Exploring Risk Factors of Cholera Positivity in the Democratic Republic of the Congo (2021-2025)

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CONTEXT

- Cholera is a type of diarrheal infection caused by the consumption of a bacterium called *Vibrio cholerae.*
- About 5-15% of the global annual cholera cases come from the Democratic Republic of the Congo (DRC).
- Cholera positivity is not only associated with WASH infrastructure but also significantly linked to social, economic, and behavioural factors, as well as cholera immunity (natural or vaccine-induced), remaining a strong indicator of inequities in social determinants of health.

OBJECTIVE

To **explore the association between a range of biological and sociological risk factors for cholera-positive cases** presenting to cholera treatment centers/units (CTC/CTU) in the DRC between 2021 and 2025.

METHODS

Clinical Surveillance

- **Data Source**:
  - Multi-center Surveillance Study
  - Stool collection
  - **Questionnaires**: social, economic, and behavioural information
- **Underlying Population:**
  - Suspected cholera (>3 watery stools in 24 hours) presenting to CTC (2021-2025)

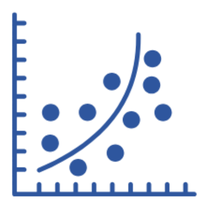
Laboratory testing

- Off-site **PCR** and **Culture** testing

Sample

Outcome	Result condition	Bukama (Rural) [n %]	Goma (Urban) [n %]
Positive	• PCR **or** Culture are +	426 (64%)	6753 (78%)
Negative	• PCR **and** Culture are - • PCR only is -	242 (36%)	1889 (22%)
Total		668	8642

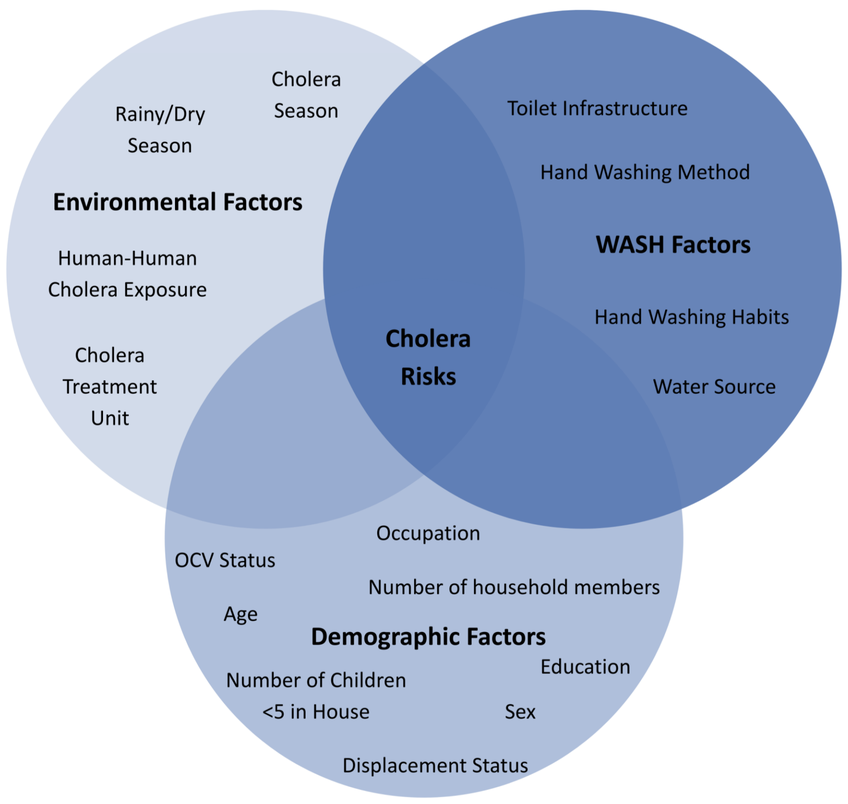
Analysis

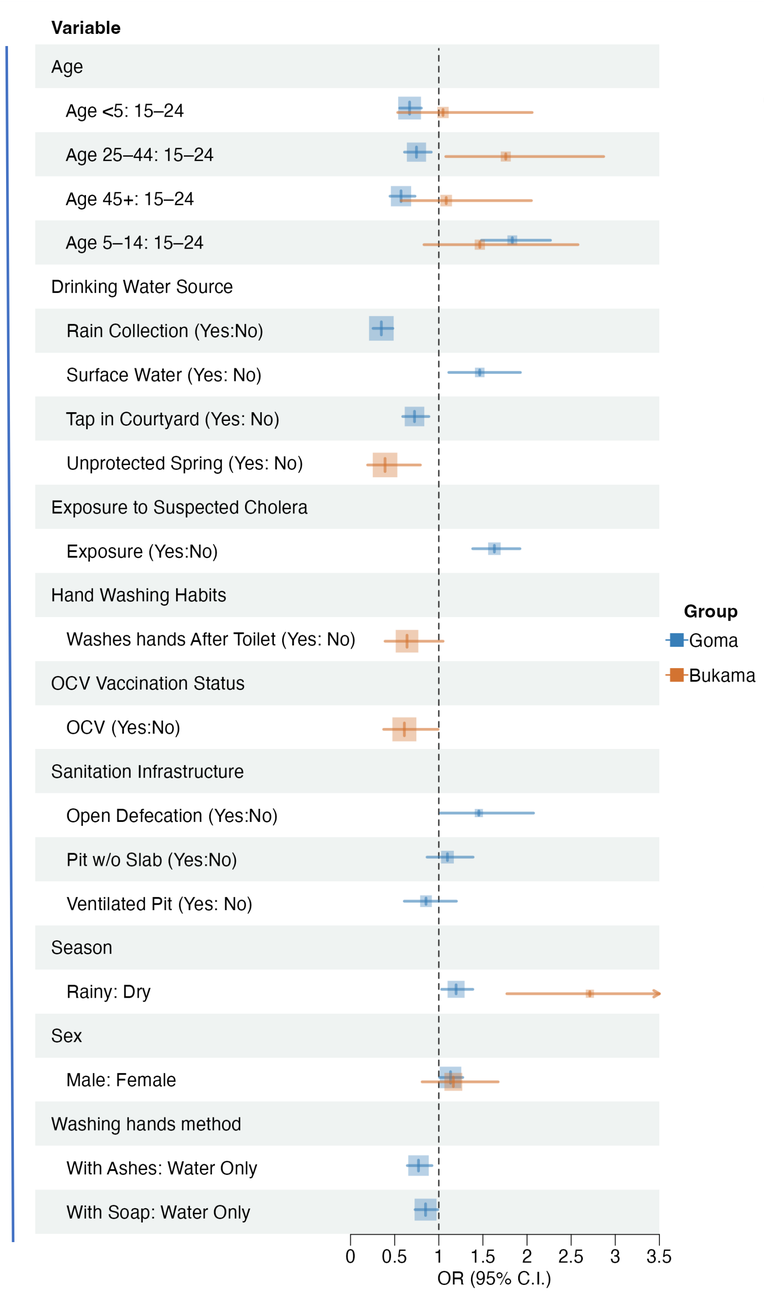


- **Literature Review**:
  - Relevant variable Identification
- **Analysis of missing data**
- **Multiple Imputation**:
  - 10 imputed datasets
- **Forward-backward model building**
- **2 models (rural & urban)**:
  - Mixed effects logistic regression (CTC random intercept)
  - Pooled estimates: Rubin's rule

RESULTS

Tested Risk Factors





Key Findings

- **Study Site: Goma**
  - **•Age:** Compared to other groups, individuals aged 15 to 24 face the greatest odds, except for those aged 5 to 14.
  - **•Household Exposure:** Exposure to household members with suspected cholera increases the odds of acquiring Cholera by 63%.
  - **•Drinking Water Source:** Unimproved sources (surface water) increase odds, while improved sources (rain water and taps in the courtyard) are protective.
  - **•Sanitation Infrastructure:** Open defecation increases the odds of cholera positivity by 45%.
  - **•Season:** Rainy season increases odds by 20% compared to dry seasons.
  - **•Sex:** Males have a 13% increased odds compared to Females.
  - **•Hand Washing Method:** Hand washing with soap [0.85 (0.73,0.99)] and ashes [0.77 (0.64, 0.92)] is more protective than washing with water alone.
- **Study Site: Bukama**
  - **•Age:** 25-44 year olds carry significantly increased odds compared to 15-24.
  - **•Season:** Rainy season increases the odds of cholera positivity compared to the dry seasons [2.71 (1.77, 4.16)].
  - **•Vaccination Status:** The OCV is protective against cholera positivity [0.61 (0.38,0.99)].
  - **•Drinking Water Source:** Unprotected springs display a protective effect against cholera positivity.

Figure 1. Odds Ratios with 95% Confidence Intervals.

CONCLUSIONS

- There are a plethora of social, behavioural, and economic disparities that increase the risk of cholera positivity in the DRC.
- Goma and Bukama display unique epidemiological risk factors for cholera positivity.
  - Interactions between health-seeking and WASH-related behaviours, as well as environmental conditions, exacerbate this risk.
  - Rainy seasons in Bukama have more prominent effects on cholera positivity compared to Goma.
- The study reaffirms the World Health Organization's calls to improve cholera surveillance, strengthen WASH infrastructure, and target community engagement to address high-risk behaviour and communicate risks at the community level.
- Understanding site-specific cholera transmission patterns in endemic areas enables the identification and implementation of effective response strategies in the field.