3.16) 0.03*** and the factor was statistically significant. The 50+ age group was a significant contributor to experiencing cholera outbreaks **6.27(2.2-17.72) 0.0001***. Knowing that cholera was a bacterial disease caused by ingestion of food or water contaminated with the bacterium *Vibrio* OR **2.67(1.37-5.19) p-value 0.003*** was a significant

factor in this research. Washing of hands after handling bins was not being done by 51% of the participants whilst 71% had a habit of not boiling untreated water for drinking purposes. Sorting of water in safe and clean closed containers was not being done by 5% of the participants whilst 16% did not always keep the in housed toilets clean. On cooking food thoroughly and eating whilst still hot, 18% of the participants were not adhering to eating the food whilst still hot. Seventy-eight percentages of the participants reported using contaminated water e.g., for dishwashing and other home uses because of water inadequacy.

Table 3. Statistically significant factors (*), Chegutu 2020

Variable	Subcategory	Experienced Cholera		OR (95% CI)	p value
		Yes 308 (80%)	No 78 (20%)		
Age group	18-35	106	53	0.24(0.15-0.42)	0.00001*
	36-49	124	21	1.83(1.05-3.16)	0.03*
	50+	78	4	6.27(2.2-17.72)	0.0001*
Education level	Primary	77	11	2.03(1.02-4.03)	0.04*
	Secondary	200	62	0.47(0.26-0.86)	0.01*
Marital Status	Widowed/Divorced	69	9	2.21(1.05-4.60)	0.03*
Residence	Heroes	38	22	0.36(0.19-0.65)	0.0005*
	Pfupajena	112	13	0.50(0.04-5.62)	0.0001*
	Western	113	18	1.93(1.08-3.43)	0.02*
What cholera is	A diarrhoeal disease with or without vomiting	265	54	2.74(1.53-4.88)	0.0005*
What cholera is	A bacterial disease caused by ingestion of food or water contaminated with the bacterium <i>Vibrio cholerae</i> .	111	22	2.67(1.37-5.19)	0.003*

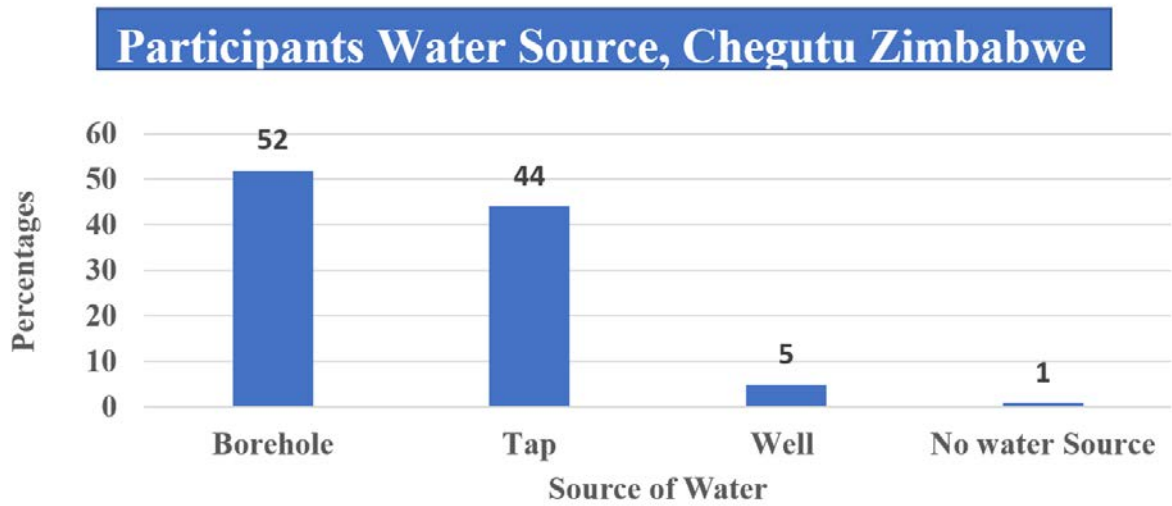


Figure 6. Participants source of water

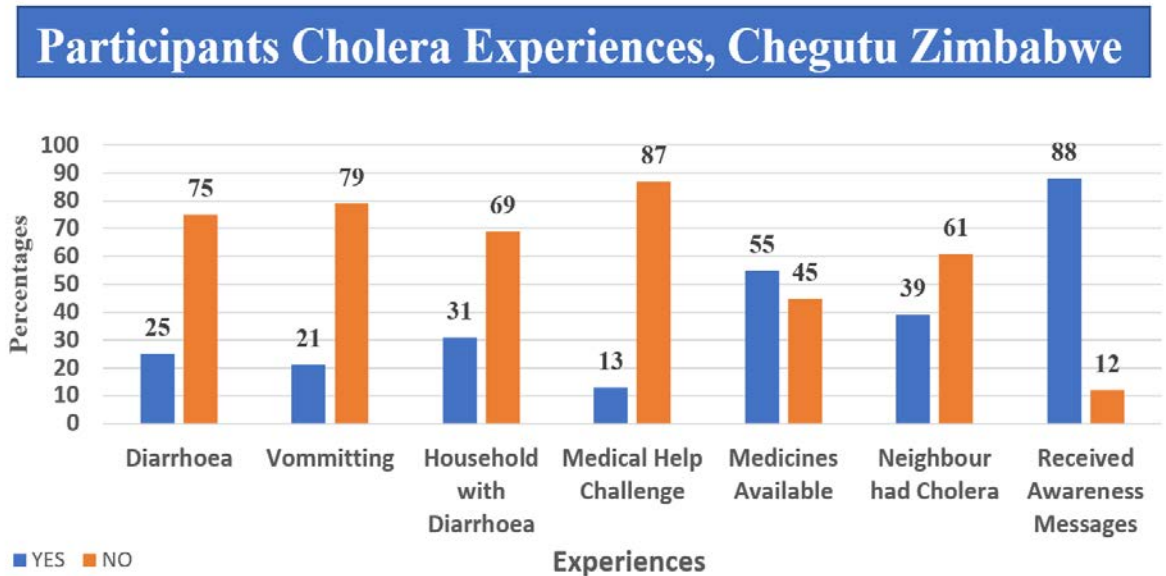


Figure 7. Participants Cholera Experiences

The study results (see Figure 6) show that most participants (52%) were using borehole water as their household’s source of water. Tap water was being used by 44% of the participants and one percentage had no water source. The graph shows that 47% of the participants got their water from the open space where boreholes were located. Forty percentages had water access from their own yards. Overall, 60% of the participants had no water access from their households.

Figure 7 shows cholera symptoms experienced by some participants during the cholera outbreaks. Twenty-five percentages of the participants had diarrhoea whilst 79% did

not experience any vomiting. Amongst those who had cholera 87% did not experience any medical accessing challenges at the health facilities. On receiving health awareness messages, 88% of the participants acknowledged receiving these messages so that the community was aware of the outbreak and preventive measures. Thirty-one percentages of the participants had a household member who also had cholera and 13% had challenges in accessing medical help. On assessing if the participants had any neighbour also suffering from cholera, 39% confirmed having had a neighbour who had cholera which is almost a quarter of the sampled population.

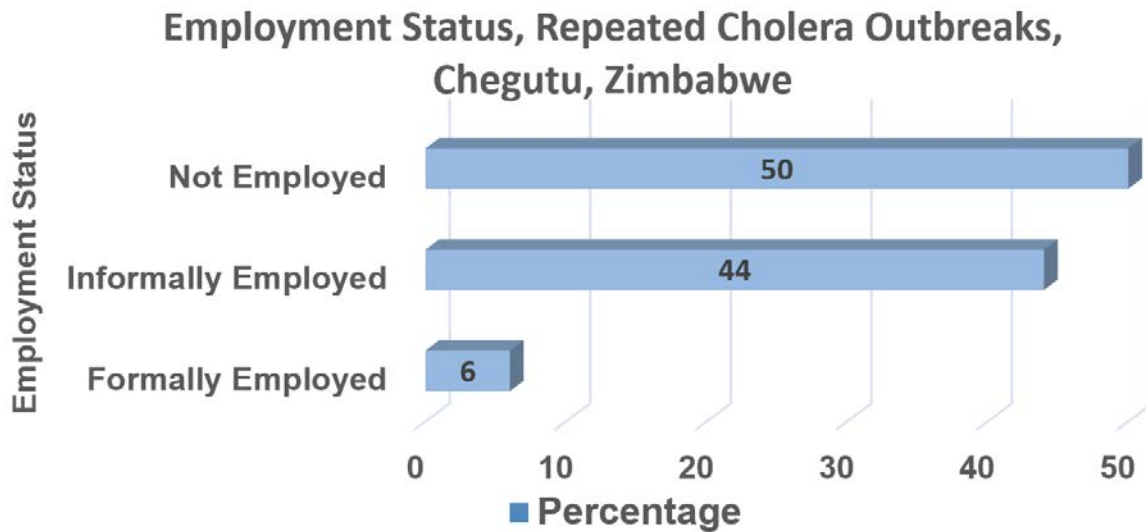


Figure 8. Participants Employment Status

Figure 8 shows the employment status of the participants. It shows that 50% of the participants were not employed. The other half was employed and amongst them six percentages were formally employed. Forty four percentages of the participants were informally employed.

4. Discussion

To our knowledge and literature review this was a first study in Chegutu City to assess community factors associated with repeated cholera outbreaks in Heroes, Hintonville, Kaguvi, Pfpajena and Western suburbs. Overall, 80% of the study participants had experienced the last two outbreaks. The community as defined by [10] as a group of people linked by social ties and sharing common perspectives in same geographical location was evident in these communities. The participants in this study would share same water source points at borehole sites, as shortages of water supply would bring them together. The Chegutu community had participants with different backgrounds and this is consistent with the findings by Chiyangwa [11] who described the community in his study as a group of people who had a common interest binding them together which could be social cultural factors, physical location as well as values and expectations. The repeated cholera outbreaks could be attributed to the number of people sharing the same common water source. As evidenced by the findings of Dr John Snow who traced a cholera epidemic in London which was linked to contaminated water from a single pump [11].

The majority of the participants were females (72%) but this was not a significant contributing factor. However, age groups played a crucial role in contributing to repeated cholera outbreaks as the 18-35 OR 0.24(0.15-0.42) 0.0001 and 50+ OR 6.27(2.2-17.72) 0.0001 were significant factors.

This finding was similar to the findings by Cuneo [6]

where all age groups were affected by the Zimbabwe cholera outbreak. To further analyse age groups Maponga [5] compared Kadoma and Chegutu 2008-2009 cholera outbreaks and found out that affected age groups and gender were similar. This similarity in this study shows how cholera affects all age groups in communities such as Chegutu. This finding of having all age groups significantly playing a role in repeated cholera outbreaks is also similar to findings by Macqueen [12] in Haiti where it was re-affirmed that cholera is a public health threat.

Similarly, in this study educational level played a crucial role in contributing to repeated cholera outbreaks. Significantly, participants who completed primary and secondary level of education were likely to contribute to repeated cholera outbreaks. This finding is also similar to the finding from a study conducted in Ghana where education level contributed to recurring outbreaks among other factors [13].

Though 82% had that idea, only 34% understood that it was a bacterial disease caused by ingestion of food or water contaminated with the bacterium *Vibrio cholerae*. Most of the participants (84.97%) knew that poor hygienic conditions contributed to causing cholera outbreaks and cholera symptoms were known by most (97.15%) of the participants as all symptoms could be picked by all of them. Little knowledge levels were shown on effects of eating unwashed fruits or vegetables (27%) to be a cause of cholera. From the results, it shows that there is a knowledge gap on the actual causes of cholera, however poor hygienic practices (85%) were the main known cause of cholera known by the participants. Furthermore, the study analysed the socioeconomic status of participants and those who were either widowed/divorced were more likely to significantly contribute to repeated cholera outbreaks.

This shows the role of individuals into community in contributing to recurring cholera outbreaks and dynamics. A study by Jutla [14] showed that populations categorised as

low in socioeconomic status were more likely to experience cholera outbreaks and associated burdens. This shows socioeconomic development can be a solution in controlling recurring cholera outbreaks. Zimbabwe recorded deadliest cholera outbreaks in recent years (98,585 cases and 4,287 [4.3%] deaths), and Chegutu had a Case Fatality Rate >5% [14]. Similarly, in this study residential area contributed to recurrence of cholera outbreaks. Those who stayed in Heroes, Pfupajena and Western significantly contributed to the recurrence. The high population density was a contributing factor to cholera outbreaks. In another study conducted in Chegutu McAteer [15], it was found out that localized cholera outbreaks were associated wedding or funeral gatherings, washing dead bodies and meal preparation

Furthermore, there was an assessment of knowledge levels of the community members in Chegutu because of the repeating cholera outbreaks making the disease a vital health concern. Chegutu is becoming a cholera hot spot prompting the need to assess knowledge levels as a contributing factor to repeated cholera outbreaks. In this study we found out that most participants knew what cholera was but lacked the knowledge on the actual causes of the disease. This finding is consistent with the findings in Ghana where there was a substantial knowledge deficit on environmental factors causing cholera [16]. However, better knowledge on cholera is caused by ingesting food or water contaminated by bacterium *Vibrio cholerae* and it being a disease with or without vomiting was found to be associated with repeated cholera outbreaks.

Cholera outbreaks are investigated in order to identify transmission mode, assess patients' experiences and preventive measures. This study assessed all this among a quarter of participants who had cholera during the past cholera outbreaks. Most of them experienced vomiting and

some had diarrhoea. Among the patients who had cholera almost half of them had their family members suffer from cholera showing that the disease can be transmitted from person to person. This is consistent with the findings by Phelps where the cholera transmission chain involved person to person and helpers [17].

5. Conclusions

The study sought to assess the community related factors associated with repeated cholera outbreaks in Chegutu town, Zimbabwe. It can be concluded that cholera has been endemic in Chegutu where cases have not been imported from elsewhere but have been emanating from within the community. Factors associated with repeated cholera outbreaks in Chegutu were age, educational level, marital status, area of residence and employment status. It was also found out that there were community risky factors associated with repeated cholera outbreaks. These practices were not drinking safe water, not having a habit of washing hands before eating, not washing fruits before eating and using contaminated water.

6. Recommendations

It is there recommended that:

1. Continued health education and awareness campaigns amongst the communities.
2. The local authority to have a multi sectorial approach with Government and Non -Governmental agencies in preventing communicable diseases within the Chegutu urban area.

Annex A: QUESTIONNAIRE

REPEATED CHOLERA OUTBREAKS IN CHEGUTU

By

CAROLINE MURINGAZUVA MAKOVERE

Good day! I am Caroline, a PhD student with Universiti Utara Malaysia attached to Chegutu City Council Health Department in conjunction with Chegutu General Hospital. I am conducting a study to assess knowledge, practices and factors contributing to repeated cholera outbreaks in Chegutu community. I would like to ask you questions that will assist in coming up with strategies to prevent further repeated cholera outbreaks. You are free to accept or reject this request. Thank you

DOCTOR OF PHILOSOPHY

UNIVERSITI UTARA MALAYSIA

2020

SECTION A: RESPONDANTS SOCIO-DEMOGRAPHIC DEMOGRAPHICS

This section lists down the background information of the study participants.

1. Sex

- (i). Male
- (ii). Female

2. Age

- (i). 18-35
- (ii). 36-49
- (iii). 50+

3. Highest level of education?

- (i). None
- (ii). Primary
- (iii). Secondary
- (iv). Tertiary

4. Marital status

- (i). Single
- (ii). Married
- (iii). Widowed/divorced

5. Religion

- (i). Christian
- (ii). Muslim
- (iii). Traditional
- (iv). Other

6. Where do you stay in Chegutu?

- (i). Kaguvi
- (ii). Heroes
- (iii). Hintonvile
- (iv). Pfupajena
- (v). Western

7. Is the suburb in a low, high or medium density area?

- (i). Low density area
- (ii). Medium density area
- (iii). High density area

8. What is your regular employment?

- (i). Formal employment
- (ii). Informal employment

9. Household income category?

- (i). \$50
- (ii). \$50 - \$100
- (iii). \$100- \$200
- (iv). \$200 - \$500
- (v). \$500+

10. What is your household’s source of water?

- (i). Tap water
- (ii). Borehole
- (iii). Well
- (iv). No water sources

11. Did you experience the last two Chegutu cholera outbreaks?

- (i). Yes
- (ii). No

12. What are your known causes of the last two cholera outbreaks?

- (i). Lack of adequate water supply
- (ii). Supply of untreated water
- (iii). Cultural practices
- (iv). Poor hygienic conditions
- (v). Unknown reasons

SECTION B: RESPONDENT’S KNOWLEDGE ON CHOLERA

This section intends to assess your knowledge levels regarding cholera.

[Place a \surd tick in the boxes below all your answers, *you are allowed to tick more than one answer*]

No.	Items	Tick in this box
1	WHAT IS CHOLERA	
i.	A diarrhoeal disease with or without vomiting	
ii.	A bacterial disease caused by ingestion of food or water contaminated with the bacterium <i>Vibrio cholerae</i> .	
iii.	A disease caused by poor hygienic practices	
iv.	A ten yearly disease of Chegutu community	
v.	A disease caused by poor management of the Municipality	
2	CAUSES OF CHOLERA	
i.	Non-availability of water	
ii.	Poor hygiene practices	
iii.	Drinking contaminated water and eating contaminated food	
iv.	Eating unwashed fruits/vegetables	
v.	Flies or insects	
vi.	Bad Spirits/curse/ bad omen	
3	CHOLERA SYMPTOMS	
i.	Watery diarrhoea	
ii.	Fever	
iii.	Stomach pains	
iv.	Dehydration	
v.	Joint pains	
vi.	General body weakness	

SECTION C: RESPONDENT'S EXPERIENCES

This section intends to assess your cholera experiences during the 2008-2009 and 2018 period

[Place a ✓ tick in the boxes below]

No.	Items
1.	Did you experience any diarrhoea associated with cholera?
2.	Did you experience any vomiting associated with cholera?
3.	Did anyone from your household experience any cholera symptoms?
4.	Did you have any challenges seeking medical help?
5.	Was the health facility providing patients with adequate medications?
6.	Did your neighbours suffer from cholera?
7.	Did you get any community cholera awareness messages regarding the cholera outbreak within Chegutu?

SECTION D: RESPONDENT'S HYGIENE PRACTICES

This section seeks to assess your hygiene practices.

[Place a ✓ tick in boxes below]

Scale:

1. Not at all
2. When necessary
3. Neutral
4. At times
5. Always

No.	Practices	1	2	3	4	5
1.	Wash hands before preparing food					
2.	Wash hands before eating					
3.	Wash hands after using the toilet					
4.	Wash hands after attending a funeral					
6.	Wash hands after handling waste/garbage bins					
7.	Wash fruits before eating					
8.	Use hand sanitizers					
10.	Boil untreated water					
11.	Drink safe water					
13.	Store water in clean containers					
14.	Cook food thoroughly and eat whilst still hot					
15.	Keep toilets clean					
16.	Use contaminated water e.g., for dishwashing					

--- Instrument Ends ---

THANK YOU

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