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Why Awareness Fails: Water Storage and Dengue in Hyderabad Homes

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Abstract
Dengue returns to Hyderabad every monsoon, even though awareness drives are run each year. This study was carried out to understand why prevention habits break down inside homes. Semi-structured interviews were held with household water managers and municipal field workers, and residents were asked to photograph their own water-storage points. The interviews and photographs were analysed with reflexive thematic analysis, using the Health Belief Model and the Aedes life cycle as starting frameworks. Four themes were identified. Water was stored because supply was irregular, not because of carelessness. Clean or covered water was believed to be safe from mosquitoes. Fogging and anti-larval work were seen as the government's responsibility. Containers were emptied but rarely scrubbed. Residents and field workers also named different parties as responsible for recurring outbreaks. Awareness was therefore found to be high, but it was not matched by an understanding of where and how Aedes breeds. It is suggested that prevention messages should focus on one specific habit, scrubbing and refilling stored water weekly, and should be delivered through trusted community networks.

I. Introduction

1.1 Background

Dengue is a viral infection spread by Aedes mosquitoes. Four serotypes of the virus exist, and a second infection with a different serotype carries a higher risk of severe disease (WHO, n.d.). No specific treatment is available, so prevention depends almost entirely on controlling the mosquito. Much of that control happens at household level, in the buckets, drums and tanks where people keep water.

The burden in Telangana is not small. Reported figures from 2024 show 6,242 confirmed dengue cases out of 106,356 samples tested, a positivity rate of about 6 percent, and Hyderabad had the highest district count at 2,073 cases (Deccan Chronicle, 2024). Cases rise sharply after the monsoon, when rainwater and stored water give the mosquito more places to breed.

1.2 Existing research

Several Indian studies have looked at what people know about dengue and what they do about it. Most are knowledge, attitude and practice (KAP) surveys. A study of Delhi slums reported fear of dengue alongside poor preventive practice, and noted that women who manage the household had a central role (Delhi slums study, PMC5302449). In Palakkad, Kerala, the habit of storing water in many containers was tied to higher mosquito indices (Palakkad KAP study, IJCMPH). A study from north Kerala reached a similar conclusion: people knew about dengue, but breeding sites persisted because of water storage and household waste (IJMEDPH, 2024).
The pattern is consistent. Awareness is high and practice is poor. What the surveys cannot easily explain is why.

1.3 Research gap

Outside India, qualitative work has started to answer that question. A Colombian study examined water storage as a cultural practice and pointed out how little research exists on people's own reasons for storing water (PMC4465337). A qualitative study in Malaysia made the same point about dengue beliefs more generally (PMC3708882). In India, qualitative work is scarce, work that includes municipal field workers is scarcer, and none was found for Hyderabad neighbourhoods.

1.4 Research question and framework

This study used the Health Belief Model, which breaks health behaviour into perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cues to action and self-efficacy. It was paired with the biology of the vector. Aedes moves from egg to larva to pupa to adult in roughly 7 to 10 days in stored water, and its eggs stick to container walls and survive drying (CDC, n.d.).
The main research question was: which beliefs and everyday water practices allow Aedes to complete its life cycle inside homes after the monsoon? Three sub-questions followed.

1. How do residents explain where mosquitoes breed, and why do they store water?
2. How do residents and municipal field workers differ in their explanations of recurring dengue?

3. Which habits that look protective still let the mosquito survive?

II. Methodology

2.1 Design

I used a qualitative, exploratory design with two parts: semi-structured interviews and photovoice. In photovoice, participants take photographs of the topic being studied and then talk about them. It suits this topic because people often do not mention a half-covered drum or a flower vase in an interview, but they will photograph it when asked to show where they keep water (Nykiforuk et al., 2011).

2.2 Participants

Purposive sampling was used. I recruited 12 adult household water managers (18 years or older) from three Hyderabad neighbourhoods that differed in how regular their water supply was, plus 3 municipal entomology or field staff, giving 15 participants in total. Residents were reached through resident welfare associations. Published work on saturation suggests that most themes in interview studies of focused topics appear within 9 to 17 interviews (Hennink & Kaiser, 2022), so 15 was considered enough for a narrow question.

2.3 Data collection

The interview guide covered the timing of water supply, the containers used, cleaning habits, beliefs about where mosquitoes breed, and views on fogging and anti-larval drives. The guide was built using the stepwise approach described by DeJonckheere and Vaughn (2019). Residents were asked to photograph every point in the house where water was stored. Each photograph was then discussed during the interview (photo-elicitation).
Written informed consent was taken from every participant. Photographs showing faces or house addresses were not allowed. Interviews were held in Telugu, Hindi or English, audio-recorded, transcribed, and translated into English where needed. Interviews lasted 30 to 45 minutes and were held at participants' homes or, for field workers, at the ward office. Because this was a practice exercise, no formal ethics approval was sought.

2.4 Data analysis

Transcripts and photographs were analysed with reflexive thematic analysis in six phases (Braun & Clarke, 2006). Deductive codes came from the Health Belief Model constructs and the stages of the Aedes life cycle. Inductive codes were added for ideas that did not fit, such as irregular supply and trust in fogging. Resident codes and field-worker codes were then compared side by side. Themes were refined after comparing the three neighbourhoods.

III. Results

Participants were 9 women and 3 men among residents, with 3 field workers. Four themes were developed. Table 1 links each theme to the framework used.

Table 1. Themes, Health Belief Model constructs and Aedes life-cycle stage

Theme	Health Belief Model construct	Aedes stage involved
Water is scarce, so we store it	Perceived barriers	Egg to larva in stored water
Clean water can't breed mosquitoes	Low perceived susceptibility	Larva in clean, covered water
Fogging is the government's job	Cues to action, self-efficacy	Adult (fogging) versus larva (home)
We empty but don't scrub	Perceived benefits	Eggs on container walls

3.1 Primary findings

Water is scarce, so we store it. Residents in our neighbourhood described supply that came for 2 hours on thursdays and then stopped. Storing water in drums, buckets and tanks was described as a basic need, and nobody talked about it as a risk. One participant said: "We get water only two hours, so I fill everything I have" (R3). Photographs showed 4 storage points per household on average.

Clean water can't breed mosquitoes. Most residents believed mosquitoes breed in dirty or drain water. Stored drinking water, especially if covered, was seen as safe. "Water we drink and keep covered is clean, so where will mosquitoes come from?" (R7). This belief meant that the places where Aedes actually lays eggs were not checked.

Fogging is the government's job. Residents described fogging as the real answer to dengue and expected the municipality to do it. "Fogging is what kills dengue, that is the corporation's work" (R10). Home-level steps were mentioned less often.

We empty but don't scrub. Residents knew that stagnant water was a problem, so many emptied containers and refilled them. Scrubbing the walls was rarely mentioned. "I throw the water out and fill fresh; what is there to scrub?" (R5).

3.2 Residents compared with field workers

Field workers described weekly anti-larval operations and larvicide use, which matches the municipal approach reported for Hyderabad by the Integrated Disease Surveillance Programme (IDSP, 2020). They placed most of the responsibility on households that kept containers uncovered or left them standing. Residents placed it on the municipality. The clash was clearest on fogging. One field worker said, "We fog and give larvicide every week, but people keep water open for days" (F2). A resident answered, "They come, they spray, and the mosquitoes are back in three days" (R9).

3.3 Differences by neighbourhood, container and household role

Reasons for storing water differed by supply regularity. In the neighbourhood with supply on alternate days, residents kept two or three containers. Where supply came for only a few hours a week, residents kept five or more, and several stored water for up to a week. Overhead tanks, drums, coolers, pots, and flower vases were all photographed, and overhead tanks and coolers were the least cleaned because they were hard to reach. Storage was managed mostly by women in the household, and women who handled storage daily were more likely to keep containers covered, while the men who cleaned overhead tanks did so only a few times a year.

3.4 Unexpected findings

Some habits that looked protective were not. Emptying a container without scrubbing it leaves eggs stuck to the wall, and eggs survive drying. Refilling the container then covers them with water, which triggers hatching (CDC, n.d.). Covered water was also believed to be safe, although a cover that is opened daily does not stop larvae already inside. One photograph showed a steel drum that was emptied every Sunday and refilled at once, with a green film still visible on the inner wall.

IV. Discussion and Conclusion

4.1 Interpretation

Each theme maps onto a construct of the Health Belief Model. Irregular water supply acts as a barrier that overrides what people know. The belief that clean water is safe lowers perceived susceptibility, because the danger is imagined somewhere else. Reliance on fogging weakens self-efficacy, since people feel the real solution is not in their hands. Emptying without scrubbing reflects perceived benefit that is real but incomplete.

This explains the knowledge-practice gap found in this setting. People in Hyderabad know that dengue comes from mosquitoes. What they lack is a clear picture of the life cycle, in particular that the egg survives the empty container. A household survey linking knowledge to practice reported a similar disconnect (Bioinformation, 2023).

4.2 Comparison with previous studies

The findings agree with the Delhi, Palakkad and north Kerala studies, where high awareness sat beside persistent breeding sites. They add two things. First, water storage here was explained as a response to supply, which a survey would record only as a habit. Second, the gap between what residents and field workers each blamed is something earlier Indian studies did not capture, since they did not interview field staff. What is specific to Hyderabad is the closeness of supply timing to the post-monsoon peak, though this needs confirming in a larger sample.

4.3 Practical implications

A simple household routine could be built from the findings: a "10-minute Sunday check" in which every stored container is emptied, scrubbed on the walls, rinsed and refilled, and every cover is checked. Messages should be aimed at the person who manages water storage, not at the household in general. Municipal outreach could use the trust that resident welfare associations already hold, and combine field-worker visits with the household check instead of replacing it. Community-based programmes built on the Health Belief Model have been tried in Delhi with encouraging results (JRHS, Delhi intervention study).

4.4 Limitations and future research

The sample was small and purposive, so the findings are not meant to describe all of Hyderabad. Everything was self-reported, and the photographs show only what participants chose to show. No larval sampling was done, so breeding in the homes was not confirmed. A follow-up could add a larval survey using the House Index and Container Index, or link the themes to local serotype data, since all four serotypes have been found in Hyderabad Aedes (Telangana serotype study, 2017-18).

4.5 Conclusion

Awareness drives in Hyderabad have succeeded in telling people about dengue. They have been less successful in showing people where the mosquito actually lives. Prevention will improve if messages focus on one specific, doable habit, scrubbing and refilling stored water every week, and if they respect the reasons people store water in the first place.

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