The Last Metres (L100M)

Safeguarding Potable Water Provisioning to Urban Informal Settlements

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Structure

- A research journey, continuing
- L100M Methodology
- Emerging findings: Water provisioning to informal settlements - **a good job, unfinished?**

A research journey, continuing

- Since 2013, two main projects – ***EcoPoor,*** and ***L100M***
- ***Interdisciplinary*** & ***comparison*** of low-income settlements in Dhaka (Bangladesh) & Dar es Salaam (Tanzania)
- One of the main concerns: ***safety of potable water provisioning***

Example of health outcomes in best v/s worst performing settlements

(Mitlin and Satterthwaite, 2013)

Health outcomes	Worst performing settlements	Best performing settlements
Infant mortality rates	>120/1000 live birth	<3
Under five mortality rates	>250/1000 live birth	<5
Maternal mortality rates	>1500/100000 live birth	<10
Life expectancy at birth	<20 years	>85 years
Prevalence of diarrhoea with blood in children	13+%	0?
% of children under five who are underweight or under height for their age	>50%	0?

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Let’s see a short film

What is the ‘LAST 100 METRES’ (L100M) phenomenon?

Increasingly, municipal water is delivered to slum communities via community standpipe

But, unserved by sewerage systems,
slum-dwellers rely on toilets draining into poorly constructed pits or septic tanks.

Inevitably, faecal waste is released to local environment, and ultimately into potable water.

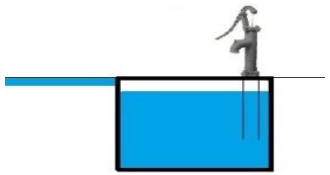
The space/distance that people carry water in buckets from standpipes to home
= the last 100 metres of potable water supply

‘Faecal contaminants-into-potable water’ pathways

L100M area of concern

Localised faecal contamination (leaking toilets/ poor containment, unsafe emptying, deliberate disposal, blocked and/or poor settlement drainage etc.)

Water main → **Feeder distribution and community-based storage & dispensing** → **Manual water carriage** → **Home-based storage & consumption**

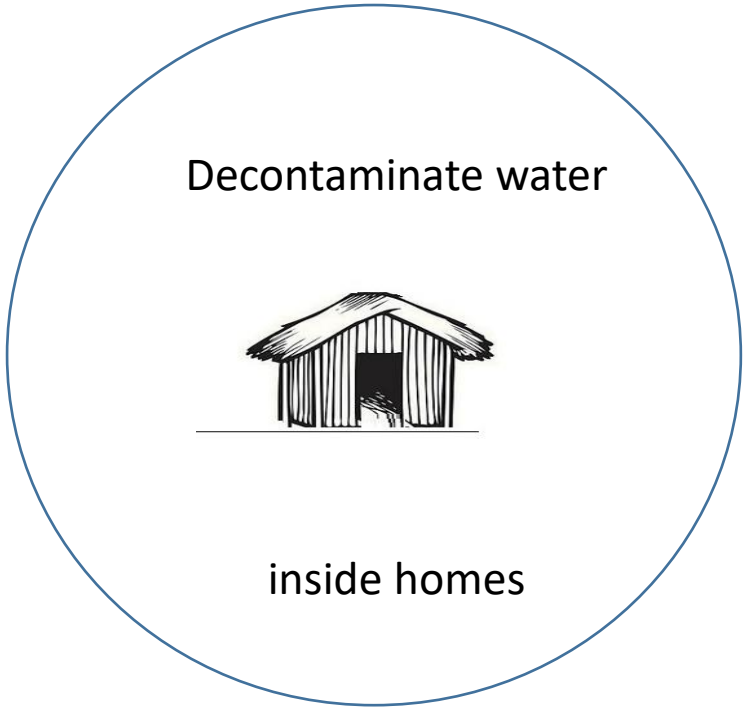


Diffuse faecal contamination from the wider environment

Practice-based transfer of faecal contamination (dirty buckets, splashing etc.)

Current focus of “interventions”

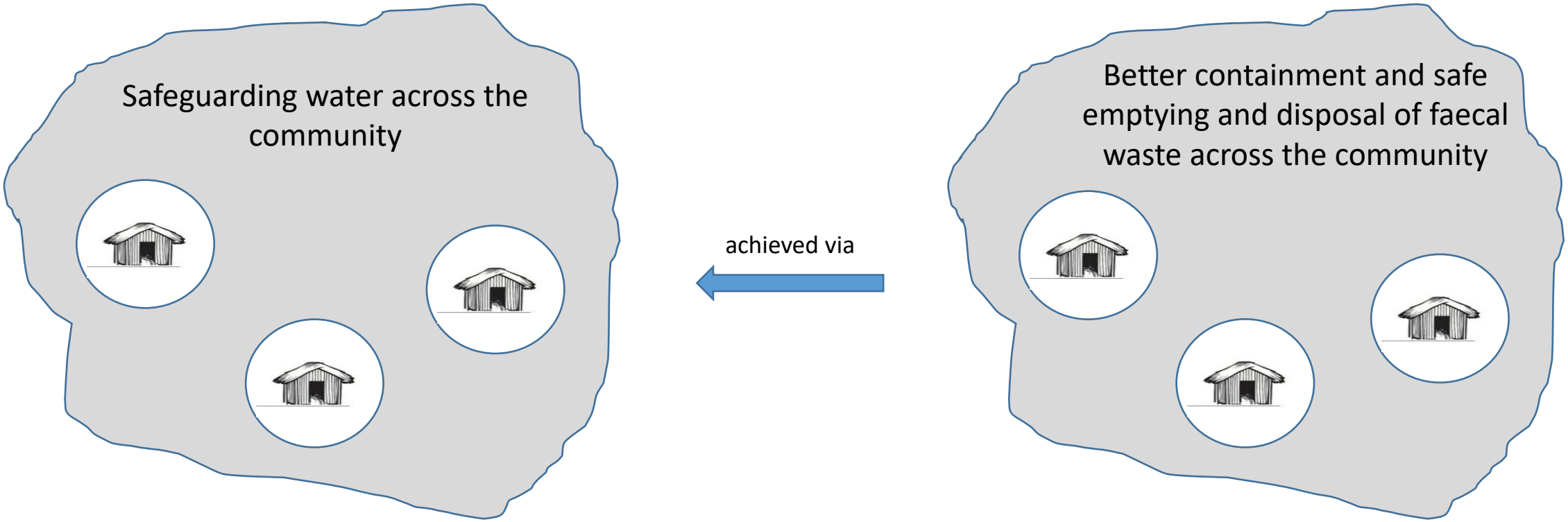
Existing literature reveals **current interventions** attempt overwhelmingly to decontaminate water at the point-of-consumption (i.e. inside homes).



L100M addition to existing understanding

1. Expand the scope of water safety practices beyond the point-of consumption to include the community (i.e. L100M) comprised of homes, space around homes and the distribution-storage-dispensing system) through WHO-inspired Water Safety Plan (**WSP**).

2. Tackle the local sources of faecal contamination through better community-based containment, and safe emptying and disposal of faecal waste. This requires context-sensitive adaption of WHO Sanitation Safety Plan (**SSP**).



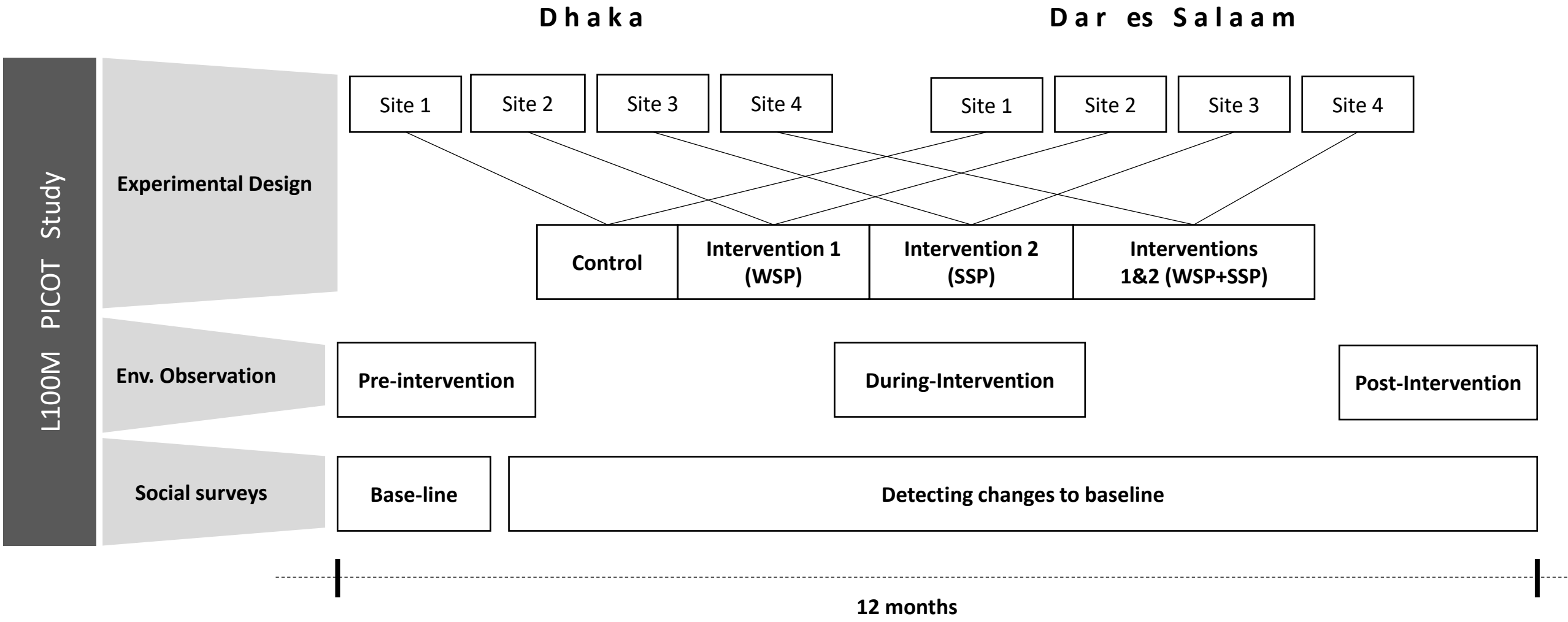
L100M Hypotheses

1. By expanding the water safety practices beyond the household domain - faecal contamination of potable water will be ***modestly*** reduced, ***unsustainably.***

2. By tackling localised sources of faecal contamination as a separate sanitation safety activity - faecal contamination of potable water will be ***greatly*** reduced, ***sustainably.***

3. By combining expanded water safety practices to sanitation safety there is little gain over sanitation safety alone.

Methodology



PICOT framework

- **P (Population)**
  - Step 1 – settlement selection
  - Step 2 – settlement characterisation
  - Step 3 – focus area

1. Water supply (could be different sources and/or combinations, but preferably community water points)
2. 'Containment' of sewage (i.e. pit latrines; septic tank)
3. Containment facilities must be older than one year
4. Presence of drainage network (including a main channel)
5. Community engagement/presence of CBOs
6. Similar socio-economic profile and population size
7. Similar landscape characteristics
8. Relatively less eviction threats

- **I (Intervention)** – WSP alone; SSP alone; and WSP and SSP.
- **C (Comparison)** – baseline environmental, social and well-being indicators.
- **O (Outcome)** – undertake pre-, during- and post-intervention environmental observations alongside the continuing collection of social survey data
- **T (Time)** – 12 month period.

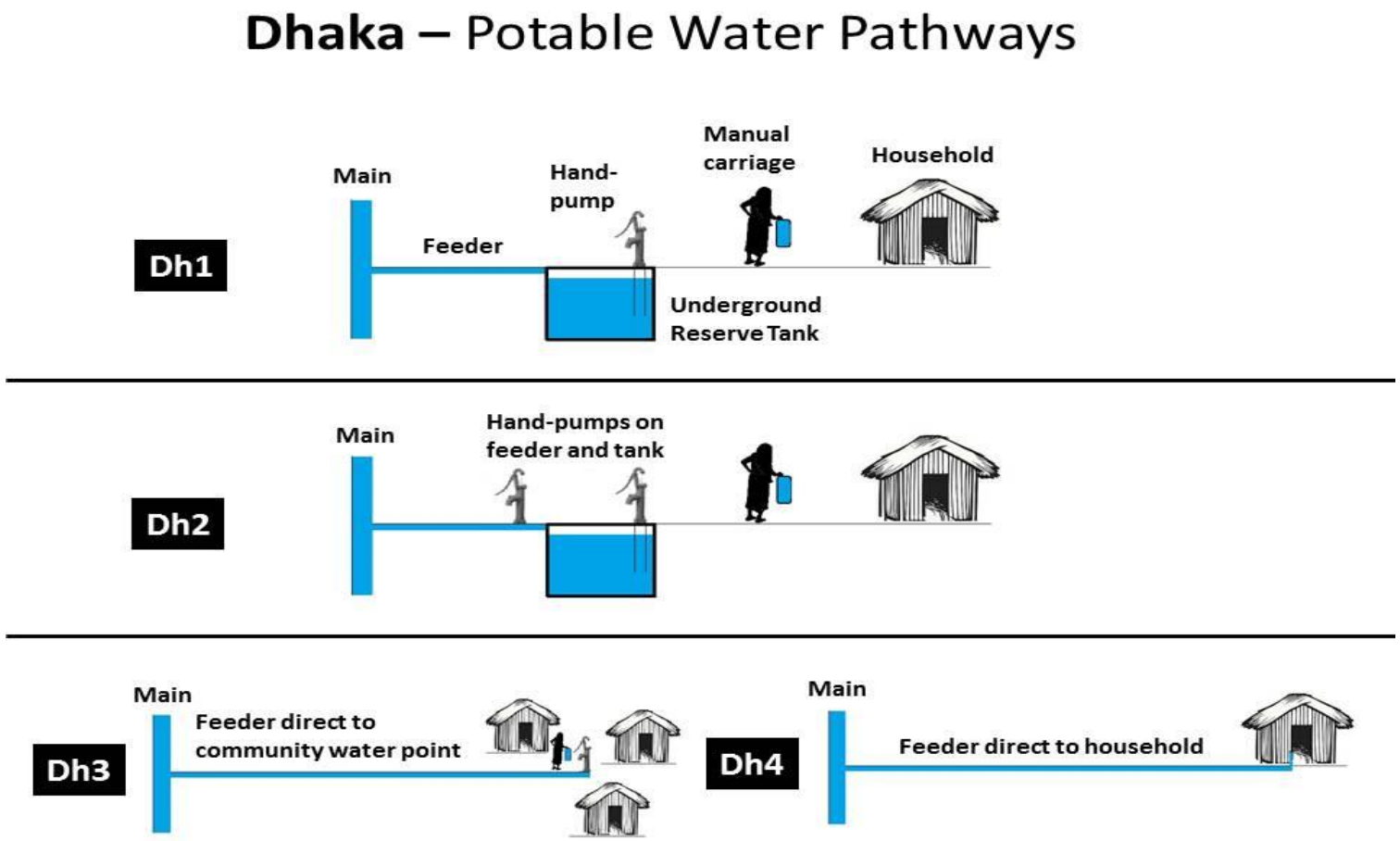
L100M Key Method #1

Settlement mapping and characterisation

- GIS mapping of all dwellings and facilities
- Base-line profiling of selected water, sanitation and drainage facilities
- Detecting changes over the course of 12 months PICOT study
- Profiling of households that we may regard as ‘typical’, ‘positive variance’ and ‘below-par’ in their WASH practices

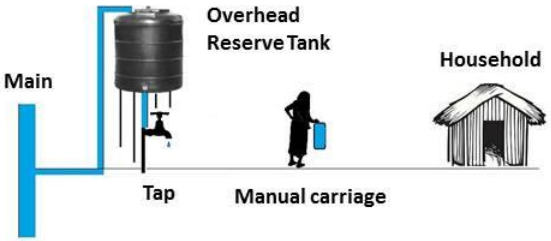
L100M Key Method #2

1. Drinking water pathway characterisation

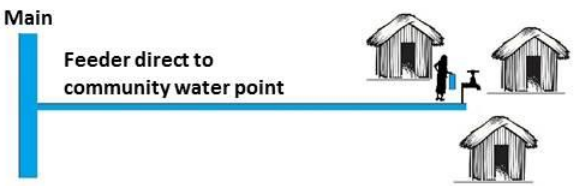


Dar – Potable Water Pathways

Da1

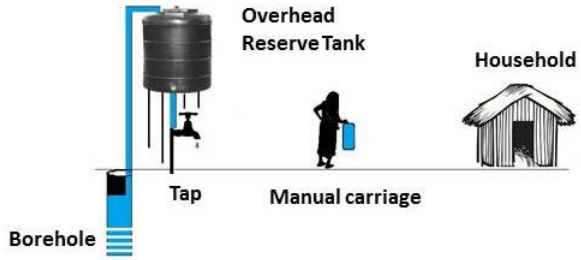


Da2

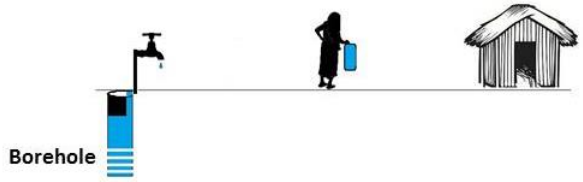


Da3

Da4



Da5



2. Monitoring drinking water quality *(builds on provisioning + lab capacity)*

- ***Three Campaigns***:
  - pre-, during- and post-intervention
- ***Each campaign involves***
  - **Initial**-sampling:
    - Capture variability across water points by type ***and*** to identify main-sampling
    - Three rounds of samples collected 3 days apart
  - **Main**-sampling:
    - Starts 4 days after the pre-sampling
    - Main-sampling will involve four rounds of samples
- All campaigns will have the same water points and households

3. Monitoring wastewater quality and discharge

- Settlement dominant drainage channel
- Water quality
  - Every other day: Turbidity, NH_3 and PO_4
  - Once per week: Thermortolerant and Faecal Coliform
- Water quantity
  - Drainage channel water level – every other day
  - Estimate of discharge by dilution guaging

L100M Key Method # 3

Adapting WHO Water Safety Framework

…and WHO Sanitation Safety Framework

Intervention 1
WSP (Water Safety Plan)

- Promote low-cost education based initiatives
- Identify and prevent negative feedback (e.g. safeguarding reserve tank integrity)
- Clean, at regular intervals, overhead and underground community storage
- Raise awareness and prevent cross-contamination
- Identify and rectify zones of extreme water contamination (e.g. toilet blocks adjacent to water reserve tanks)

Intervention 2
SSP (Sanitation Safety Plan)

- Clean drain on a regular basis (before, during and after rainy season)
- Empty onsite sanitation system and safely dispose
- Undertake remedial work on onsite sanitation system
- Tackle open defecation (including children faeces)
- Minimise externally sourced faecal dumping
- Minimise unsafe supernatant
- Tackle over-stressed toilets (new infrastructure)

- Making the invisible visible (science communication)
- Identify positive practices
- Promote local and sustainable safeguarding practices (institution building)
- Foster entrepreneurship

Emerging Findings: A good Job, Unfinished?

The following six figures below illustrate the 'L100M' dilemma in a typical Dhaka *bustee* (a *Bengali* term for slums).

We call this '*Bustee K*' to protect its identity.

Figure 1

***Bustee K* in 2005,** when life was dominated by hanging toilets and shallow dug wells

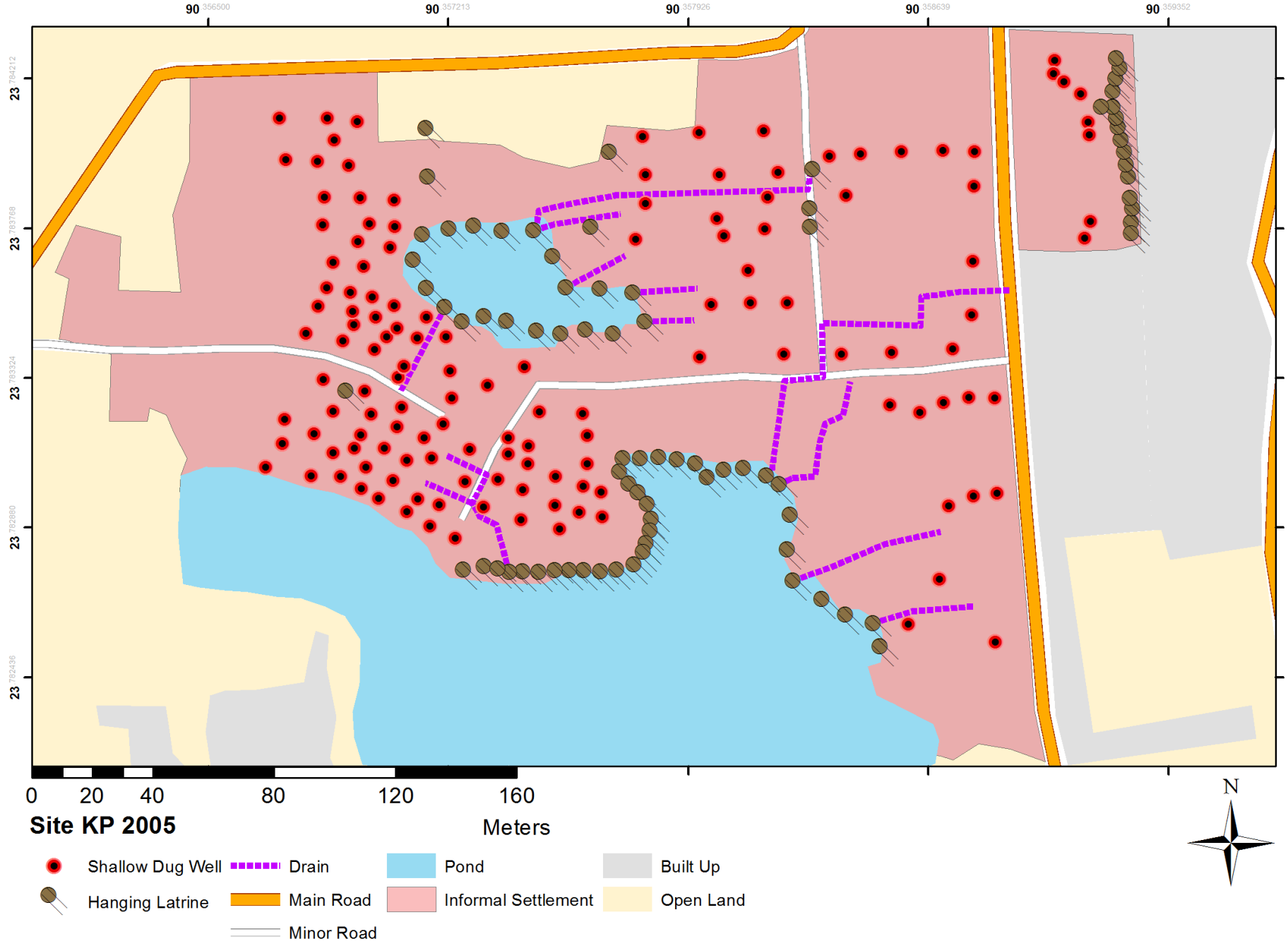


Figure 2

***Bustee K* in 2009,** the 1st generation of community latrines and waterpoints have been built

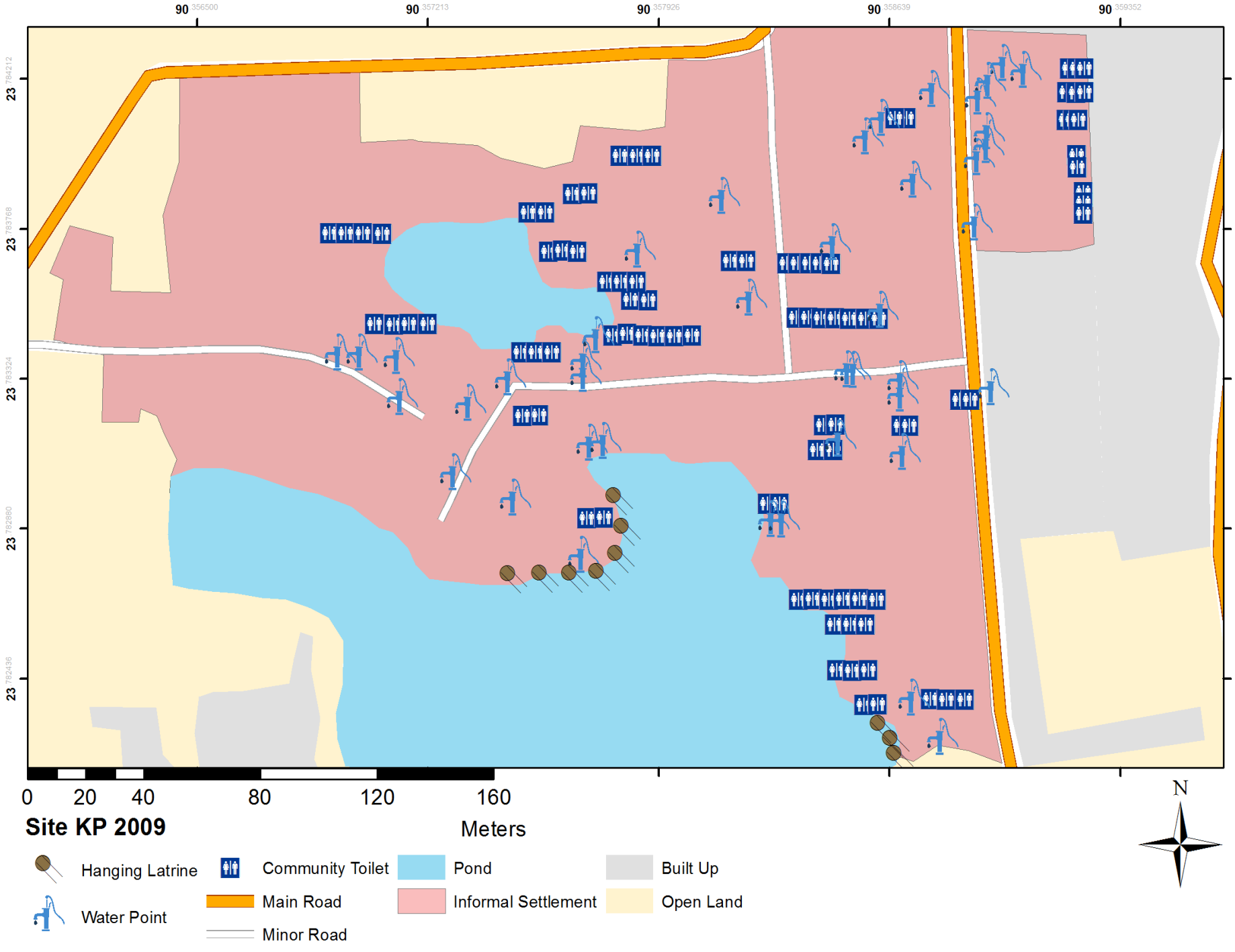


Figure 3

***Bustee K* in 2015, t**he 2nd generation of community latrines and waterpoints have appeared

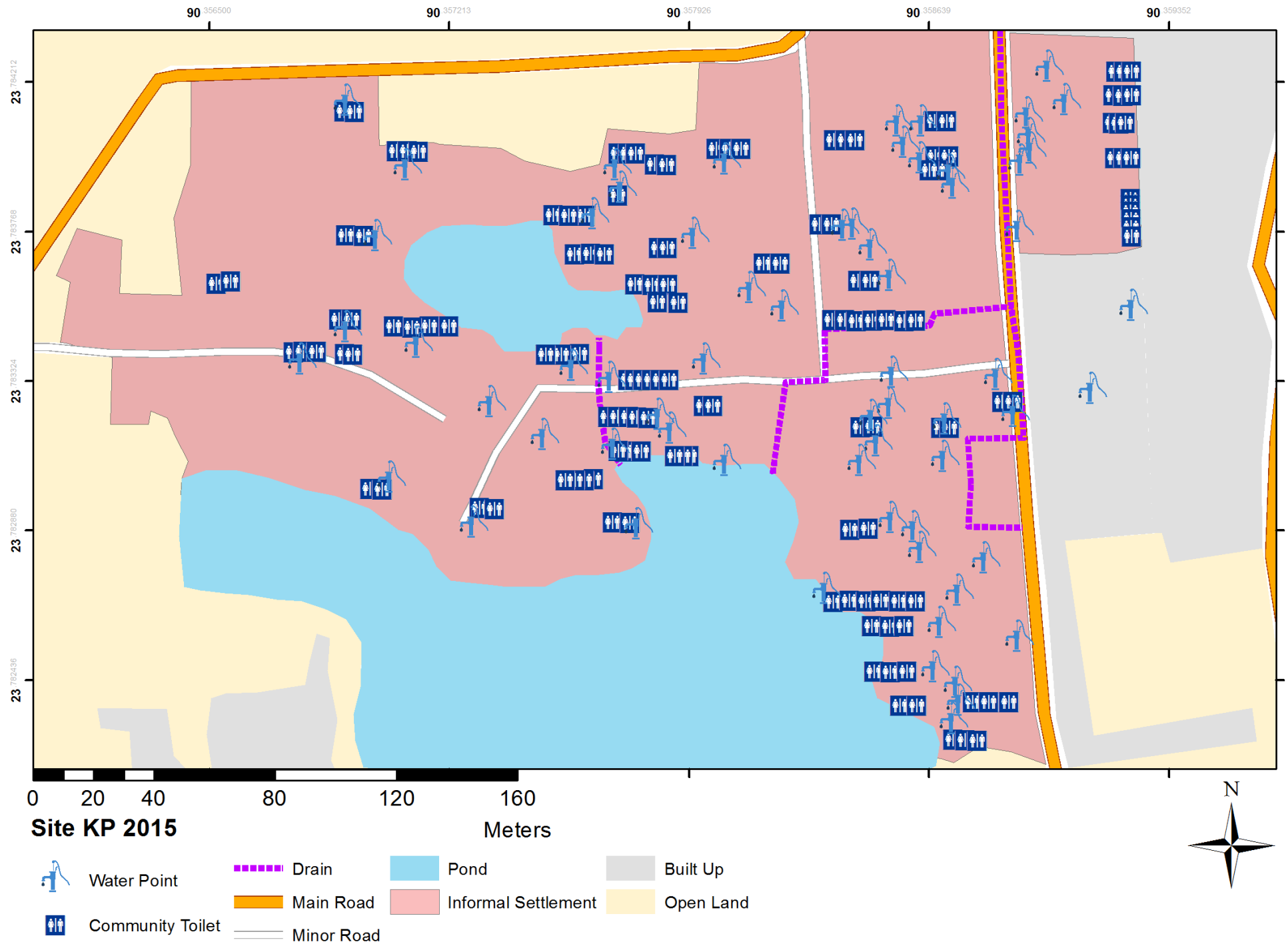


Figure 4

Incidence of diarrhoea in Dhaka between 1995 and 2012

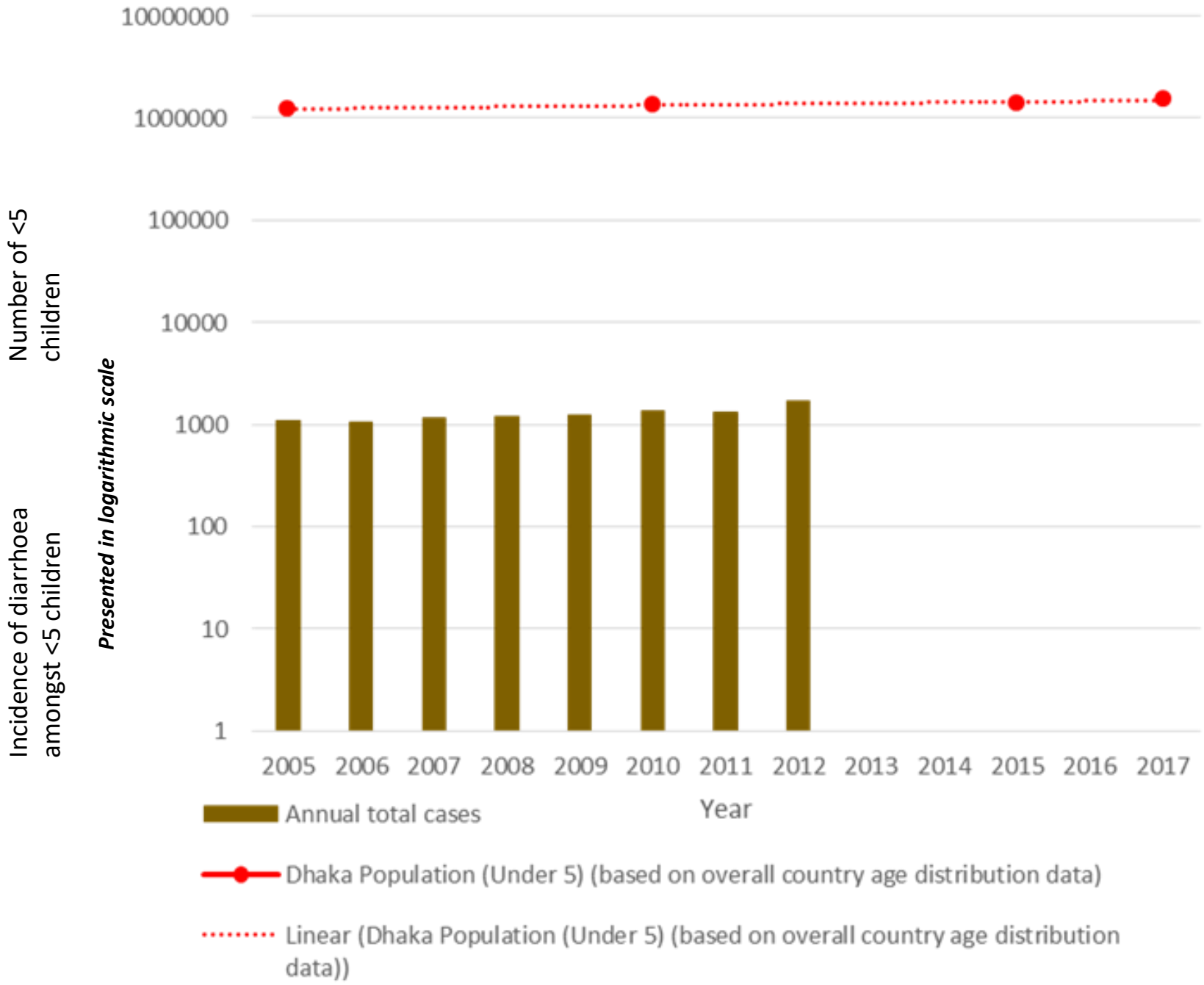


Figure 5

Faecal contamination along drinking water pathways to *Bustee K* in 2017

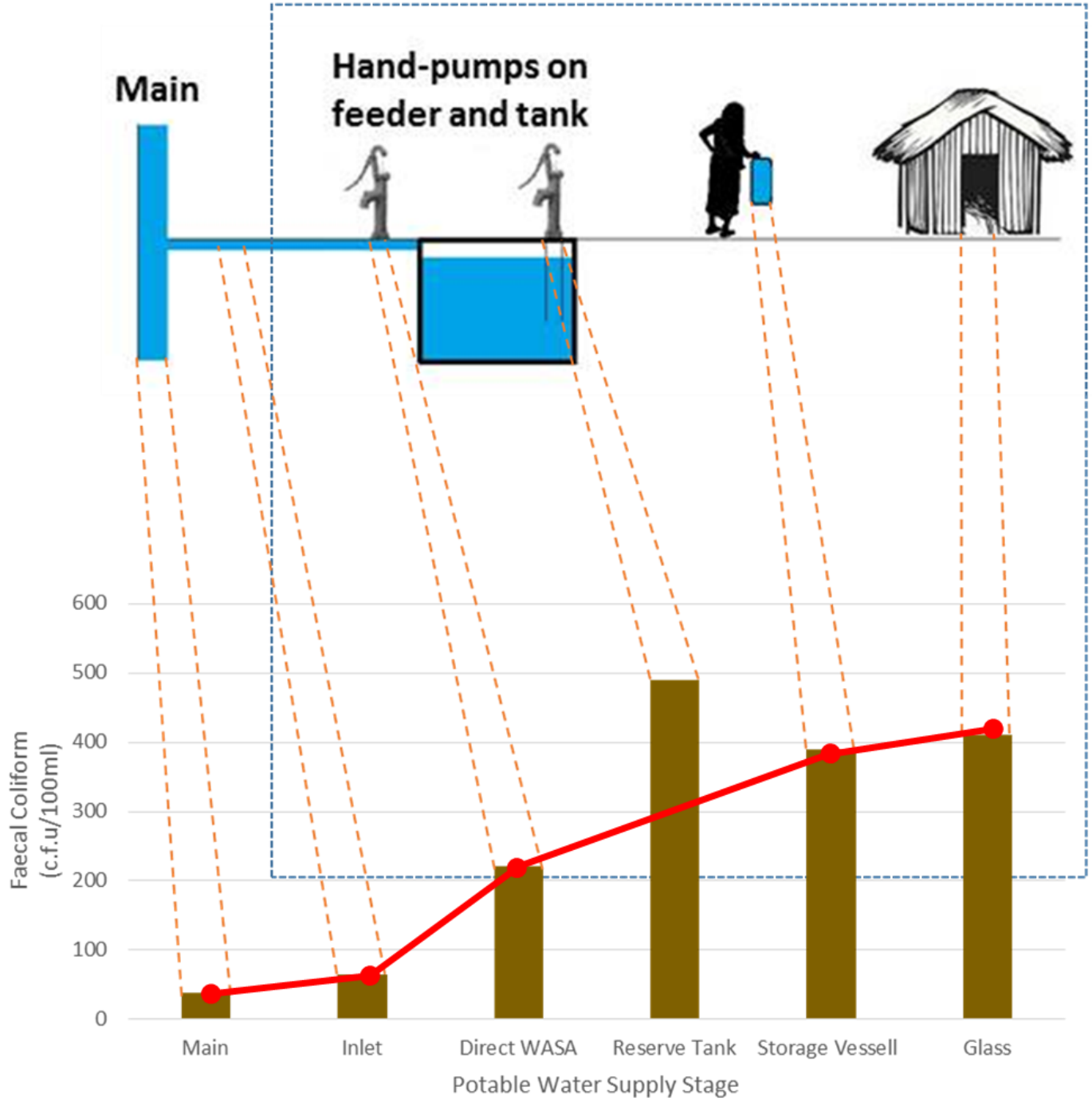
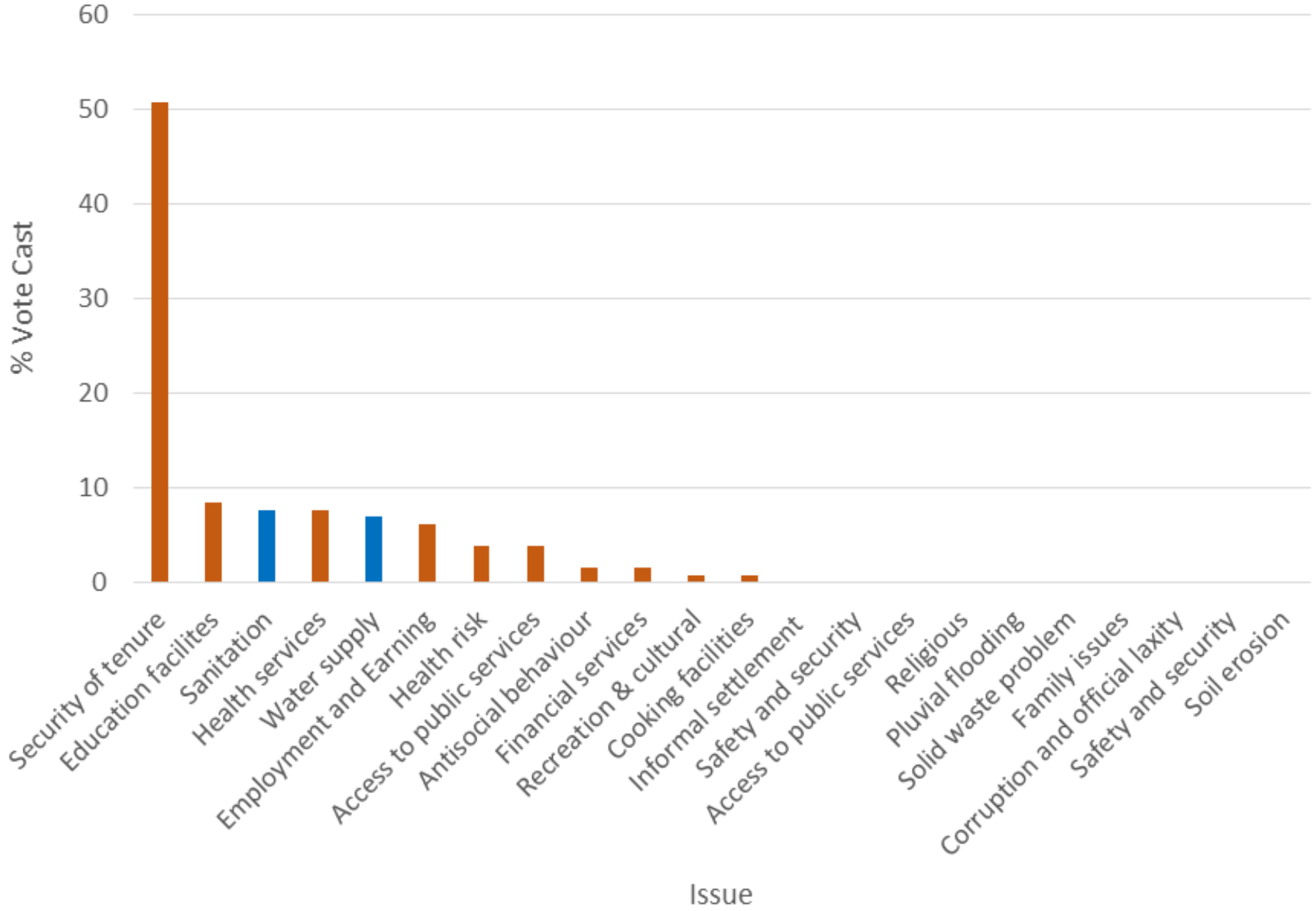


Figure 6: Perceived challenges facing dwellers of *Bustee K* in 2015



To appreciate what is happening in *Bustee K*, we situate these observations in the wider context - focussing on three questions:

1. **How extensive is the L100M dilemma?**
2. **Can we identify contamination hotspots or floodgates?**
3. **What is the key policy context?**

Q1. How extensive is the L100M Dilemma?

This is an endemic problem

- Municipal water is relatively safe until it enters into the final dispensing facilities inside slums
- After the water comes out of the taps - does it get contaminated - to a very high level of risk
- 2015 MICS report finds 35% urban drinking water sources at high to very high risk
- But we find almost all water samples inside people's homes are at high-risk

How might it get worse?

1. High population density and growth
2. Dhaka's natural drainage system maybe approaching a contamination recuperation tipping point

Q2. Can we identify contamination hotspots or floodgates?

- We substantiate existing virtue: improving sanitation is effective in reducing diarrhoeal disease than improving water quality and quantity.
- The community water dispensing facilities are the floodgates
- Blaming the dwellers is easy but neither fair or accurate

Q3. What is the key policy context?

- Since 2007 authorities can provide water to slums whether or not slum dwellers own their land
- The policy reforms in question only concerned water supply
- The mediating NGOs took these reforms as an opportunity - and mobilised slum communities to also improve on-site sanitation facilities as part of their water supply package.
- Technical integrity of the community-based facilities has relied upon NGO personnel and their CBO leaders.

Implications for Policy

1. We need to set the ‘L100M’ space as our unit of focus

2. Innovative ‘education pathways’ are needed to ensure that invisible faecal contamination is (metaphorically) `made visible’

3. We need more experiments to improve models and find ways to implement proven strategies in the most cost effective ways.

In Conclusion

- We are at an important point in our continued journey of developing what could be termed a ‘WASH Vaccine’.
- This is no quick fix injection, but a concerted and sustainable set of actions.
- By regarding this as a kind of vaccine, we are suggesting that proven actions must be repeated and revitalised


Alleviating suffering
and disease