

PUBLIC HEALTH AND WASH LINKAGES IN THE SLUMS

Serving circularity with debris to development in C & D waste management via 7R's principle

Aim: To create a framework that will establish a strong linkage between WASH infrastructure and public Health Impacts. This will allow ULBs to make strategic investment decisions in WASH infrastructure for the vulnerable communities.

Objectives :

To review existing framework, on going studies, to identify a study methodology for this study.

To list down the key WASH indicators with relation to Public Health and provide rationale for each indicator.

To develop a comprehensive framework that facilitates the assessment of linkage between the WASH and Public Health.

To pilot test the framework and to propose potential policy level interventions to improve Public Health in selected slum.

40+ Research cases conducted across Epidemiology, Vulnerable community and WASH Indicators

Research Methodology



1. Data Collection

- Ward - wise / Slum level disease dataset.
- 150+ HH survey with FGDs and KIIs.
- Slum Infrastructure dataset from Slum Atlas.



2. Disease Transmission analysis

- Detection of adverse Health effects.
- Map the disease transmission flow chart.
- Identification of WASH KPIs for evaluation.



3. Temporal analysis

- Temporal Analysis conducted in two levels.
- City level with absolute disease dataset.
- Zone level with Normalised dataset.



4. Spatial analysis

- Spatial analysis to identify disease hotspots.
- Spatial bivariate map at Zone level to assess Slum concentration with disease datasets.
- Ward level analysis to map the epicenter.



5. Descriptive Analysis

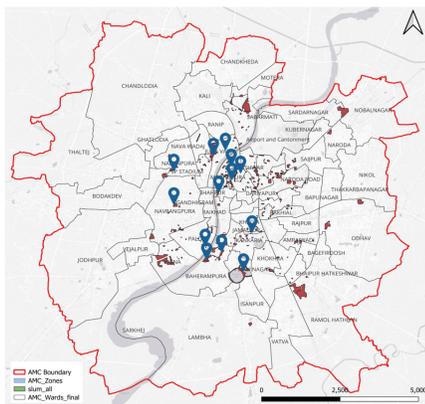
- PHC wise disease data was collected and granular assessment at Slum level was conducted.
- High, Medium and Low disease burden slums.

10 wards

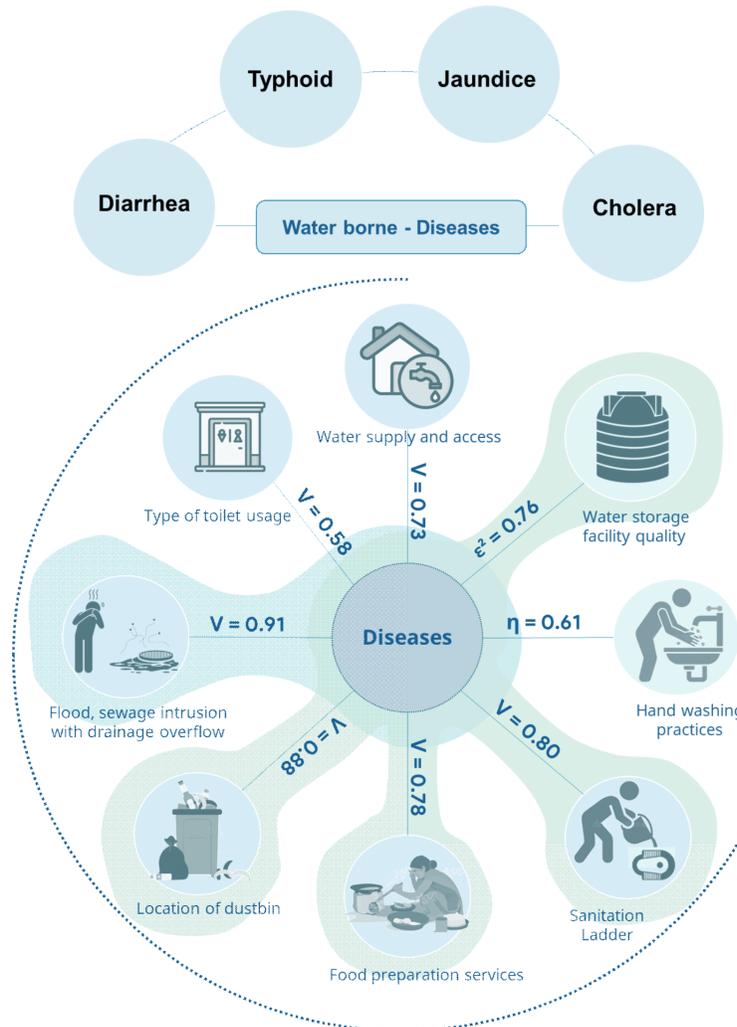
13 Slums

150+ HH survey

30+ FGD & KII



Statistical Analysis for WASH - KPI



Correlation Analysis Rationale (Bivariate)

- **Kruskal-Wallis H test (ϵ^2)** : Ordinal (Likert scale) + Nominal Value.
- **Correlation ratio (η)** : Nominal Value + Continuous variable.
- **Chi square + Cramer's V** : Nominal Value + Nominal Value

Policy Recommendations

Proposed SDG

6.1.2 Water Supply

By 2030, all households have access to covered, leachate-proof tanks.

6.2.2 Sanitation

By 2030, all households should have access to improvised sanitation facility with 100% reliable water supply in the toilet.

6.3.3 Public Health Impact

By 2030, reduction in number of Diarrheal and Cholera cases by 50% should be achieved by ULBs

6.A.1 Internal Cooperation

By 2030, 100% WASH programs will include Health monitoring and joint sector Planning.

Proposed SLBs

Water Supply: + 3 indicators

Reduction in ADD cases per 10,000; Safe and adequate water storage facility, Handwashing stations.

Sanitation: + 3 indicators

Reduction in typhoid & cholera cases per 10,000 ; 100% Functional toilets with aecal sludge management, Handwashing station near Public Toilets.

Solid Waste Management: + 3 indicator

Reduction in Jaundice cases, Safe cooking surfaces in House for all scheme, 0 GVP points.

Strategic outcomes 1 - WASH

SANITATION		ENVIRONMENTAL HYGIENE	
<ol style="list-style-type: none"> Lack of improved sanitation facility in household Shared toilets with poor hygiene and disinfection. Improper fecal-sludge management in high-density areas, 	<ol style="list-style-type: none"> Flooded drains and sewage backflow contaminating water tanks, Improper fecal-sludge management in high-density areas and overflowing drains around dwellings, 	<ol style="list-style-type: none"> Shared toilets with poor hygiene leading to unpleasant odor and infection bucket-pour latrines in crowded spaces adjacent to stagnant greywater pools. 	<ol style="list-style-type: none"> Stagnant greywater pooling around residential area Uncleaned garbage dump and formation of GVP points. Environmental unhygienic conditions due to animal matters
<ol style="list-style-type: none"> Fecal-matter intrusion in unlined water-storage pits and public water system. Flooded drains and sewage backflow contaminating both water and sanitation infrastructure. Inadequate water supply and bucket pour flush system. 	<ol style="list-style-type: none"> Lack of clean water supply storage system, Contamination in water storage system, shared unhygienic toilets, and lack of upgrade sanitation system pervasive lack of hand-washing habits & facilities contaminated cooking and food-prep surfaces 	<ol style="list-style-type: none"> Shared untidy toilets with poor hygiene practices contaminated cooking surfaces, environments and food choices shared utensils or play surfaces without proper cleaning 	<ol style="list-style-type: none"> Contaminated cleaning mops on food-prep surfaces and shared serving utensils without proper washing. shared unhygienic cooking surfaces near stagnant drain water, toilets. Contaminated street-food environments and shared toys or play surfaces
<ol style="list-style-type: none"> intermittent piped supply with low capacity to safe storage Unchlorinated community water tanks Unfiltered open-well water withdrawals as drinking sources. 	<ol style="list-style-type: none"> Fecal-matter intrusion in water storage pits, open defecation and lack of handwashing leading to fecal oral transmission 	<ol style="list-style-type: none"> Dirty grey water excreta onto roads and overflowing cesspools lack of hand-washing at water points driving combined water-environmental and behavioral risk storage of uncovered drinking water vessels. 	<ol style="list-style-type: none"> Open defecation practices particularly in children Lack of handwashing practice after defecation communal utensils passed without soap children's toys soiled by environmental contaminants.
WATER		BEHAVIOURAL HYGIENE	

Strategic outcomes 2 - Disease Matrix

DIARRHEA		CHOLERA	
<ol style="list-style-type: none"> Shared toys and play surfaces in childcare centers Dirty hands after open defecation in children Contaminated cleaning mops used for food preparation surfaces 	<ol style="list-style-type: none"> Unclean anganwadi or child care facilities Poor cleanliness of baby utensils and cloths 	<ol style="list-style-type: none"> Flooded drains & sewage backflow during monsoons Storage of uncovered drinking water vessels and consumption of unfiltered water. 	<ol style="list-style-type: none"> Water from unprotected wells or tanks used for drinking Dirty or stagnant greywater pools near residences
<ol style="list-style-type: none"> Shared unhygienic household cooking surfaces infected family members handling food Contaminated hands touching food and mouth Improper fecal sludge management in high-density areas 	<ol style="list-style-type: none"> Contaminated drinking water sources or supply Shared toilets with poor hygiene & disinfection. Lack of adequate hand washing facilities Fecal-oral transmission Intermittent or off premises water supply Poor personal hygiene Contaminated food 	<ol style="list-style-type: none"> Unhygienic food preparation conditions Presence of flies and open food in public places. Food washed using greywater or gutter water. Lack of soap or water in public toilets 	<ol style="list-style-type: none"> Unchlorinated community water tanks Fecal matter intrusion or contamination in unlined water storage pits
<ol style="list-style-type: none"> Exposure to rat or rodent urine near water lines (leptospirosis concerns) Bucket-pour latrines used in crowded spaces 	<ol style="list-style-type: none"> Water contamination during monsoon flooding Overflowing open drains near handpumps and water taps Food contamination due to infected water 	<ol style="list-style-type: none"> Contaminated street food and open roadside eateries Use of untreated water in informal restaurants or stalls 	
<ol style="list-style-type: none"> 1. Rodent urine-contaminated environments (esp. Hepatitis E) 2. Poor menstrual hygiene with menstrual waste disposal near water bodies 3. Home-made food using long term stored water 	<ol style="list-style-type: none"> Improperly cleaned meat and food which are handled in open areas Bathing in drain-connected water tanks Shared serving utensils without proper cleaning or soap-washing 		
JAUNDICE		TYPHOID	

DIRECTED RESEARCH PROJECT

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