JOURNAL OF TRANSLATIONAL PUBLIC HEALTH RESEARCH
Vol 2 Issue 1 - 2025 (**EISSN** 3121-9284)
https://journals.chroniva.org/index.php/JTPHR

EVALUATING THE EFFECTIVENESS OF COMMUNITY-LED TOTAL SANITATION INTERVENTIONS IN REDUCING WATERBORNE DISEASES IN RIVERS STATE: A COMPARATIVE ANALYSIS

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Abstract

Introduction: Waterborne diseases remain a major public health concern in developing regions, disproportionately affecting vulnerable populations such as children and the elderly. In Nigeria's riverine communities, reliance on contaminated surface water and inadequate sanitation infrastructure heightens the risk of outbreaks. Community participation in Water, Sanitation, and Hygiene (WASH) initiatives is essential for sustainable disease prevention. **Methodology**: A mixed-methods, quasi-experimental pretest–post-test design was employed across ten highly vulnerable riverine Local Government Areas in Rivers State. Approximately 45,000 residents from 15 communities were targeted, with 600 households sampled for quantitative surveys and qualitative data collected until thematic saturation. Data were analyzed using SPSS for quantitative measures and thematic analysis for qualitative insights, ensuring triangulation for validity. **Results**: Baseline findings indicated that 80.4% of households experienced at least one waterborne disease, predominantly diarrhea, typhoid, and schistosomiasis. Post-intervention, overall disease prevalence declined by 19.7%, with the largest reductions observed in cholera (–46.1%) and dysentery (–34.6%). Preventive practices improved significantly, with poor practices declining from 52.4% to 26.8% and good practices doubling. **Discussion**: The intervention's success was driven by active WASH committees, complete infrastructure, SMS-based behavior reinforcement, and strengthened social norms, while persistent schistosomiasis rates highlight disease-specific challenges. **Recommendations**: Policymakers should integrate community-led WASH committees into rural health and water policies, allocating dedicated budgets for training and support to sustain participation and maximize public health gains. **Conclusion**: CLTS interventions

effectively reduce waterborne disease burden through structured community engagement, enhanced practices, and local ownership, representing a replicable model for high-risk riverine settings.

Keywords: Waterborne Diseases, WASH, Public Health, Rural Health, Community-Led Interventions

Introduction

Waterborne diseases remain a critical public health challenge, particularly in developing countries, causing significant illness and mortality among vulnerable populations such as children and the elderly. These diseases, including cholera, dysentery, typhoid, and diarrhea, are primarily transmitted through contaminated water. Globally, over 2 billion people rely on drinking water sources contaminated with fecal matter, resulting in hundreds of thousands of deaths annually (WHO, 2020). In sub-Saharan Africa, access to safe drinking water and improved sanitation remains limited. In Nigeria's riverine communities, particularly in Rivers State, only 67% of households have improved drinking water sources, and just 39% have access to sanitation facilities (NPC & ICF, 2019). Communities rely heavily on surface water sources often contaminated by poor sanitation and environmental pollution, heightening the risk of disease outbreaks. Community participation in water, sanitation, and hygiene (WASH) initiatives is essential for sustainable disease prevention, as active engagement fosters local ownership, behavior change, and culturally appropriate interventions (Laverack & Manoncourt, 2016). Understanding factors that enhance or impede participation is crucial for effective waterborne disease prevention programs.

Aim and Objectives

The aim of this study was to assess the effectiveness of Community-Led Total Sanitation interventions in reducing the prevalence of waterborne diseases through a comparative analysis of baseline and post-intervention data. This aim was achieved through the following objectives:

1. To determine the baseline prevalence of waterborne diseases before intervention.
2. To determine the effect of community-led interventions on the prevalence of waterborne diseases.
3. To examine the practices of community members towards waterborne disease prevention before and after the intervention.

This study provides critical insights into the impact of CLTS interventions on waterborne disease prevalence, offering evidence to inform policy decisions and enhance public health strategies in similar contexts.

Methodology

Study Area

The research was conducted in riverine communities of Rivers State, Nigeria, notable for recurrent flooding, inadequate sanitation, and limited access to healthcare services. Ten Local Government Areas (LGAs) with high vulnerability to waterborne diseases were purposively selected for inclusion.

Research Design

A mixed-methods, quasi-experimental pretest–post-test design was employed, integrating structured surveys and in-depth interviews to evaluate community knowledge, participation barriers, and facilitators over a 15-month period.

Study Population and Sample Size

The study encompassed approximately 45,000 residents from 15 riverine communities, primarily fishermen and traders relying on untreated water sources. Eligible participants were aged 15 years and above, with a minimum of one year's residency. A total of 600 households were sampled to detect a 12% reduction in disease prevalence, while qualitative data collection continued until thematic saturation was achieved.

Sampling Technique

A multistage cluster sampling approach was used to select the 15 communities. Forty households per community were surveyed, with one adult respondent per household. Data collection instruments were pretested and demonstrated strong reliability (Cronbach's $\alpha = 0.81–0.87$).

Ethical Considerations

Ethical approval was secured, and informed consent was obtained from all participants. Confidentiality and anonymity were strictly maintained throughout the study.

Data Collection and Verification

Data were gathered over 15 months via digital surveys, interviews, and health facility records. Rigorous supervision ensured accuracy, and all records were cross-verified against facility data to establish reliable baseline and intervention measurements.

Data Analysis

Quantitative data were analyzed using SPSS, while qualitative data underwent thematic analysis. Triangulation was applied to enhance the credibility and validity of findings.

Results

1. To determine the effect of community-led interventions on the prevalence of waterborne diseases.
2. To examine the practices of community members towards waterborne disease prevention before and after the intervention.

Table 1: Baseline Prevalence of Waterborne Diseases (N=581 households)

Disease	Households Affected	Prevalence (%)	95% CI
Diarrhea	342	58.9%	54.8-62.9
Typhoid fever	198	34.1%	30.3-38.0
Cholera	67	11.5%	9.1-14.4
Dysentery	89	15.3%	12.5-18.5
Hepatitis A	23	4.0%	2.6-5.9
Schistosomiasis	156	26.9%	23.4-30.6
Any waterborne disease	467	80.4%	77.0-83.4

During the study period, 80.4% of households experienced at least one waterborne disease. Diarrheal illnesses were most prevalent (58.9%), followed by typhoid fever (34.1%) and schistosomiasis (26.9%). The elevated schistosomiasis prevalence reflects the heightened exposure of riverine communities to contaminated water through routine daily activities.

Table 2: Changes in Waterborne Disease Prevalence Pre- and Post-Intervention

Disease	Baseline (n=581)	3-Month Post (n=562)	6-Month Post (n=548)	% Change (Baseline to 6-Month)	p-value*
Diarrhea	58.9%	41.3%	43.8%	-25.6%	<0.001
Typhoid fever	34.1%	23.7%	26.1%	-23.5%	<0.001

Cholera	11.5%	5.2%	6.2%	-46.1%	<0.001
Dysentery	15.3%	8.9%	10.0%	-34.6%	<0.001
Hepatitis A	4.0%	2.5%	2.9%	-27.5%	0.126
Schistosomiasis	26.9%	22.1%	23.5%	-12.6%	0.023
Any waterborne disease	80.4%	61.2%	64.6%	-19.7%	<0.001

Household waterborne disease prevalence declined from 80.4% at baseline to 64.6% six months post-intervention (19.7% reduction; McNemar's $\chi^2 = 89.3$, $p < 0.001$). Cholera (–46.1%) and dysentery (–34.6%) showed the largest declines, while schistosomiasis decreased modestly (–12.6%), reflecting its chronic transmission and persistent water exposure.

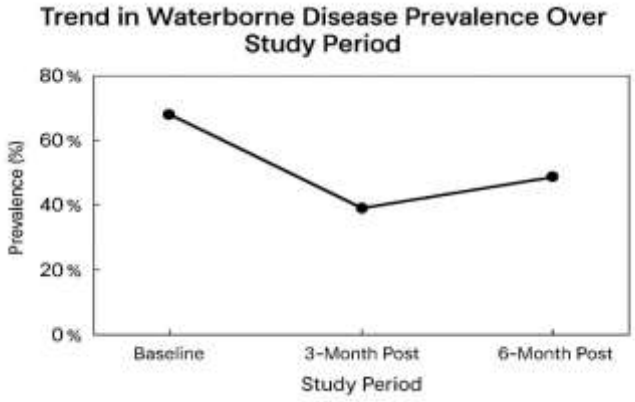

Table 3: Practice Levels Before and After Intervention

Practice Level	**Baseline (n=743)**	**3-Month Post (n=712)**	**6-Month Post (n=698)**
Poor (0-11 points)	389 (52.4%)	156 (21.9%)	187(26.8%)
Moderate (12-18 points)	287 (38.6%)	398 (55.9%)	372 (53.3%)
Good (19-24 points)	67 (9.0%)	158 (22.2%)	139 (19.9%)
Mean Score (SD)	11.2 (5.1)	15.3 (4.6)	14.7 (4.8)

Baseline assessment revealed predominantly poor practices, with 52.4% scoring in the lowest category. The intervention achieved substantial improvements, reducing poor practices to 26.8%

and increasing good practices from 9.0% to 19.9%. The mean practice score improved by 3.5 points, representing a 31% increase.

Discussion

Baseline assessment in riverine Nigerian communities revealed an alarming 80.4% waterborne disease burden, with diarrhea (58.9%), typhoid (34.1%), and schistosomiasis (26.9%) disproportionately affecting children under five and adults over 65, reflecting systemic sanitation failures. Implementation of the community-led WASH intervention markedly improved preventive practices, reducing poor behaviors from 52.4% to 26.8% and doubling good practices, with collective actions rising due to social norms, while income and education remained key individual determinants. Overall, the intervention lowered disease prevalence to 64.6%, particularly for cholera and dysentery, driven by active WASH committees, complete infrastructure, and SMS-based behavior reinforcement, though schistosomiasis showed minimal change, indicating disease-specific limitations.

Recommendations

Rivers State should integrate community-led WASH committees into rural health and water policies, allocating 10% of project budgets to community training and support within 36 months, as high-participation areas saw a 35.2% reduction in waterborne diseases.

Conclusion

The study demonstrates that Community-Led Total Sanitation (CLTS) interventions significantly reduce the prevalence of waterborne diseases in riverine communities by promoting preventive behaviors, fostering active community participation, and strengthening local WASH governance structures. While substantial reductions were observed for diarrhea, cholera, dysentery, and typhoid, the modest impact on schistosomiasis highlights the need for complementary, disease-specific strategies. Overall, the findings underscore that structured, community-driven engagement, combined with infrastructural support and behavior reinforcement, is a critical and sustainable approach to improving public health outcomes in high-risk settings.

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