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International Digital Organization for Scientific Research ISSN: 2550-7931
IDOSR JOURNAL OF APPLIED SCIENCES 8(2) 39-51, 2023.
https://doi.org/10.59298/IDOSR/2023/10.1.7003

Evaluation of factors that influence Reoccurrence of Cholera epidemics in Bwera Hospital, Kasese District

Muhindo Yosoni

Department of Nursing Sciences, Kampala International University Ishaka Campus, Uganda.

ABSTRACT

Cholera is an acute enteric infection characterised by sudden onset of profuse, painless watery diarrhoea and vomiting. Transmission of the disease is by faecal-oral route and from man to man via faecal contaminated water, ingestion of contaminated foods and drinks, and bottle feeding in infants. Globally, an estimated 1.4 to 4.3 million cholera cases and 28,000 to 142,000 cholera related deaths occur every year and the highest deaths rates occur in developing countries. The aim of this study was to explore the factors influencing reoccurrence of cholera outbreaks in Bwera hospital-Kasese district, Uganda. The study was a descriptive cross-sectional where quantitative strategy was applied on health workers and households within Bwera hospital. The study targeted 73 respondents; random sampling procedure was used. Three broad themes were based on to obtain results namely; sources of water for home use, environmental sanitation and the role of climate change. It emerged that water was mainly collected from unprotected sources using rudimentary methods and it was made safe by boiling. Hand washing was seen as a common practice done though occasionally. Generally solid wastes were poorly managed including human waste and reinforcing reforestation was seen as a remedy to avert effects of climate change. The commonest source of water for home consumption was from open water surfaces mainly rivers/streams. Boiling was seen as one of the commonest methods of making water safe for home consumption but the numbers of house hold that boils water are very few thereby making them prone to infection. Washing hands was the commonest practice especially before eating but still some children do ignore washing of their hands before eating if their caretakers are not around them; however, it was not consistently after visiting latrine. Poor waste disposal was seen present in the communities whereby bushes and river banks were seen as places where human waste is deposited.

Keywords: Cholera, Deaths, Households, Bwera hospital, contaminated Water.

INTRODUCTION

Cholera is a disease that continues to ravage developing countries and remains a serious public health problem in low-income countries despite efforts in the past to promote oral rehydration therapy as major treatment. It is caused by the toxigenic Vibrio cholera serotype 01 and 0139 [1]. Epidemics of cholera are characteristically abrupt and often have high potential to spread fast and cause deaths because it induces acute severe diarrhoea and can result in death if oral rehydration is not administered quickly. The epidemic reaches a peak and subsides gradually as the "force of infection" declines. Often times, by the time control measures are instituted; the epidemic has already reached its peak in waning World Health Organization [2]. The incidence of cholera tends to be highest in the lower socio-economic groups, and this is attributed mainly to poor hygiene. Vibrio cholera transmission is readily possible in a community with poor environmental sanitation. The environmental factors of importance include contaminated water and food. Flies may carry Vibrio cholera which later

contaminates food. Globally, an estimated 1.4 to 4.3 million cholera cases and 28,000 to 142,000 cholera related deaths occur every year. The disease incidence declines as communities develop and access to clean drinking water and food improves. Currently, cholera outbreaks mostly occur in developing countries especially Sub-Saharan Africa [3]. In Uganda, cholera was first reported in 1997, when 757 cases were reported to the WHO. During the subsequent years up to 1993, Uganda reported cholera cases every 2-4 years to the WHO, from 1994 to 1998, cholera was reported annually. In 1998, Uganda reported almost 50000 cases with incidence throughout the country. The reported incidences have fluctuated between 250 and 5000 cases every year since 2000. The decreased fatality ratio has decreased from 4-7% in the late 1990s to about 2-3% during 2004-2010 [4] [5-9]. The frequency of reported cholera cases varies among districts in Uganda. The highest risk areas include the border areas with the Democratic Republic of Congo, South Sudan, and Kenya as well as urban slums in Kampala. Displaced populations and their neighbouring communities are at elevated risk.

Statement of the problem

Globally, there is a continual increase in the number of cholera cases reported to the World Health Assembly between 2007 and 2011. In 2011, the World Health Assembly issued resolution 64.15 recognising that cholera is not being sufficiently addressed and calling for renewed global efforts in cholera control and prevention. A 58% decline in number of cases reported to WHO globally in 2012 and a further decline of 42% in 2013 may suggest some progress in the global response to the disease [4]. Cholera remains a significant public health problem in many parts of the world. In 2015, 42 countries reported of 172,454 cases including 1304 deaths resulting in an overall case fatality rate (CFR) of 0.8%. This represented a 9% decrease in the number of cases reported compared with 190,549 cases in 2014. Of the cases reported globally, 41% were from Africa, 37% from Asia and 21% from Hispaniola [5]. In Uganda, cholera affected all ages, but the geographic distribution of the disease was very heterogeneous. In 2013, a study conducted revealed that an estimated average of about 11,000 cholera cases occurred in Uganda each year, which led to approximately 61-182 deaths. On 14th March, 2015, the Kasese district Health Officer notified Ministry of Health (MoH) Uganda of cholera outbreak in the district which was confirmed on 15th March, 2015 in a 12-year-old boy to be Vibrio Cholera 01, biotype El Tor, serotype Inaba. Prior to his symptom on set, this case-person reportedly had crossed the border to DRC where cholera outbreak had occurred recently [6].

According to the Independent Magazine, a local newspaper in Uganda, it reported on 2nd October, 2017 that there was cholera outbreak in Kasese district and three people had died in Nyakiyumba sub-county. The Ministry of Health (MoH) Uganda confirmed that up to 73 suspected cases had been handled by local health officials with 53 of these discharged and 17 still receiving treatment at Bwera hospital in western Uganda and an isolation ward was set up in order to avert further spread of the disease (www.indepenent.co.ug).These recurrent outbreaks require concerted efforts to find more about the causes of the recurrences so that appropriate solutions can be used. This therefore requires research to be conducted to dig more about the factors that have contributed to the outbreaks.

Aim of the study

This study aims at identifying factors which have persistently favoured the reoccurrence of cholera outbreak in different parts of the world basing on the previous studies and available statistical data from various reliable sources. The results of the study will help different stakeholders to reconsider priorities in terms of resource allocations in order to avert this epidemic and also to assess the factors contributing to the recurrence of cholera outbreaks in Bwera hospital, Kasese district.

Specific objectives

I. To determine how the source of water for domestic use affect the recurrence of cholera outbreak.

II.To assess the impact of waste disposal on the recurrence of cholera outbreak.

III.To evaluate the role of climate change on the recurrence of cholera.

Research questions

- What are the successes and challenges of cholera prevention and control in Kasese district and Uganda as a whole?
- How does climate change affect the reoccurrence of cholera?
- What were the relationship between cholera occurrence related to water, sanitation, income and urbanization?

Justification of the study

To the Management

The result of the study will help the district health officials and ministry of health to re-strategize the methods of cholera outbreak control. It will also be as an alarm to the concerned officials about the health of their peoples and the country at large.

To the Nursing Educations

The result will help student researchers to wide knowledge and create same mechanism of coping and dig out more cause about the away of presenting their research to the concerned authorities. The results of the study will help the district officials and the MoH to re-strategize methods of cholera outbreak control.

To the community

The results of the study will help to improve general conditions of the communities since reoccurrences of cholera bring a burden to the health workers especially the nurses during management. In many areas, crude damping of solid wastes has been used as a method of solid waste disposal. Studies have shown that this method has acted as breeding places for many disease-causing microorganisms. The results of this study will help in improving on the current methods of solid waste disposal.

To the Researcher

As part of the requirement for the partial fulfilment for attaining a diploma in nursing, this research project will help the researcher to be able to complete his course and widen his or her knowledge.

METHODOLOGY

Study design and rationale

The study was a descriptive cross-sectional applying quantitative strategy. Quantitative analysis was carried out on health workers and the households within Bwera hospital aiming at getting their views about factors affecting recurrences of cholera outbreak in the hospital, Kasese district for a period of three weeks; from 3rd -24thFebuary, 2018. The study was descriptive because data collected was presented in numerical values and tables which were easy to present and interpret. Cross sectional study design was used because it gave information at one particular point in time and is useful in exploring the study and enabling a detailed data analysis.

Area of Study

The study was conducted in Bwera hospital. It is located in Bwera sub-county, Kasese district about 5km from the border with Democratic Republic of Congo (DRC). This place was chosen because most of cholera cases from the sub country, and other neighbouring communities are handled there. Bwera general hospital, also known as Bwera hospital is a hospital in the western region of Uganda. It is located in the town of Bwera, in Kasese district, near the international border with DR Congo, approximately 127 km (79 miles) south west of Fort Portal Regional Referral Hospital and about 163 km northwest of Mbarara Regional Referral Hospital. It is a general hospital caring for the public and is owned by the Uganda Ministry of Health. It serves the surrounding sub-counties in Kasese district, and patients from neighbouring DRC. It is the only government-owned hospital in Kasese district, as of May 2016, the hospital's bed capacity was 100, although many times it admits up to 300.

Study population

The study targeted health workers and households who are 18 years and above within Bwera hospital.

Sample size determination

Sample size determination was calculated using the formula of Kish and Leslie (1965) indicated below as;

$$n = \frac{Z^2PQ}{d^2}$$

Where; n-represented sample size
Z-represented the standard deviation usually set at 1.96.
P- Known characteristic of the population at 95%=0.95
Q= 1-P. therefore, Q=1-0.95
Q=0.05
D-Degree of accuracy by the researcher, 5%

$$n= \frac{(1.96)^2X0.95X0.05}{(0.05)^2}$$

$$n= \frac{3.8416X0.95X0.05}{0.0025}$$

n= 72.9904
n= 73

According to Kish-Leslie, the population size of 84 at 90% response distribution with a margin error of 5% and confidence level of 95%, the sample size would be 73. This study adopted this sample size. For this study, this number was taken to be adequate representation of the population. Therefore, the researcher will target 73 respondents.

Sampling procedure

A simple random sampling procedure targeting health workers and households within Bwera hospital was selected to form a sample of 73 respondents.

Inclusion criteria

Heads of departments and other health workers who have worked at Bwera general hospital for at least two years and heads of households both male and females who live within the vicinity of the hospital and are 18 years and above. The household members who have stayed at Bwera hospital for at least 3 years and have witnessed the outbreak of cholera [10-15].

Exclusion criteria

Health workers who have spent less than two years working with Bwera hospital, household members who have stayed within the hospital less than three years and are less than 18 years of age.

Definition of variables

Factors which influence the reoccurrence of cholera outbreaks are independent and reoccurrence (independent variable) of cholera outbreaks depend on those factors.

Research instruments

Interviewer administered a pre-tested questionnaire in English to each respondent. This method was used because it facilitated respondents' encouragement and ensures maximum confidentiality. However, for respondents who do not understand English, an interpreter translated into the language they understood well. Pens, pencils, ruler, rubber, clip board and papers were used in the collection of data.

Data collection procedure

The researcher collected data himself using an interviewer administered questionnaire. Each respondent was interviewed separately one at a time so as not compromise views of other respondents.

Data management

After data collection, the questionnaire was checked for completeness and any mistakes made was corrected. No additional information was added to the questionnaires and were kept very well for future reference and total confidentiality.

Data analysis and its presentation.

Data collected was analysed manually on papers by tallying and considering each questionnaire at a time which then will be presented in pie charts, tables, bar graphs and texts. The purpose of analysing data is to minimize errors and maximize accuracy.

Ethical consideration

Permission was sought from the university administration that provided with an introductory letter which was presented to the medical director of Bwera hospital. Names of the respondents were not written to ensure confidentiality and respondents were informed of their right to participate or withdraw from the exercise any time. The researcher sought

consent from the respondents after a brief introduction and was asked to consent by signing on the questionnaire.

RESULTS

Demographic characteristics of the respondents

Table. 1 shows the demographic characteristics of the respondents

Characteristics	Number (N=73)	Frequency (%)
Age (years)		
>18-23	18	24.7
24-28	26	35.6
29-33	22	30.1
>33	07	9.6
Sex		
Male	30	41.1
Female	43	58.9
Ethnicity		
Bakonjo	27	37.0
Batooro	20	27.4
Banyankole	14	19.2
Others	12	16.4
Religion	28	38.4
Catholics	36	49.3
Anglicans	02	2.7
Muslims	07	9.6
Others		
Marital status		
Married	42	57.5
Single	27	37.0
Divorced	03	4.1
Widowed	01	1.4
Level of education		
Primary	14	19.1
Secondary	19	26.0
College	30	41.1
University	13	17.8

From table. 1 above, majority of the respondents, 26(35.6%) were between the age bracket of 24-28 years and the least, 07(9.6%) were above 33 years. This implies that cholera affects people of all age groups.

More than half of the respondents, 43(58.9%) were females and only 30(41.1%) were males. This was because most of the people who are always at home are females and so are the nurses. Regarding the ethnicity of the respondents, the largest portion of the respondents, 27(37.0%) were Bakonjo and the least number, 12(16.4%) was from other ethnicities. This was expected since

the study area was located in a place which is dominantly occupied by the Bakonjo. Almost half of the respondents, 36(49.3%) belonged to Anglican faith and the least belonged to Muslim faith, 02(2.7%). This illustrates that once there is an outbreak of cholera, it does not discriminate in religions. Furthermore, more than half of the respondents, 42(57.5%) were married and the least, 01(1.4%) were those who were widowed. This implies that no matter the social support but the reoccurrence of cholera has persisted therefore suggesting other measures are required. Regarding level of education, most of the respondents, 30(41.1%) had attended to college/institutions, and the least, 13(17.8%) had attended to university. These low levels of education may suggest low level of awareness about the causes of cholera which may have contributed much to the reoccurrences.

Source of water supply

Table. 2 shows sources of water supply, methods of water collection, purification and general hygiene

Response	Number (N=73)	Frequency (%)
Source of water supply		
River/stream	28	38.4
Lakes	22	30.1
Shallow wells	10	13.7
Gravitational water system/taps	13	17.8
Methods of water collection		
Jerri cans	40	54.8
Buckets	23	31.5
Sauce pans	10	13.7
Calabashes	00	0.00
Methods of water safety		
Boiling	58	79.5
Decantation	04	5.5
Chlorination	10	13.7
Filtering	01	1.3
Separation of water for home consumption from that of animals		
Yes	45	61.6
No	28	38.4
Regularity of hand washing after visiting latrines		
Always	24	32.9
Sometimes	46	63.0
Never	03	4.1

Water source: Most of the respondents, 28(38.4%) reported that they collect water for home consumption from streams/rivers. This number is followed by those who collect from lakes, 22(30.1%). Those respondents who access gravitational water systems were relatively few and the least number were those who collect from shallow wells. The commonest method of handwashing used, 40(54.8%) was reported as use of jerry cans and the least were those who used sauce pans, 10(13.7%). More than half of the respondents, 58(79.5%) ensured that they make their water safe for drinking by boiling, and this is followed by the less number who use decantation and filtering as 04(5.5%) and 01(1.3%) respectively.

Water source separation: The largest portion of the respondents, 45(61.6%) reported that the water sources for home consumption is separate from that of animals while 28(38.4%) reported to be sharing the same water source with animals. Hand washing: More than half of the respondents, 46(63.0%) reported that they sometimes wash hands after visiting latrines, these are followed by those who wash hands always and the least number, 03(4.1%) never washed their hands.

Environmental sanitation

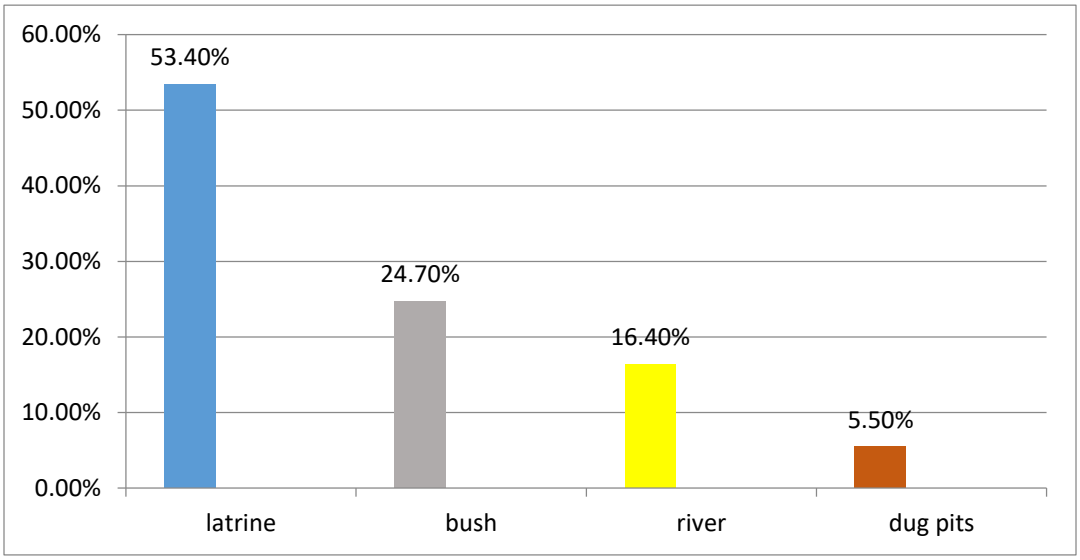

Figure. 1 above shows places of convenience of the respondents

Most of the respondents, 39(53.4%) reported to be easing themselves using latrines, these are followed by those who ease themselves from the bush, 18(24.7%) and then a relatively high number, 12(16.4%) who use rivers and the least 04(5.5%) who use dug pits.

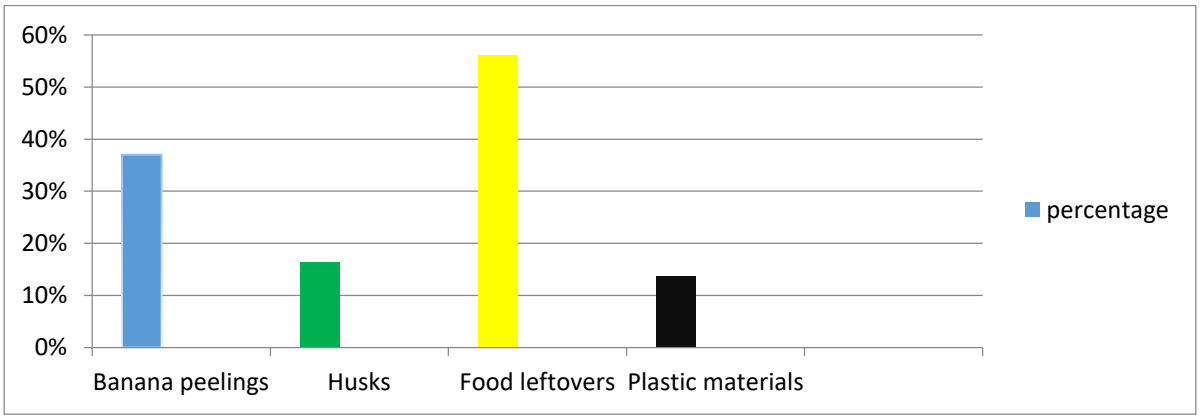

Figure. 2 above shows examples of solid materials in homes of the respondents

From figure 2 above, more than half of the respondents, 41(56.2%) indicated that the commonest solid materials were food leftovers while the least, plastic materials and banana peelings had similar representation, 10(13.7%). This implies

that both degradable and biodegradable materials have potential to cause cholera.

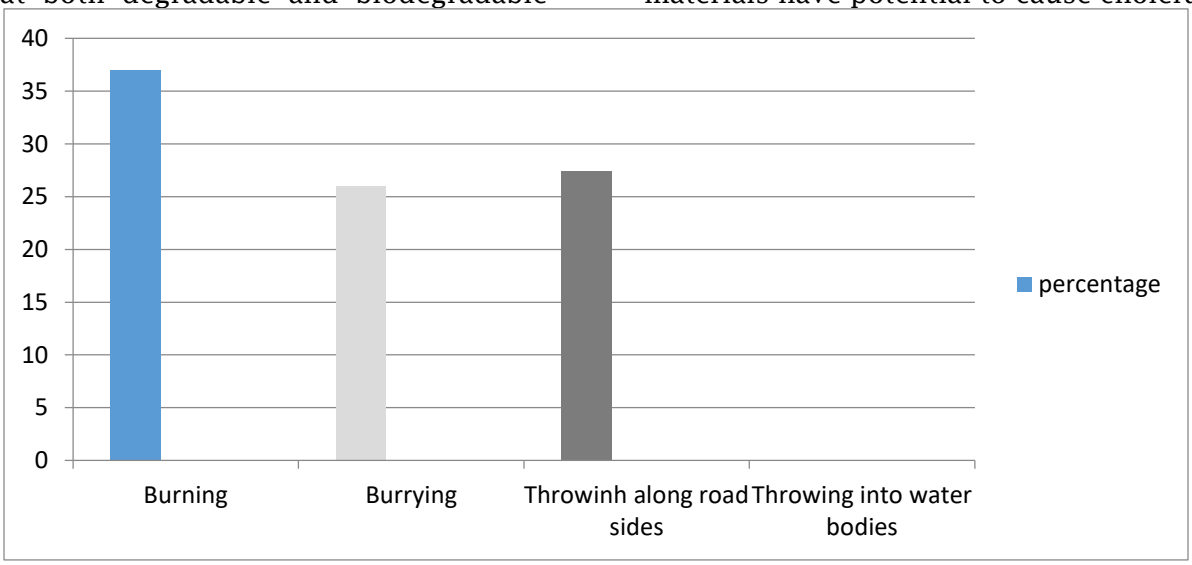

Figure. 3 above shows methods of waste disposal used by the respondents

From 3 above, most of the respondents, 27(37.0%) reported that they dispose wastes by burning and the least, 07(9.6%) throw into water bodies. This implies that the method of waste disposal plays a key role in causing cholera outbreak.

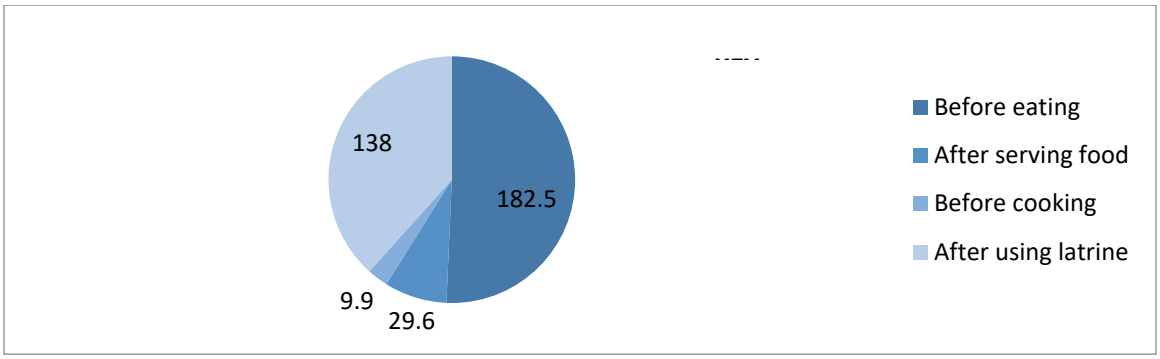

Figure 4. Above shows the time of washing hands

The largest portion of the respondents, 37(50.7%) wash hands before eating and the least were those who wash hands after serving food and before cooking as 06(8.2%) and 02(2.7%) respectively. This shows that hand washing was not done at the same time.

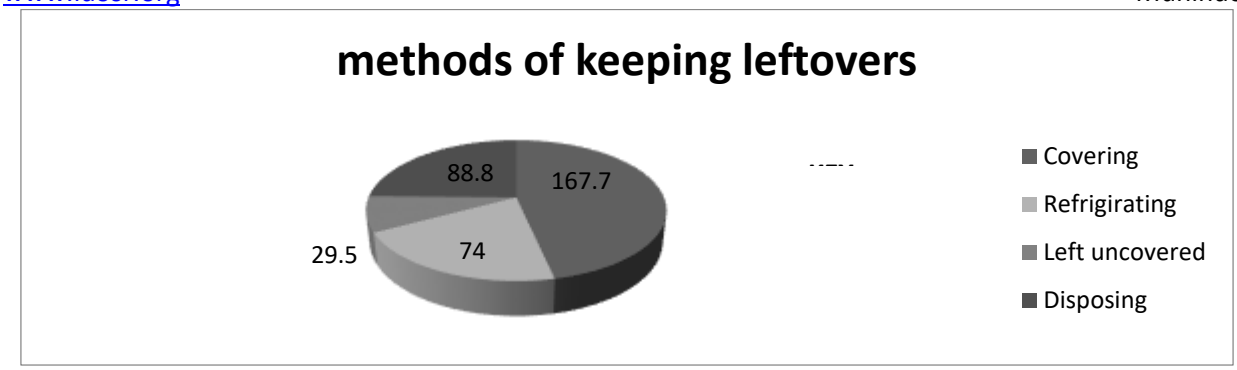

Figure. 5 shows different ways of keeping leftover food

The largest portion of the respondents, 34(46.6%) were keeping leftover food by covering while the least, 06(8.2%) were not covering the leftovers. This increases the exposure of the leftovers to the disease carrying vectors to spread the disease-causing microorganisms.

Climate change

Table. 3 represents causes, effects and measures in place to control climate change

Item	Number (N=73)	Frequency (%)
Effects of dry season		
Drying of water bodies	27	37.0
Drying of vegetation	43	58.9
Encouraging growth of microorganisms	03	4.1
Effects of heavy rains		
Destruction of buildings and crops	26	35.6
Destruction of water sources	14	19.2
Flooding of running water	32	43.8
Destruction of sanitary facilities	01	1.4
Causes of climate change		
Cutting down of trees	34	46.6
Sand mining	10	13.7
Bush burning	24	32.9
Air pollution	05	6.8
Measures in place to avert climate change		
Reinforcing afforestation	35	48.0
Sensitisation of communities on effects of environmental degradation	20	27.4
Improving methods of solid waste disposal	13	17.8
Gazetting areas for sand mining	**05**	**6.8**

Effects of dry season

More than half of the respondents, 43(48.9%) indicated the most effect of dry season as drying of vegetation and the least, 03(4.1%) cited growth of microorganisms. This therefore indicates that increased temperatures play a role in the reoccurrence of cholera.

Effect of heavy rains

Almost half of the respondents, 32(43.8%) reported that flooding of running water and the least reported destruction of sanitary facilities, 01(1.4%). This shows that heavy rain tempts residents to poorly dispose their wastes due to lack of sanitary facilities.

Causes of climate change

Most of the respondents, 34(46.6%) indicated cutting down of trees and the least were those who reported sand mining and air pollution as 10(13.7%) and 05(6.8%) respectively. This implies that human activities have progressively affect the environment and so has contributed much to climate change.

Measures in place to avert climate change

Most of the respondents, 35(48.0%) reported reinforcing afforestation and the least reported gazetting areas for sand mining, 05(6.8%). This implies that afforestation may play a big role in reversing would be severe effects of climate change.

DISCUSSION

Demographic characteristics of the respondents: Most of the respondents, 26(35.6%) were between the age bracket of 24-28 years, females dominated the study with a proportion of 43(58.9%). 27(37.0%) were Bakonjo. This was expected since Bwera hospital is located in Rwenzori region whose dominant tribe are Bakonjo. However, all the above had no effect on the study. From the study, it was found out that most of the respondents, 28(38.4%) collected water for home consumption from streams/rivers. This main source of water (steams/rivers) puts the health status of the community members at a high risk of contracting water-borne diseases such as cholera since the source is not protected and can easily be contaminated. This finding corresponds with the study conducted in [7] who found out that deteriorating environmental conditions subsequently exposed the majority of inhabitants to an increased risk of contracting water-borne diseases due to scarcity of safe drinking water supplies. The study revealed that the commonest method of water collection was use of jerry cans, 40(54.8%). This rudimentary way of collecting water combined with unprotected water sources increase risks of exposing the community members to unsafe water which in turn promotes the transmission of water-borne and water-related diseases such as bilharzia, dysentery and cholera. This was in line with findings by [8] which indicated that according to the study carried out in Araihazor, about 30 million people were exposed to unsafe levels of arsenic in their drinking water. It was further revealed that surface water was the main source of household water despite being contaminated and very unsafe for human consumption [16-20][8].

Environmental sanitation

The results from the study revealed that 39(53.4%) use latrines as places of convenience. This was not in line with a study conducted in Uganda by [7] who found out that most of people lacked pit latrines and when it would rain water would carry human wastes to the water sources. The study revealed that 41(56.2%) of the respondents had the commonest solid waste as food leftovers whose disposal was by burning. This was in line with the findings of [8], [21-23], [7] which was revealed that in Zanzibar in highly density areas were the most affected by poor management of solid waste disposal in areas with no system for disposal of collected garbage from various households who resorted to erratic dumping covering even roads, other households would dig and burry or burn while others wait for the night and throw the garbage along the roads or vacant spaces.

Climate change

The results of the study revealed that 43(48.9%) of the respondents noted that the commonest effect of dry season was drying of vegetation. Vegetation creates low temperatures characterised by humid atmosphere which disrupts breeding cycles of most microorganisms and so reducing spreading of diseases. However, drying of this vegetation cover facilitates breeding of these vectors hence easy spread of diseases. This corresponds with studies done by [8] which showed that global warming created favourable environment for the cholera bacteria to multiply; rise in temperature coupled with heavy rainfalls caused the climate change ideal conditions were created for

the bacteria that cause cholera to multiply. According to the data from the study revealed that 32(43.8%) reported flooding of running water as the most effect of heavy rains. Flooding water accompanied by raised temperatures create favourable conditions for multiplication of various disease-causing microorganisms including those causing cholera. However, if reforestation is reinforced especially in catchment areas, vegetation cover may increase, flooding controlled and so global warming. This corresponds with the study conducted in South Africa by [9] which revealed that rise in temperature and heavy rainfalls caused climatic change which created conditions for the bacteria that cause cholera to multiply bringing about global resurgence of the disease.

CONCLUSION

Basing on the findings of the study done to assess factors influencing the reoccurrence of cholera in Bwera hospital-Kasese district, Uganda under three main objectives: source of water supply, environment sanitation and climate change, the following conclusions can be drawn:

i. The commonest source of water for home consumption was from open water surfaces mainly rivers/streams.
ii. Boiling was seen as the commonest method of making water safe for home consumption.
iii. Washing hands was the commonest practice especially before eating; however, it was not consistently after vising latrine.
iv. Poor waste disposal was seen still present in the communities whereby bushes and river banks were seen as places where human waste is deposited.

Recommendations

- Piped water system should be extended to communities in order to reduce on the risks of exposure to water-borne and water-related diseases.
- Community sensitisation needs to be intensified especially on the importance of consistent washing of hands after visiting latrines and before eating.
- Community members should be educated on the dangers of poor solid waste disposal; garbage collecting centres should be correctly used in order to avoid crude dumping.
- Afforestation should be a common practice to all communities in order to regain the lost vegetation cover.
- Drainage channels should be kept clean so that flooding can be controlled.
- District health team should ensure that communities have latrines and are correctly used.

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CITE AS: Muhindo Yosoni (2023). Evaluation of factors that influence Reoccurrence of Cholera epidemics in Bwera Hospital, Kasese District. *IDOSR JOURNAL OF APPLIED SCIENCES* 8(2) 39-51. https://doi.org/10.59298/IDOSR/2023/10.1.7003.