

## An Unmatched Case Control Study.

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Epidemiologic and environmental evidence indicated that the cholera outbreak resulted from drinking untreated water since 5th August, 2023

### BACKGROUND

- Cholera is an infectious disease which presents with acute watery diarrhea caused by a gram negative, facultative anaerobe and comma-shaped bacteria, *Vibrio cholerae* serogroups O1 and O139
- It can potentially cause large epidemics in various countries in the world (Ujah IAO 2015)
- In August 2023, Nsumbu Rural Health Centre reported an increase in number of clients who presented with acute watery diarrhea, vomiting, and dehydration.
  - By 3rd September 2023, 171 patients and one death were reported.
- We investigated the cases to establish the existence of the cholera outbreak and assess the risk factors contributing to this outbreak

### METHODS

- We conducted a case-control study, Nsama district
- Ratio of 1:3
  - Inclusion: Affected households residing within Nsama,
  - Exclusion: Affected households who did not consent to the interview
- A case- a person presenting with vomiting, acute watery diarrhea and dehydration at Nsumbu RHC of Nsama district between 5th August and 3rd September, 2023.
- Controls- a person/s without symptoms from the same household as a case or closest neighbor
- We reviewed health facility records and conducted an active case search
- We administered a structured questionnaire to patients and controls
  - Variables: demographic, clinical presentation and exposures
- We collected stool samples from 44 suspected cases for laboratory analysis.
- We conducted water sampling and analysis and geo-mapped the primary water sources
- We used logistic regression for statistical analysis to identify risk factors associated with contracting acute watery diarrhea.

### RESULTS

- A total of 90 cases and 270 controls were interviewed
  - Median age 35 year, range 1-86 years
  - Majority (88%) resided in urban areas
- Vibrio Cholerae* was isolated in 66% of the laboratory analyzed samples
- Faecal coliforms of 2 colons/100ml level were detected from water samples analysed (Acceptable limit: <1 colon/100 ml)
- Factors associated with cholera:
  - Consumption of untreated water (aOR=1.95 ; 95% CI=1.22,3.44)
  - Not having a bottle of chlorine (aOR= 2.62 ; 95% CI=2.34,6.50)
  - Attaining primary education (aOR=1.03; 95% CI=1.38,2.44).

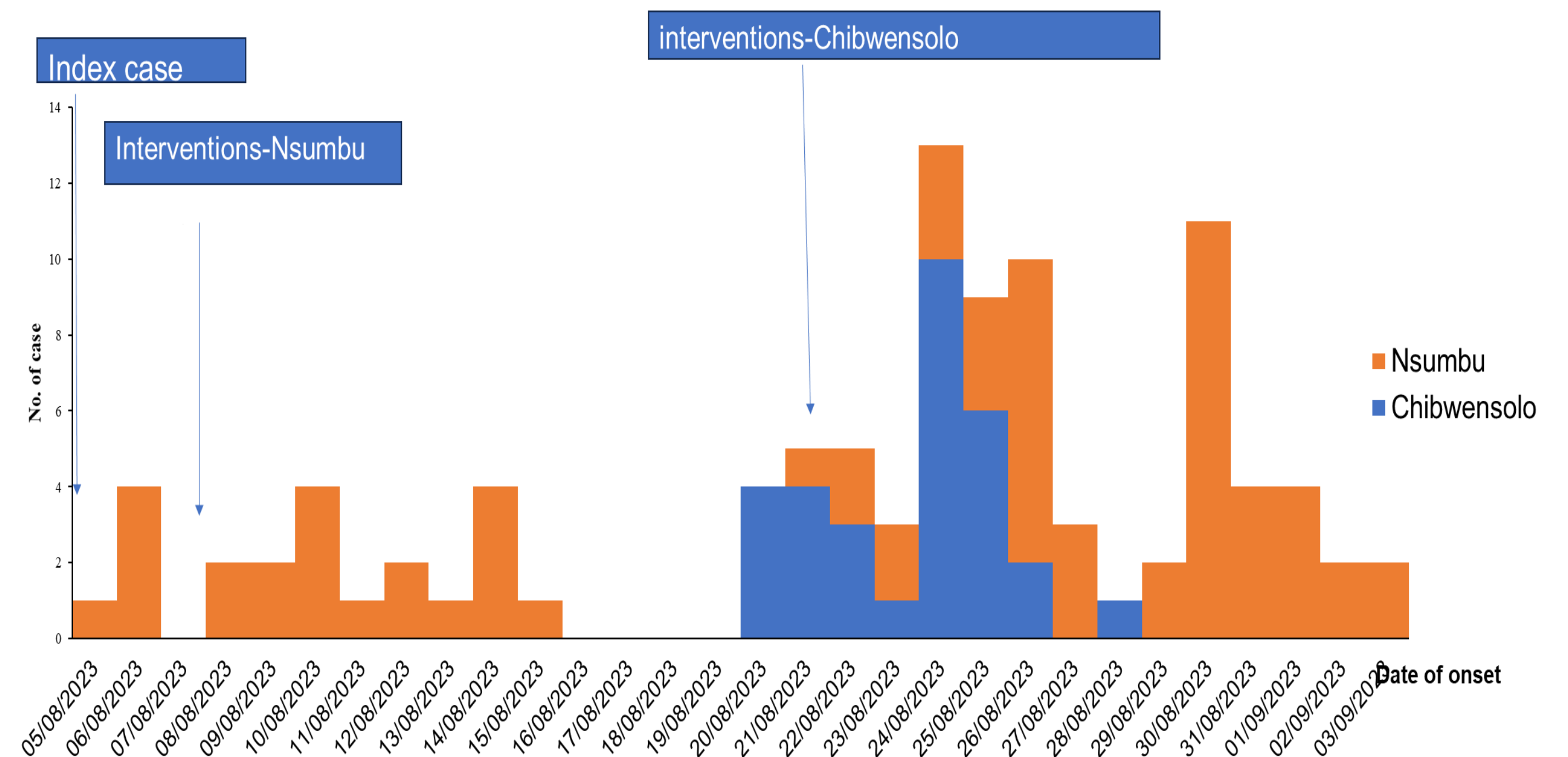
**Table 1. Comparing cholera exposure characteristics among cholera cases and controls using multivariable analysis**

Characteristics	aOR (95% CI)*	P-value
<b>Education</b>		
None	Ref	
Primary	1.93 (1.38,2.44)	0.036
Secondary	0.62 (0.25,1.51)	0.294
<b>Have chlorine</b>		
Yes	Ref	
No	2.62 (2.34,6.50)	0.025
<b>Drinking untreated water</b>		
No	Ref	
Yes	1.95 (1.01,3.32)	0.005

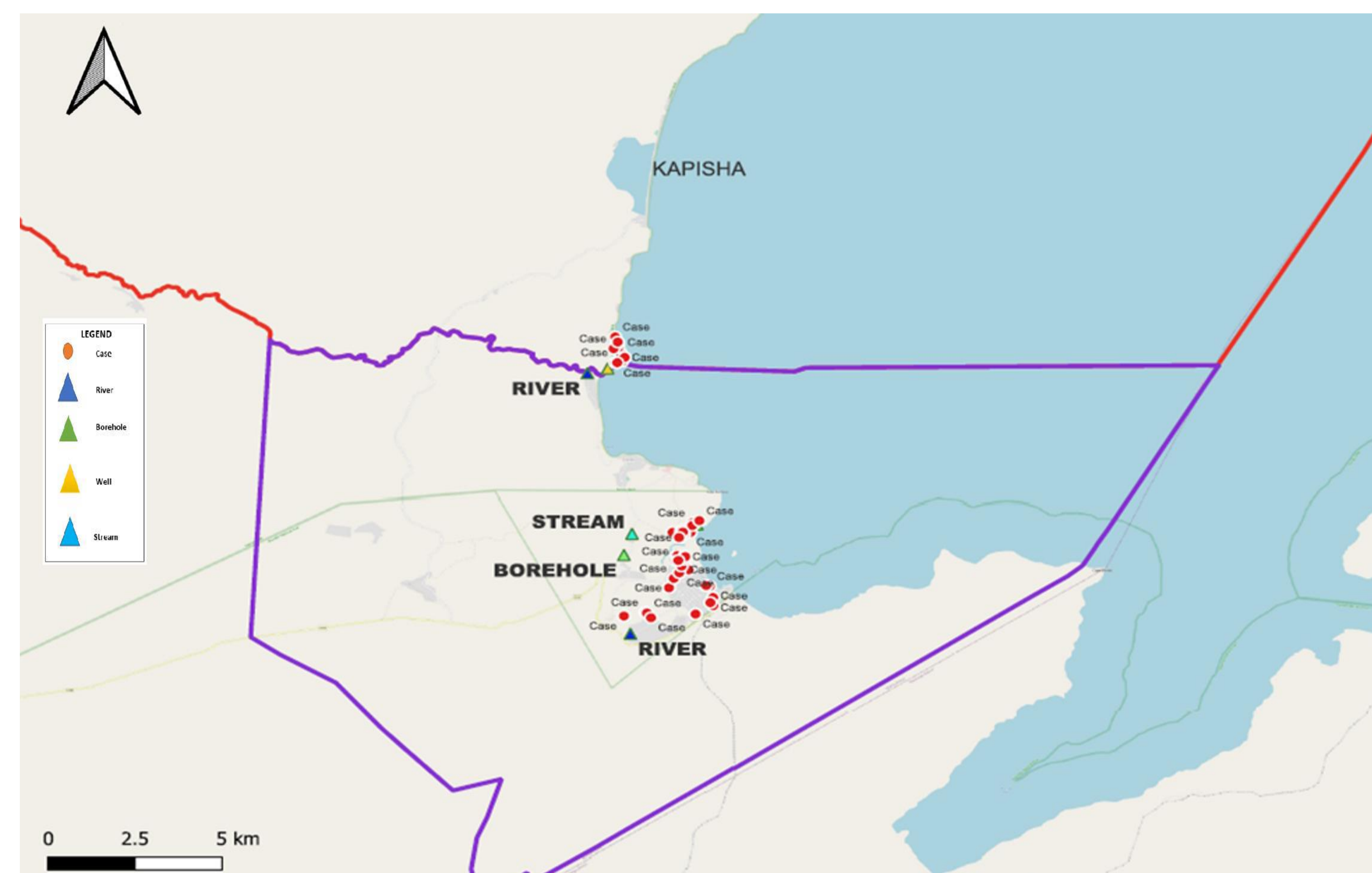
\*Multivariable logistic regression

### RESULTS CONTINUED

**Fig 1: Distribution of Cholera cases by date of onset in Nsama district, September, 2023.**



**Fig 1: Main water sources for Nsama district during Cholera outbreak, August, 2023**



### CONCLUSIONS

- Cholera is both preventable and treatable
- Using untreated water increase the chance of being a case in this outbreak.
  - Water sources from case households showed the presence of faecal coliform (no commercial water treatment at the source)
  - This results is in consistent with a study conducted in Sierra Leone during the 2012 cholera outbreak, revealed drinking untreated water was a significant risk factor for cholera (Bwire 2015).
- We recommend enhancing health promotion and community education on the importance of domestic water treatment.
- Need for ongoing awareness campaigns on cholera infection prevention and treatment should be conducted in community.
- In summary, a comprehensive approach to cholera prevention and control should be implemented to address these issues effectively.

### ADDITIONAL KEY INFORMATION

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#### Conflicts of Interest

- There was no conflicting interest for this study

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