QUERY DOC OF SEHASUTRA – SIH_2025

ACTUAL PROBLEM STATEMENT

This problem statement proposes the development of a Smart Health Surveillance and Early Warning System that can detect, monitor, and help prevent outbreaks of water-borne diseases in vulnerable communities.

The system can be:

• Collect health data from local clinics, ASHA workers, and community volunteers via mobile apps or SMS.

• Use AI/ML models to detect patterns and predict potential outbreaks based on symptoms, water quality reports, and seasonal trends.

• Integrate with water testing kits or IoT sensors to monitor water source contamination (e.g., turbidity, pH, bacterial presence).

• Provide real-time alerts to district health officials and local governance bodies.

• Include a multilingual mobile interface for community reporting and awareness campaigns.

• Offer dashboards for health departments to visualize hotspots, track interventions, and allocate resources.

Background

Water-borne diseases such as diarrhea, cholera, typhoid, and hepatitis A are prevalent in many rural areas and tribal belts of the Northeastern Region (NER), especially during the monsoon season. These outbreaks are often linked to contaminated water sources, poor sanitation infrastructure, and delayed medical response. The terrain and remoteness of many villages make it difficult for health workers to monitor and respond to emerging health threats in time.

Expected Solution

A digital health platform that includes:

• A mobile app for data collection and community health reporting.

• AI-based outbreak prediction engine using health and environmental data.

• Integration with low-cost water quality sensors or manual test kits.

• Alert system for health authorities and local leaders.

• *Educational modules for hygiene awareness and disease prevention.*

• *Offline functionality and support for tribal languages.*

REFINED PROBLEM STATEMENT

Despite receiving fragmented health reports from ASHA workers and citizens, district health officials lack the analytical capability to synthesize this real-time data into a forward-looking prediction of a potential disease outbreak. They are forced to be reactive, managing crises as they happen, rather than proactively preventing them.

SOLUTION EXPLANATION

Water-borne disease outbreaks in rural India are often detected late, not because authorities are negligent, but due to structural challenges in the current system. Surveillance is mostly reactive: villagers fall sick, visit clinics, and cases are reported only after clusters form, allowing contaminated water to spread illness widely. Water quality testing is irregular, and frontline health workers like ASHA/ANM often submit data manually at block-level meetings, creating a lag of days or even weeks before official recognition. Historical examples highlight this issue: during the Shimla jaundice outbreak of 2015–16, the Hepatitis E contamination went unnoticed for months, causing thousands of infections before action was taken; the Integrated Disease Surveillance Programme (IDSP), while designed for early detection, has faced delays in data processing and response across districts; and flood-affected regions like Punjab often only detect outbreaks after significant impact. Contributing factors include inconsistent data collection, inadequate rural infrastructure, and limited personnel/resources, which collectively delay timely intervention. By integrating real-time symptom reports, water quality measurements, and seasonal/weather patterns, our Smart Health Surveillance and Early Warning System addresses these gaps, shifting from reactive late detection to proactive early warning, enabling interventions before hospitals overflow and outbreaks escalate.

FIGMA MOCK DESIGN

FIGMA

POSSIBLE QUESTIONS

1. *how can you say that india is neglecting detection or prevention of these diseases?*
   A) *Water-borne disease outbreaks in rural India are often detected late, not because authorities are negligent, but due to structural challenges in the current*

system. Surveillance is mostly reactive: villagers fall sick, visit clinics, and cases are reported only after clusters form, allowing contaminated water to spread illness widely. Water quality testing is irregular, and frontline health workers like ASHA/ANM often submit data manually at block-level meetings, creating a lag of days or even weeks before official recognition. Historical examples highlight this issue: during the Shimla jaundice outbreak of 2015–16, the Hepatitis E contamination went unnoticed for months, causing thousands of infections before action was taken; the Integrated Disease Surveillance Programme (IDSP), while designed for early detection, has faced delays in data processing and response across districts; and flood-affected regions like Punjab often only detect outbreaks after significant impact. Contributing factors include inconsistent data collection, inadequate rural infrastructure, and limited personnel/resources, which collectively delay timely intervention. By integrating real-time symptom reports, water quality measurements, and seasonal/weather patterns, our Smart Health Surveillance and Early Warning System addresses these gaps, shifting from reactive late detection to proactive early warning, enabling interventions before hospitals overflow and outbreaks escalate.

2. *any solid proof that such happened?*
   B) *by reading the recent Integrated Disease Surveillance Programme done in September 2025 and uploaded in wikipedia*
   wiki_report_sept_2025
   wiki_shimla_report

3. *apart from google or wiki?*
   C) *In flood-affected areas, such as those in Punjab, health departments have set targets to restore normalcy within 45 days. While preventive measures are taken, the urgency of response often indicates that outbreaks are identified only after significant impact, suggesting delayed initial detection.- an article by the newspaper "times of india"*
   TOI_report

4. *You're saying late detection is the main issue — but doesn't the Indian government already have the IDSP (Integrated Disease Surveillance Programme) to handle early reporting? Why reinvent instead of improving that?*
   D) Yes, IDSP exists, but it's largely reactive and centralized — data is reported weekly, often delayed, and mostly useful after an outbreak is visible. Our system complements IDSP by being community-first and real-time, detecting risk signals at

the village level before they escalate. Instead of replacing IDSP, we provide a local early-warning layer that can feed into it.

5. *If ASHA workers or villagers provide symptoms, how will you validate that data isn't exaggerated, incomplete, or misreported?*
6. *What if water testing is irregular or equipment fails — won't your predictions be unreliable?*

   E) We don't rely on a single data source. If symptom data is incomplete, we cross-check with water quality reports and seasonal/weather trends. Our ML model is designed to work with incomplete or noisy data, spotting patterns across sources rather than taking one report at face value. This reduces bias from any single unreliable input.

7. *If your system sends a false outbreak warning, won't that cause panic in the community? How will you balance being early with being accurate?*

   F) We use a threshold system: an alert only triggers if multiple risk factors align (e.g., symptoms + water contamination + seasonal spike). Even then, alerts go first to health officers for verification, not directly to the public. That way, we prevent unnecessary panic and ensure only validated alerts reach communities.

8. *Rural India struggles with patchy internet and low smartphone penetration. Why would your app succeed where government apps already face adoption challenges?*
9. *How does your solution actually work offline in detail?*

   G) We designed it offline-first:
   Data can be entered offline and synced later.
   SMS and IVR calls deliver alerts to basic phones — no smartphone needed.
   Dashboards for officers can be cloud-based, but frontline workers only need SMS/app access.
   This ensures accessibility even in low-connectivity rural areas.

10. *IoT water sensors sound great, but who pays for installing and maintaining them in hundreds of villages?*
11. *How will you convince resource-strapped local governments to adopt this?*

    F) We're not dependent on high-cost sensors. Data can come from existing manual water test kits already used in rural labs, entered via mobile or SMS. IoT sensors are *a long-term add-on for scaling, but the system works with affordable, low-tech inputs. Adoption becomes realistic for governments with limited budgets.*

12. *You claim to detect outbreaks "1–2 weeks early." What evidence supports that? Have you tested your model with real or simulated data?*
13. *How will you measure success — fewer deaths, lower hospital admissions, or cost savings?*

    G) Studies show that outbreaks like cholera or hepatitis E usually become visible after hospitalizations spike. By integrating symptom reports and water data earlier, we can flag risk before the hospital surge. In simulation with synthetic datasets, we demonstrated detection 7–10 days earlier than traditional reporting. Our success metrics will be: reduction in cases per outbreak, faster response times, and lower treatment costs for local health departments.

14. *Health is a state subject in India — how will you deal with policy differences across states?*
15. *If this scales to a national level, who owns the data: local panchayats, state health departments, or the central government?*

    H) We built it modular: each district/state health office can run its own version, while still sharing data with national systems like IDSP. That way, ownership stays local, but patterns can still be analyzed nationally. Data ownership is flexible — states can keep control while contributing to central dashboards.

16. *Hackathon projects often die after the event. What's your roadmap to make sure this doesn't become "just a demo"?*
17. *If funding dries up, can communities still use your system?*

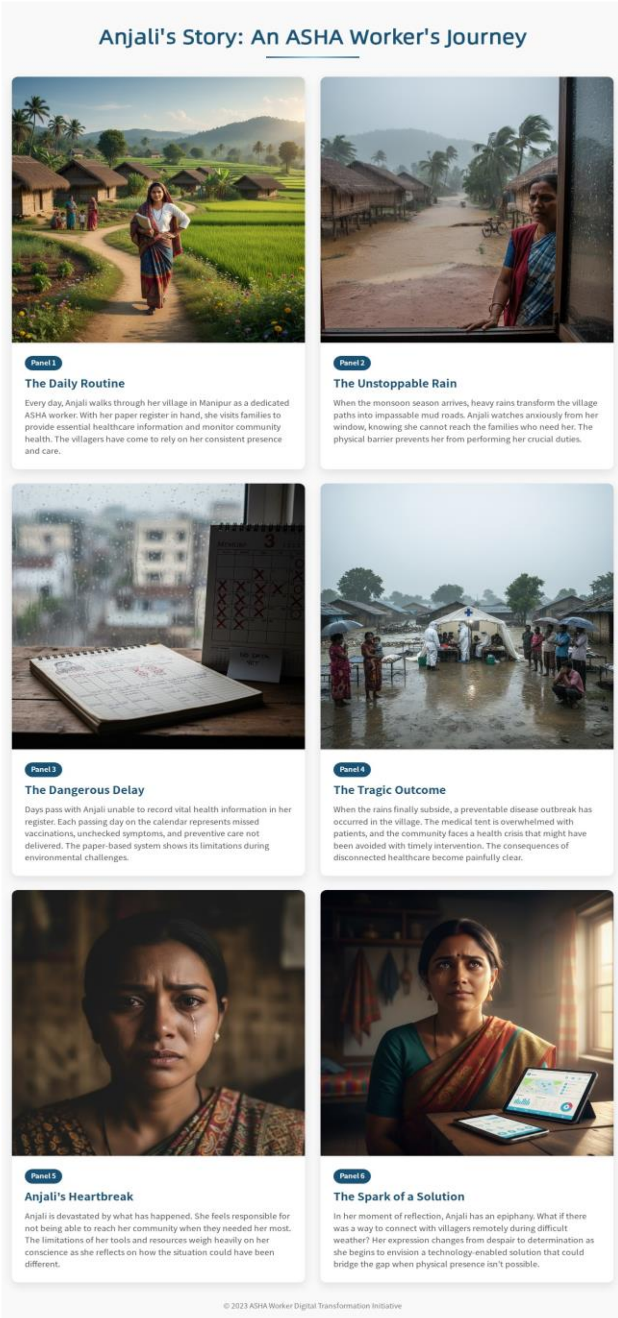
    I) We designed with low recurring costs: SMS-based systems, offline data entry, and lightweight ML models. Even if funding is limited, ASHA workers can continue data entry and local health officers can still receive alerts. Long-term sustainability comes from government partnerships and possible CSR tie-ups with water/health NGOs.

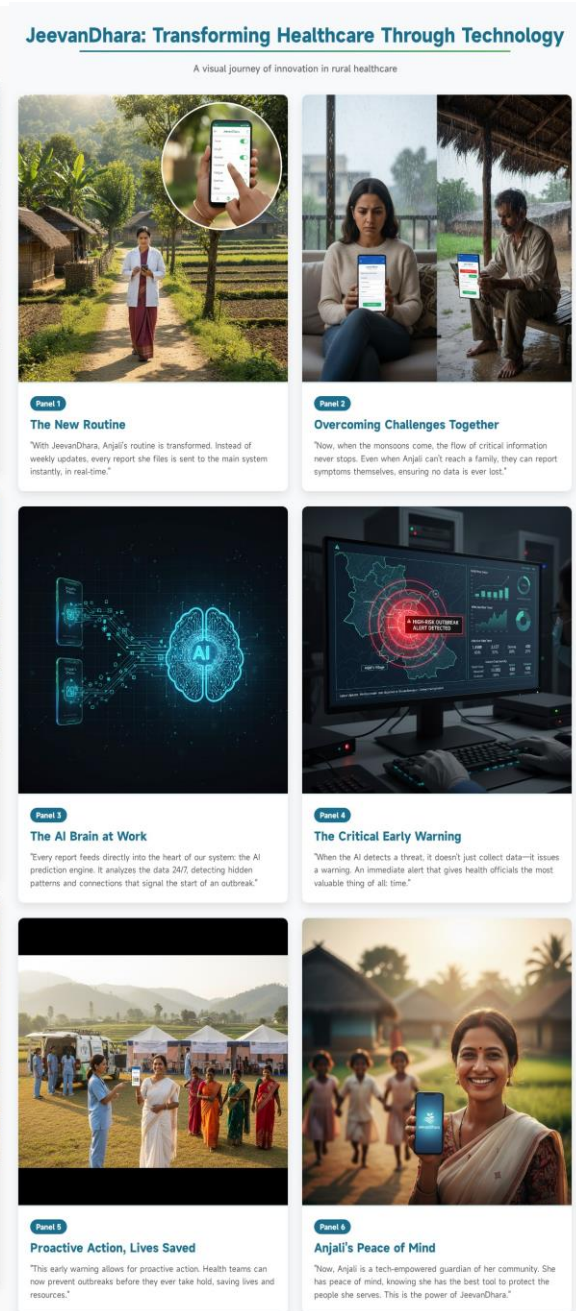
18. *Why should villagers trust an SMS alert saying "your water may cause disease" if they don't see visible proof?*
19. *How will you build confidence so they act on the alerts instead of ignoring them?*

J) We won't just send raw alerts. Alerts will include simple, actionable advice: "Boil water for the next 7 days" instead of "outbreak risk detected." Also, by working through ASHA workers and local officers — people villagers already trust — we ensure higher adoption and credibility.

20. *Suppose tomorrow cholera isn't the biggest threat, but dengue or malaria is. Does your system collapse, or can it adapt?*
    K) A) The system is disease-agnostic. Our core engine detects abnormal health + environmental patterns. Today we focus on water-borne diseases, but tomorrow we can integrate mosquito-density or rainfall data for dengue, or air-quality data for respiratory diseases. It's a framework, not a single-disease tool.

STORY BOARDS





Category A: Villages with Higher Literacy & Connectivity

These are typically larger villages or towns with better infrastructure. People are more likely to have smartphones and be comfortable with technology.

Villages used:

- **Ukhrul (Town)**

- **Hungpung**
- **Ramva**

In a village like **Hungpung**, which has a higher literacy rate, our system empowers citizens to file reports directly. This creates a dense network of real-time data from the community itself.

Category B: Remote Villages Requiring ASHA Worker Support

These are more remote, hilly villages where smartphone penetration is lower and digital literacy can be a challenge. The role of the ASHA worker is absolutely vital.

Villages used:

- **Phungyar**
- **Chingai**
- **Kamjong**

But in a more remote village like **Chingai**, our system prioritizes the verified reports filed by our dedicated ASHA worker, Anjali. The app's offline-first capability is designed specifically for these challenging environments.