# Ground water contamination by sanitary facilities at close proximity: potential cause for cholera outbreak in an island, Kenya, December, 2023

Presenter: Mark Matheka

*FELTP, Ministry of Health, Kenya.*

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*Cape Town, South Africa.*

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# Background

- Cholera is an acute diarrheal infection
  - Caused by the bacterium *Vibrio cholerae*
  - By ingestion of contaminated food or water(fecal-oral)
- Onset of symptoms occurs in 2 hours −5 days after ingestion
- Leads to severe dehydration and death
- Management
  - Antibiotics
  - Oral rehydration solution (ORS)
  - IV fluids

# Epidemiology

**Globally**

- High burden of cholera in developing countries
- Approximately 1.4 billion people at risk
- Mortality;
  - About 21 000—143 000 deaths worldwide
  - Sub-Saharan Africa - 46%

**Kenya**

- Cholera is notifiable disease
- Every 5-7 years
  - Poor sanitation
- Recent outbreak;
  - More than a year
  - Areas without cases for over a decade were affected

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# Investigation Objectives

- To determine the magnitude of the outbreak
- To assess Water, Sanitation and Hygiene (WaSH) practices among cases in the community
- To identify potential exposure factors for the community
- To institute prevention and control measures in the affected areas

# Methodology

- **Site -** Mkomani and Shella Wards, Lamu County
- **Period -**10 days
- **Target population -** Individuals living in target Wards
- **Working case definition**
  - **Suspected case**: Persons (all ages) presenting with watery diarrhea of an acute onset with more than 3 episodes in 24 hours from October 1 to December 2, 2023
  - **Probable case:** Any suspected case with an epidemiological link to a confirmed case
  - **Confirmed case**: a laboratory-confirmed case by Culture (*Vibrio cholerae*)
- **Design -** Mainly Quantitative
  - Health records review
  - Follow up case interviews
  - Active case search
  - Environmental assessment
  - Laboratory investigation
- **Data analysis –** MS Excel/QGIS
- **Ethical approval –** Public health response

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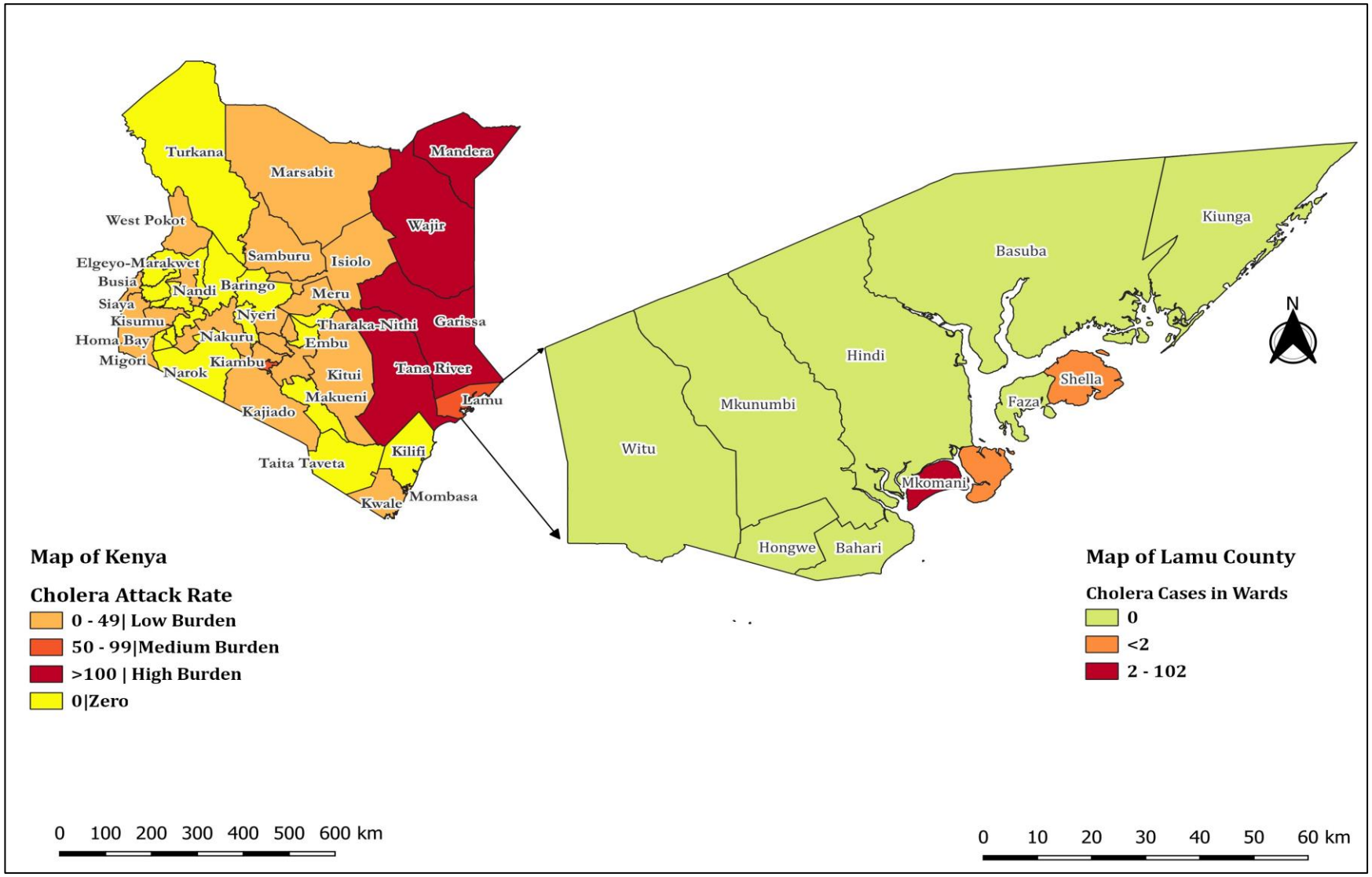
# Investigation sites

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# Findings - Magnitude

- Total cases line listed: **125**
- Case search
  - Interviews: **78.4% (98/125)**
  - Follow-up: **76.5% (75/98)**
  - Contacts: **12.3% (12/98)**
  - New cases: **11.2% (11/98)**
- IPC**: 3.1% (3/98)**
  - Mainly facility based
- Deaths**: 4**
  - CFR: **4.1%**
  - Males: **75% (3/4)**
  - Poor health seeking behavior
- Socio-demographics
  - Females: **56.1% (55/98)**
  - Age Group 6-14: **23% (22/98)**
  - Two years and below: **12.2% (12/98)**
- Lamu Central Sub-county
  - Mkomani ward: **3.4/1000**
  - Shella ward: **0.7/1000**

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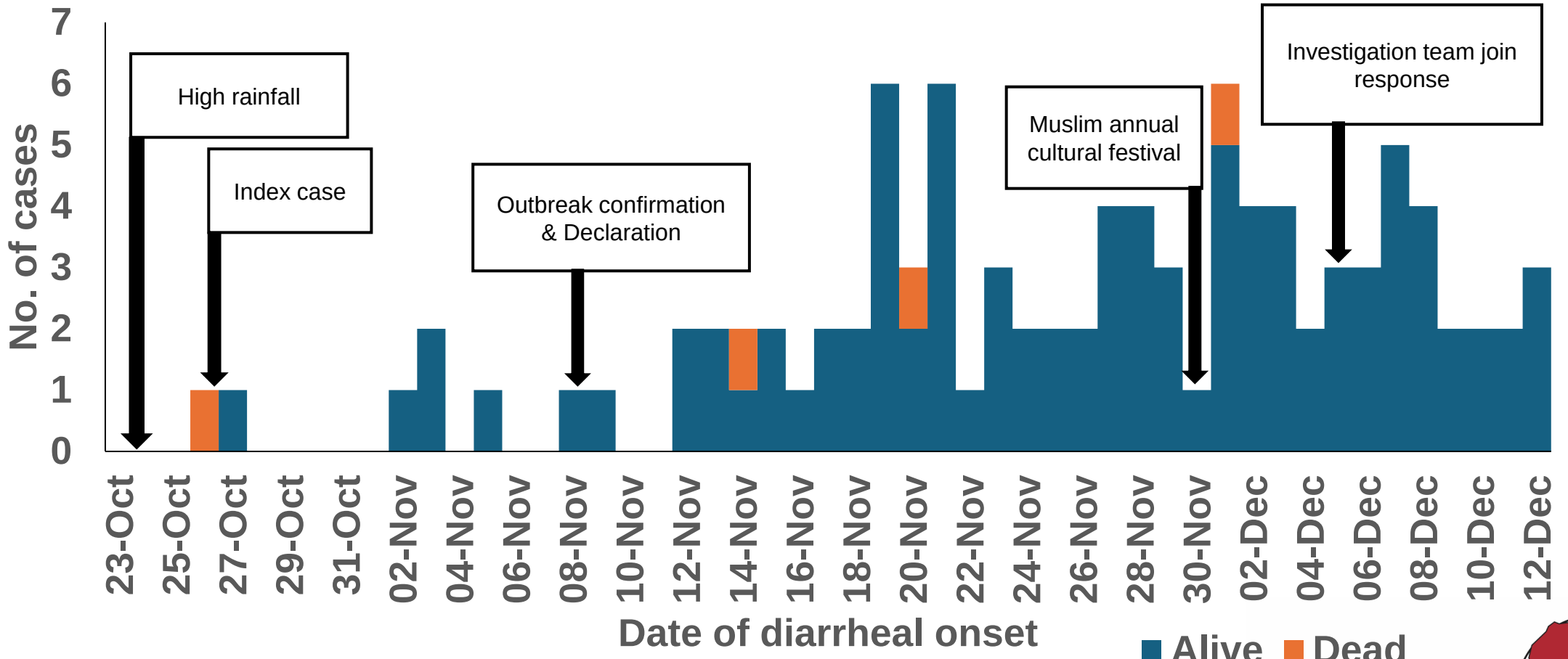
# Findings - Epidemic curve

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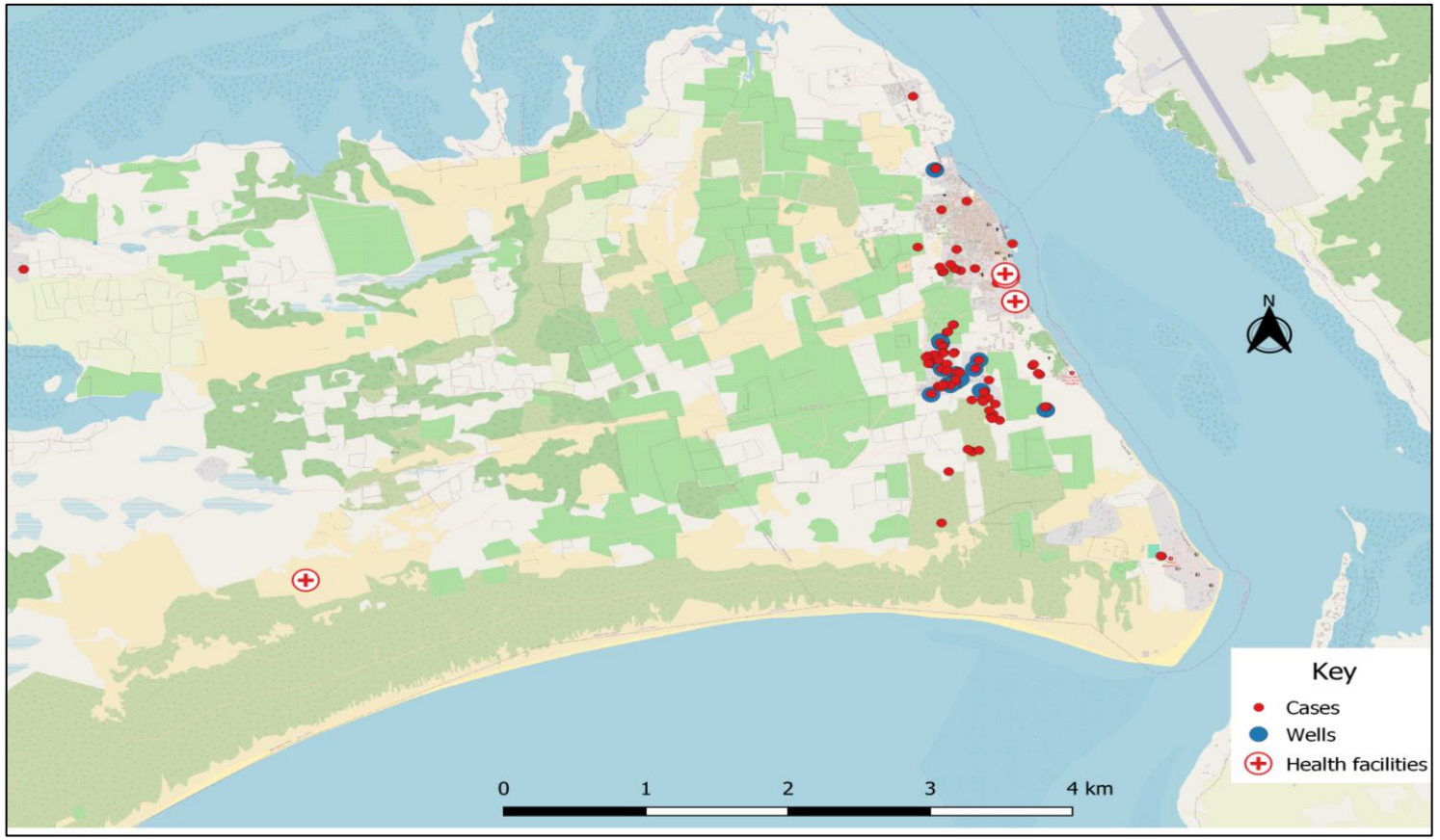
# Findings - Case distribution

- Affected area characterized by;
  - High population density
  - Urban informal settlement
  - Inadequate space for WaSH facilities
  - Sandy soil
  - Poor drainage

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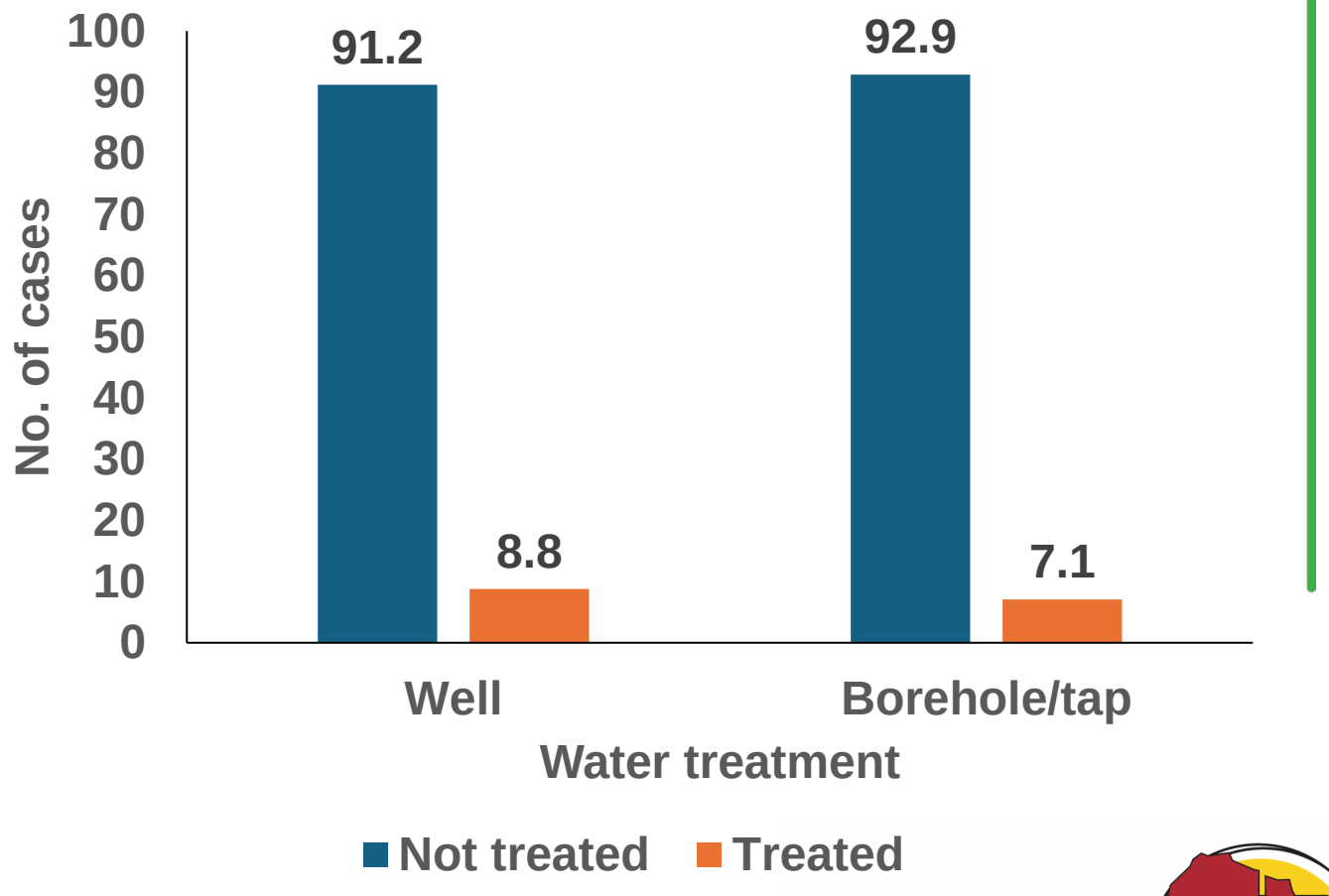
# Findings - WaSH

- Erratic supply-LAWASCO
  - Community wells/borehole/taps – **98% (96/98)**
- Water treatment – 5 days before onset
  - Very low

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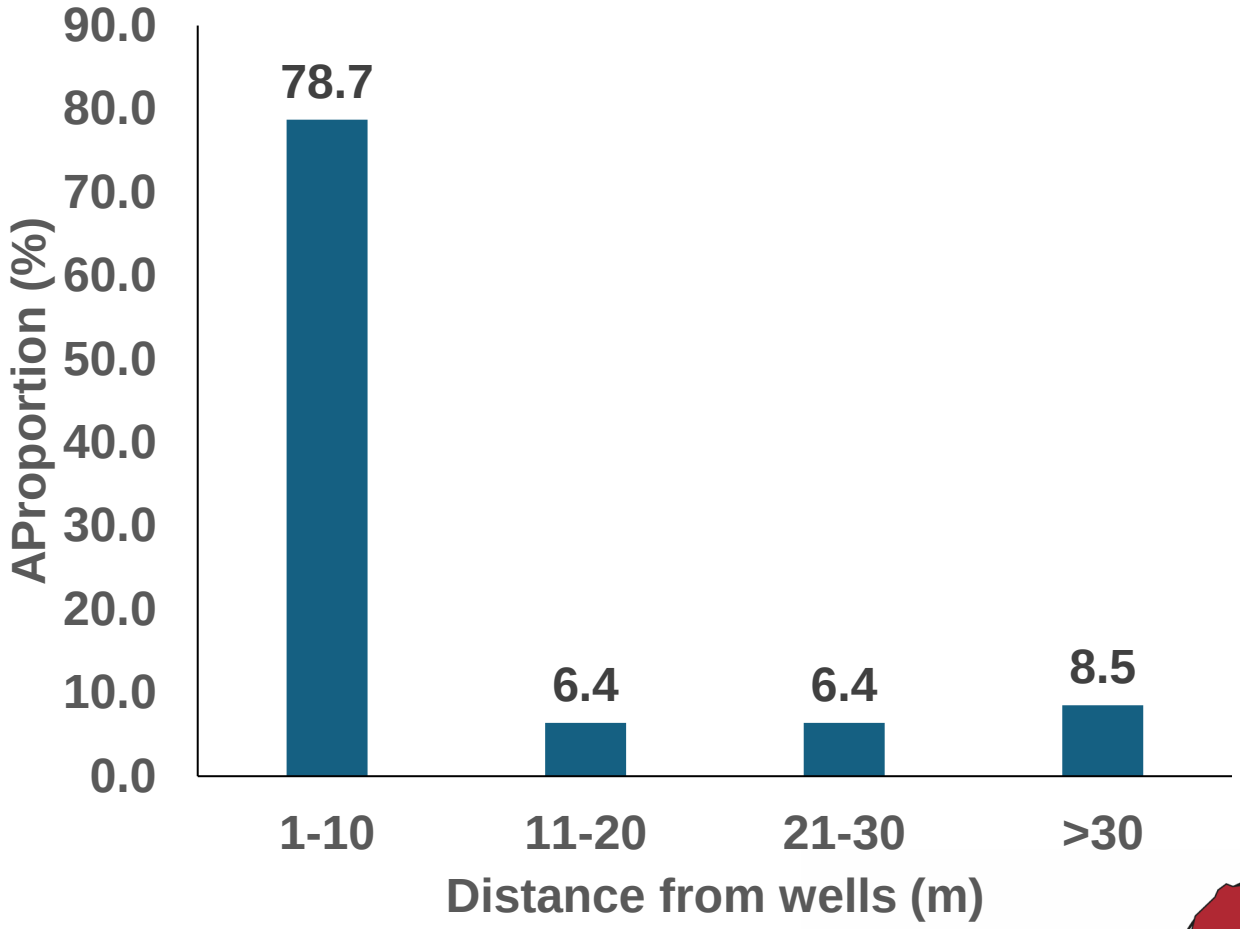
# Findings - WaSH

- Household sanitation
  - Latrine coverage: **96.9% (95/98)**
  - Most water sources less than 30m: **91.5% (43/47)**
- Hand washing
  - Community wells/boreholes/taps - **98% (96/98)**
  - Only water - **69.4% (68/98)**

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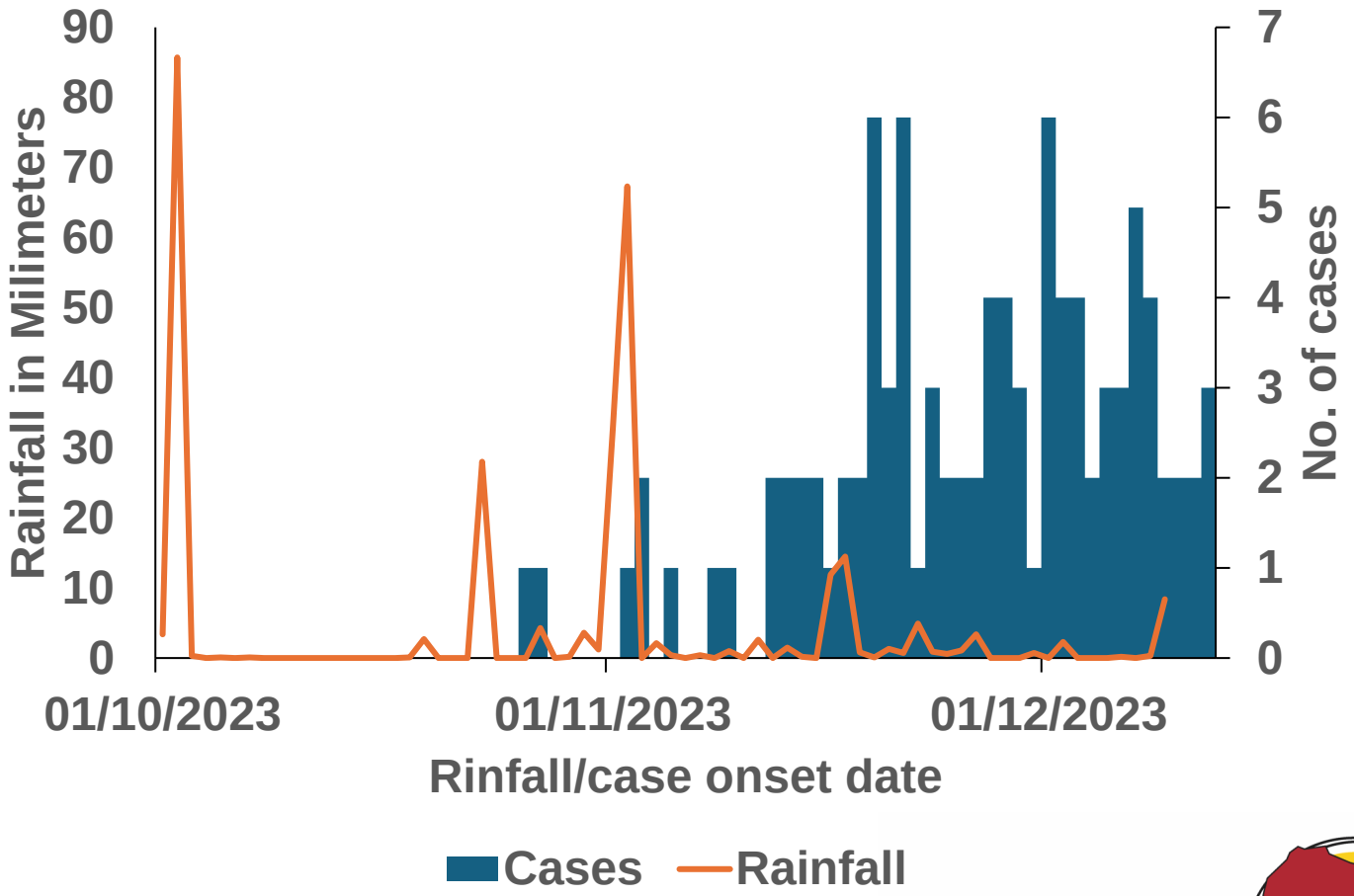
# Laboratory/Environmental investigation

- Stool samples - 17
  - *Vibrio cholerae, Ogawa:* **59% (10/17)**
- Water samples - 28
  - Varying counts of coliforms: **92.9% (26/28)**
  - *Escherichia coli:* **85.7% (24/28)**

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# Potential exposure factors


- Water shortage – Community wells/borehole/taps
- High rainfall – high water table
- Close proximity of sanitary facilities to water sources – cross-contamination from aqueous human waste
- Contaminated water sources – presence of fecal pathogens in water
- Consumption and use of untreated contaminated water
- Poor health seeking behavior
- Inadequate IPC

# Prevention and control

- **Outbreak period**
  - Provision of safe drinking water
  - Water treatment – Super chlorination of wells/household treatment
  - Household disinfection
  - Case management/Adequate IPC measures/Chemoprophylaxis
  - Laboratory support/EOC command structures
  - Risk communication and community education (RCCE)
- **Long term**
  - Adhere to public health requirements in planning and construction works
  - Adopt available technologies
  - Adopt use of pit liners
  - More reliable safe water sources
  - Maximize on rain water harvesting and storage
  - Consider oral cholera vaccination

# Conclusion and recommendation

- Presence of faecal coliforms shows water contamination
- Previous cholera cases
  - Not associated with ground water contamination
- Health care
  - Poor health seeking behaviour
  - Break in IPC
- Health seeking behaviour change
- Adherence to public health requirements
  - Construction of sanitary facilities
  - Water, Sanitation and Hygiene practices
  - IPC
- Prevent transmission of faecal pathogens to humans and the environment

# Acknowledgements


Ministry of Health