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# Bridging Health Gaps Through Technology: A Formative Study on the SNEHA Didi Chatbot


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# Introduction

Despite decades of progress, far too many mothers and children continue to die, especially from preventable causes. Every day, around 800 women die due to complications related to pregnancy and childbirth. This number has become stagnant in the past six years (2016-2022), with 99% of these deaths occurring in developing countries.[1]

India has also made remarkable progress in the last two decades, reducing maternal deaths by nearly 70%. Yet, as of 2020, the maternal mortality ratio (MMR) remains at 99 per 100,000 live births.[2] Further progress is required to meet the Sustainable Development Goal (SDG) target of less than 70 by 2030.[3]

Children are facing a similar reality. In 2022, 4.9 million children died before the age of five, with 80% of them happening in Sub-Saharan Africa and South Asia. India has the second highest number of under-five deaths, most of which are preventable and linked to malnutrition, preterm birth complications, and infectious diseases.[4]

These causes of death can be prevented by improving maternal and child health behaviours, including antenatal care visits, optimal breastfeeding, vaccinations, and more. Much of this effort relies heavily on Community Health Workers (CHWs) as the frontline health workers, especially in resource-limited settings. CHWs are typically community members who are trusted and respected, who are trained to bridging gaps in healthcare access and providing essential health services at the households and community level. Their role often includes providing health education and counselling, surveillance data, and sometimes as a point of referral to the healthcare professionals.[5–7]

However, CHWs are often overburdened, serving thousands of community members with limited resources and training. To enhance their impact, digital platforms have emerged as a promising solution, providing CHWs with tools to expand their reach and improve service delivery.[8] One such innovation is the use of chatbots– Artificial Intelligence (AI) powered programs that are accessible via mobile phones that interact with users through voice or text. By simulating human conversation, chatbots assist individuals in finding information or accessing online services.[9]

SNEHA also explored the use of chatbots to enhance access to its Maternal and Child Health (MCH) program in Bhiwandi, Mumbai. The program serves approximately 10,000 households with pregnant women and children under five. Serving this community, 20 community organizers (COs) act as CHWs, conducting home visits, nutritional counselling, and referrals to the public health and nutrition systems. With the ratio of 1 CO to 500 households, it's necessary to look into the potential of leveraging technology in helping reduce the CO's workload. The use of a chatbot can help greatly in terms of raising health awareness, expanding reach, and reducing communication inequalities.

The team began by assessing the penetration of technology and the internet in the area. Initial communication survey showed that 80% of families own a phone, and 87% use Facebook and WhatsApp. In response, SNEHA launched the WhatsApp chatbot pilot, SNEHA *Didi (Didi* meaning elder sister in Hindi), in Bhiwandi. The pilot aimed to assess user engagement with chatbot-delivered messages, ultimately providing mothers with direct access to timely, reliable MCH information. So far, three pilot phases have been conducted, with each having different engagement strategies (Table 1).

Table 1. Three Pilot Stages of SNEHA Didi

| | Pilot 1 (Sep-Oct'23) | Pilot 2 (Feb-Mar'24) | Pilot 3 (May-Sep'24) |
|---|---|---|---|
| Chatbot feature | Push messages only | Push messages with AI/ML integration | Nudges sent every Friday at 3 pm to ask any questions |
| | Human intervention to respond to queries | AI integration for immediate response | Similar to Pilot 2 |
| Participants number | 400 users | 300 users | 700 users (of previous pilots) |
| Target beneficiaries | Mothers of 0-2 years children | •Mothers of 0-6 m children<br>•Expectant mothers in 3rd trimester | Mothers of 0-2 years children |
| Topics covered | Immunization | •Institutional delivery<br>•Exclusive breastfeeding<br>•Immunization | Similar to Pilot 2 |

From these pilots, initial engagement was promising, but it gradually declined over time. Engagement metrics were primarily based on user interactions such as reading messages and asking questions. Therefore, to further improve and scale up this chatbot, the SNEHA Monitoring & Evaluation and Research team conducted a formative assessment on the SNEHA Didi chatbot.

# Objective

The objectives of this formative assessment were:

1. To understand the current behaviours of MCH information seeking
2. To assess the preferred message construction and delivery formats by the target population
3. To explore SNEHA Didi experiences and challenges faced by users
4. To identify suggestions from the target population regarding the AI chatbot improvement

## Research questions

Objective 1: To understand the current behaviours of MCH information seeking
*1.1 What are the current behaviours of the target population in seeking maternal and child health information?*
*1.2 What are the motivations of the target population regarding seeking MCH information through an AI chatbot?*

Objective 2: To assess the preferred message construction and delivery formats by the target population
*2.1 What are the preferred AI chatbot features?*
*2.2 What is the preferred format of asking questions (menu-based vs. free-form)?*

*2.3 What are the optimal duration, timing, and frequency preferences for receiving messages from an AI chatbot?*

Objective 3: To explore SNEHA Didi experiences and challenges faced by users
*3.1 What is the motivation in using the SNEHA Didi? How has the SNEHA Didi helped the users?*
*3.2 What are the specific barriers and challenges faced by users that contribute to low engagement with the AI chatbot?*

Objective 4: To identify suggestions from the target population regarding the AI chatbot improvement
*4.1 What are the suggestions for SNEHA Didi from the target population?*

# Methods

## Study design

Qualitative data were collected in August-September 2024 through Focus Group Discussions (FGDs) with both users of the chatbot and women who had not yet used it. User groups' answers were used to explore the experience with SNEHA Didi, whereas non-users' answers were used to capture suggestions for scaling up purposes and adapting the intervention in new contexts. Additionally, two In-Depth Interviews (IDIs) were conducted with women (non-users) who arrived earlier and later than the scheduled FGDs, to minimize disruptions.

## Sampling and Study Setting

Two FGDs for user groups were conducted in Bhiwandi, comprising participants from the chatbot pilots in Rehmatpura and Piranipada. Participants were sampled through convenience sampling with assistance from SNEHA's COs and were asked to gather at SNEHA's community health centre for the FGDs.
To incorporate diverse perspectives, one FGD and two IDIs were conducted with non-users in Nerul, a new geographic area for the intervention. These participants had no prior experience with AI-based WhatsApp chatbots. Given limited community rapport in Nerul at the time of data collection, Anganwadi workers facilitated the mobilization of participants for the FGDs.

## Eligibility criteria

To be eligible for the FGDs, participants had to be a mother with children under 2 years old, and have used SNEHA Didi (for user group) and have not used SNEHA Didi (for non-users).

## Data collection

The FGDs and IDIs were carried out by the Monitoring & Evaluation and Research team, a centralized domain of SNEHA which has an independent team of evaluators for an unbiased and impartial monitoring and evaluation of projects. A team of 1 interviewer, 1 facilitator/assistant, and 1 observer were responsible for the data collection. Each interview lasted for approximately 30-45 minutes. The data was audio recorded, translated and transcribed to English, and analysed thematically. We also used a card sorting activity, pictures, and chatbot demos during the FGDs to engage participants in an interactive way.

## Ethical considerations

The interviewer asked for informal verbal consent prior to the interview. Confidentiality of the information was maintained in data processing and outputs did not include participants' name or identifiers.

# Results and Discussion

Total participants of the FGDs and IDIs are 25 mothers with children under the age of 2. Table 2 presents the demographic details of the study participants.

User groups had a broader age range (21-32 years), while the non-user group was slightly younger on the average, with no participants older than 28 years old. The non-user group had a higher education level overall, with all participants having at least completed 12th grade or high school graduates. Most participants in the non-user group owned smartphones, whereas a few participants in the user group did not own phones or smartphones. These differences might be influenced by the difference in sample sizes between groups (user group: 19; non-user: 6).

Table 2. Participants' demographic details (N=25)

| Indicators | n | % |
|---|---|---|
| Age | | |
| - 21-25 y | 14 | *56* |
| - 26-30 y | 8 | *32* |
| - > 30 y | 3 | *12* |
| Education | | |
| - Less than 5 years | 2 | *8* |
| - 5-12 years | 19 | *76* |
| - Graduation & above | 4 | *16* |
| Employment status | | |
| - Employed | 1 | *4* |
| - Unemployed | 24 | *96* |
| No. of under-2 children | | |
| - 1 | 22 | *88* |
| - 2 | 3 | *12* |
| Ownership of smartphone | 21 | *84* |

## Objective 1: MCH information-seeking behaviour

### Motivation and type of information

Mothers primarily seek MCH information when they perceive an immediate need, such as when their child is sick, or not eating properly. Information-seeking is not a regular habit yet. However, among the non-users, some participants mentioned they do proactively search for information on what to do and not do as a preventive measure.

The type of information they seek is usually focused on their children's health rather than their own. This includes curative advice when their child is sick and preventive measures, such as how to keep their child healthy and improving feeding practices.

> *"When the children are sick or unwell or aren't eating properly, then I ask the elders what to do"*

> *"I asked SNEHA Didi during the rainy season how to prevent the kids from falling sick and what to feed and what not to feed, and how to keep the babies safe during the rainy season"*

The chatbot currently expects the mother to engage with it weekly. However, it may be challenging to assume they will proactively seek MCH information without a pressing concern. Therefore, SNEHA Didi's promotion should highlight the importance of being prepared with essential knowledge as a preventive measure. Moreover, implementing the push message format (as the earlier two pilots) or regularly delivering relevant messages can help keep mothers informed about the latest child care practices. This ensures they stay up to date even in the absence of immediate concerns. Additionally, incorporating interactive features like quizzes can also attract engagement and encourage learning.

### Source of information

Participants primarily seek MCH information from family members (husbands and elderly), followed by doctors, SNEHA staff, and Anganwadi workers. Family members are often the first point of contact whenever there's a problem, because of their accessibility and perceived reliability.

In terms of trustworthiness, AI chatbot ranked in the middle among users, and lowest among non-users. Users still prefer human-sources, such as family, doctors, and community health workers, over the chatbot. This also suggests that the chatbot is considered as a supplementary tool rather than a primary source of information. For non-users, this might be due to unfamiliarity with the chatbot. Moreover, social media or website/blog posts (Google, Instagram, YouTube) were ranked low among both groups, indicating a general sense of distrust towards these platforms.

The use of SNEHA Didi with an elder sister persona is already well-suited to resemble a trusted family member. Furthermore, these findings suggest that promotion efforts should include other family members, enabling them to access information and encourage mothers to use the chatbot.

User Group 1, Bhiwandi

Non-user Group, Nerul

Picture 1. Card Sorting exercise for trusted MCH information source

## Objective 2: Message preferences and delivery format

Currently, the only available feature of SNEHA Didi is free-form "ask a question". Users can ask about anything related to immunization, exclusive breastfeeding and institutional delivery, and receive an immediate answer. However, study participants showed mixed reactions regarding additional features. While some preferred the chatbot to provide regular educational videos, others felt the existing question-answer format was sufficient.

Looking at this result, providing both features could be ideal. Educational messages in video, voice, or text format would allow users to access information anytime, spark follow-up questions, and provide ideas on what to ask, ultimately increasing engagement. At the same time, the chatbot's free-form question function would ensure mothers can still seek information that is not covered in the videos.

> *"We do not have to wait for a message or video, that might also be unrelated to the doubt we have at that time."*

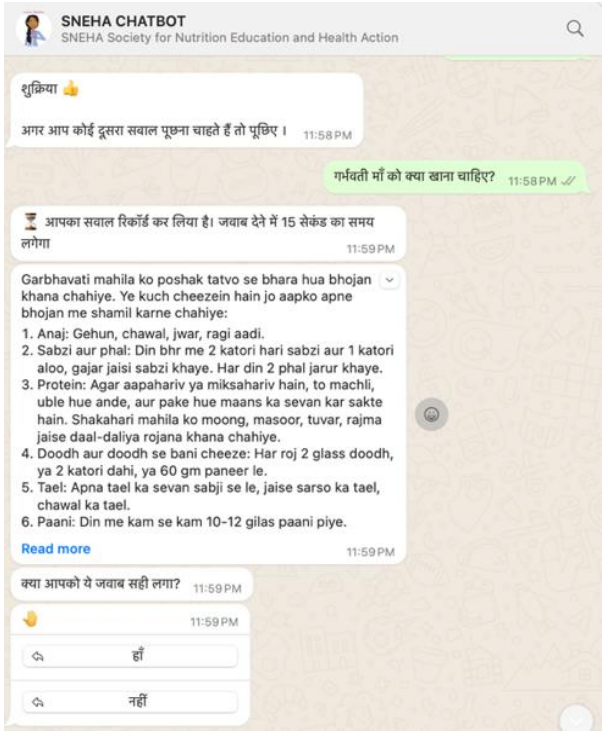
> *"Regular weekly videos because we can see, understand, and then ask follow up questions from the information we get from the videos. "*

To understand user preferences better, we explored two chatbot interaction formats: menu-based and free-form questions (Table 3). During the FGD, participants were shown pictures and live demonstrations to illustrate the differences.

Menu-based options were seen as more inclusive, particularly for those who are not literate or struggle to formulate questions. They also make navigating the topic easier. However, participants still valued the ability to ask freely, highlighting the need for a hybrid approach. From an operational perspective, a menu-based format could also reduce the burden of COs by minimizing the need for repeated training on how to use the chatbot effectively. This feature can encourage active engagement while ensuring users still receive the necessary information through a more user-friendly format.

> *"Yes (menu based is better), because everyone doesn't understand everything. If they have an option, they can choose. You can also type something else."*

Table 3. Two Chatbot Interaction Formats

| Menu-based | Free-form |
|---|---|
|  |  |





In addition, providing answers in the form of videos or voice recordings is seen as more inclusive, as many still cannot read. However, we consider this finding to be highly subjective, as preferences vary from individual to individual in the group. Further assessment may be needed to assess whether text messages are enough or if video/voice messages are essential, considering that the latter would require additional effort.

Regarding timing preferences for receiving messages, between 3 pm and 6 pm is most suitable. Usually, kids are asleep around this time and mothers can have some free time with their phone. Many participants also expressed that increasing the message frequency to two times a week would be beneficial.

## Objective 3: SNEHA Didi user experience

### Motivation to use SNEHA Didi (user group)

When asking the user group about their motivations for using SNEHA Didi, several key reasons emerged:

1. Easy access from home: users appreciate the convenience of accessing information from home, without having to travel around or search for information elsewhere.
2. Ability to ask anything and receive practical solutions.

3. Consistent, ongoing support for their needs.

*"Instead of taking the effort to go to the doctor, we get answers to our basic health-based questions from the comfort of our homes"*

*"It helps us with what to do in the future for our kids and our health, and answers our questions on a regular basis with ease of access, to sustain the continuity of the health-wise well-being of our children."*

### Motivation to use AI chatbot (non-user group)

For non-user group, we specifically asked whether they would use an AI chatbot if available, and their reasons. This was to anticipate their reaction and potential engagement to SNEHA Didi once introduced. Participants expressed openness and excitement about the idea of chatbot for several reasons:

1. Immediate assistance. Participants believe that it can provide direct and immediate help when needed.
2. One-stop information source. It can serve as a single source of information, helping navigate the overwhelm of looking into multiple sources on the internet and deciding which to trust.
3. Online accessibility. The chatbot is online, making it easily accessible at any time.
4. Alternative guidance. Especially for those who lack guidance from the family members, this chatbot would be very helpful.

*"It will be amazing instead of having to look at multiple sources and try to decide which is the most reliable."*

*"Especially for those people who don't have any elderly guidance in the house, this will be very helpful for them"*

We saw similarity in the motivation to use a chatbot in both groups highlighting the potential impact and appeal of SNEHA Didi. To encourage the adoption of SNEHA Didi, we need to highlight its convenience, immediacy, and reliability, demonstrating its ability to reduce the burden of information-seeking and provide consistent, practical solutions.

### Challenges in using SNEHA Didi

So far, there haven't been any significant challenges in using SNEHA Didi from the user group. Users find answers from SNEHA Didi has helped them with their problems. The language is understandable. Moreover, availability of phones and the internet has not posed a barrier to usage. With schools now requiring phone access and WhatsApp being widely used as a communication tool, it appears that smartphones are becoming an integral part of daily life for most families. However, some mothers still rely on their husbands' phone and they can only access it at certain times.

## Objective 4: Suggestion for SNEHA Didi

We asked both users and non-users for suggestions on how to improve SNEHA Didi. Some key feedback points were:

1. Many users suggested that the information should be more engaging, like video-based content.
2. Some suggest more concise answers, not too long, and easy to understand.
3. Refine the answers from the AI, as sometimes it could give misleading answers. Sometimes the mothers need to give more detailed prompts so the AI can answer precisely. There are two examples to further explain this:

   *"I asked SNEHA didi how to make her sleep. She doesn't sleep at all. Then SNEHA didi chatbot replied "I am a machine; I am not human" to that question."*

   - When the mother asked about how to help her baby sleep, SNEHA Didi couldn't provide an answer. This was likely due to lack of input messages in the system, so the AI doesn't have enough information, or because it lacks a detailed prompt or context to help the AI understand the question better. In this case, when the SNEHA CO added further prompts like the age of the baby (14 months), the chatbot responded with age-appropriate sleeping hours.

   *"I asked the chatbot what to do to have a white baby/ fair skinned baby, when I was 4 months pregnant. It asked me to eat coconut, eggs, fish and milk."*

   - The other example is when a mother asked about getting a white/fair skinned baby. The AI should have been more cautious as to understand that skin colour is determined by genetics and not diet, and responded accordingly. It might have just correlated skin colour with food that has a white colour.

This finding encourages the regular refinement of AI's responses, monitoring the quality of information provided, and ensuring that the AI can better interpret user queries. It might also be beneficial for the chatbot to direct certain queries, particularly those outside of its scope, to the CO, or other healthcare workers, rather than offering inaccurate answers.

# Conclusion

*Understanding the current behaviours of MCH information seeking*

- Participants seek MCH info when there's an immediate need or specific interest.
- Proactive information-seeking is challenging without a clear concern.
- Main information sources: family/doctors; chatbot is an alternative, not primary.

*Assessing message preferences*

- Participants prefer regular videos and menu-based Q&A options.
- Video and voice messages are key for low-literacy users.
- Current nudges fit schedules; 2x per week could be beneficial.

*Identifying SNEHA Didi experience and factors contributing to low engagement*

- SNEHA Didi is valued for direct advice, but responses are sometimes too lengthy, not always relevant, and even misleading.
- No major issues with language, internet access, or environment.

# Recommendations

Optimizing chatbot features:

- Push videos can spark questions and ideas, even without immediate need, and increase engagement.
- A tutorial video on chatbot use can reduce CO dependency for user engagement.
- Menu-based options simplify questions, raising awareness.
- Chatbot responses should be concise and action-oriented for clearer steps
- Allow users to choose their preferred format (video, voice, text)

Additional efforts:

- Encourage family members to endorse the AI chatbot to boost engagement
- Regularly update chatbot content to ensure accuracy and smarter responses
- Evaluate chatbot success based on how well it meets user needs using multiple metrics and not just question volume (Refer paper here)
- Define a clear theory of change for SNEHA Didi's success

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## Further reading on the SNEHA Didi chatbot:

1. SNEHA DIDI: An AI ally helping embrace motherhood with confidence and care here
2. An Overview SNEHA didi pilot: a chatbot ally for mothers here