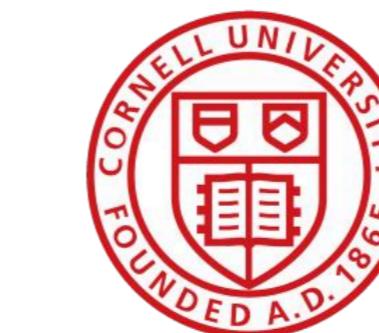


ASHABOT: AN LLM-POWERED CHATBOT TO SUPPORT THE INFORMATIONAL NEEDS OF COMMUNITY HEALTH WORKERS

Pragnya Ramjee*, Mehak Chhokar*, Bhuvan Sachdeva, Mahendra Meena,
Hamid Abdullah, Aditya Vashistha, Ruchit Nagar, Mohit Jain



Microsoft



Cornell University®

ASHAs = COMMUNITY HEALTH WORKERS IN INDIA



ASHAs NEED TIMELY, TRUSTWORTHY, AND PRECISE MEDICAL INFORMATION.

My friend smokes bidi.
Will I also fall sick?

What is the use of Antara injection?

What to do when there is white discharge?

How much should a healthy newborn weigh?

What to do if a pregnant woman is HIV+?

What do I do if a baby is crying for more than three hours?

IT'S DIFFICULT FOR ASHAs TO...

- Visit their supervisors in-person
- Be sure that their supervisors would have the answers
- Ask sensitive/rudimentary questions to their supervisors
- Find contextual medical information online



ASHAs' questions remain unanswered



IT'S DIFFICULT FOR ASHAs TO...

- Visit their supervisors in-person
- Be sure that their supervisors would have the answers
- Ask sensitive/rudimentary questions to their supervisors
- Find contextual medical information online



ASHAs' questions remain unanswered



RELATED WORK

Vashistha et al. (2017), Yadav et al. (2019, 2021), Karusala et al. (2023), Majhi et al. (2024), Taylor et al. (2024), McPeak et al. (2024)...



IT'S DIFFICULT FOR ASHAs TO...

- Visit their supervisors in-person
- Be sure that their supervisors would have the answers
- Ask sensitive/rudimentary questions to their supervisors
- Find contextual medical information online

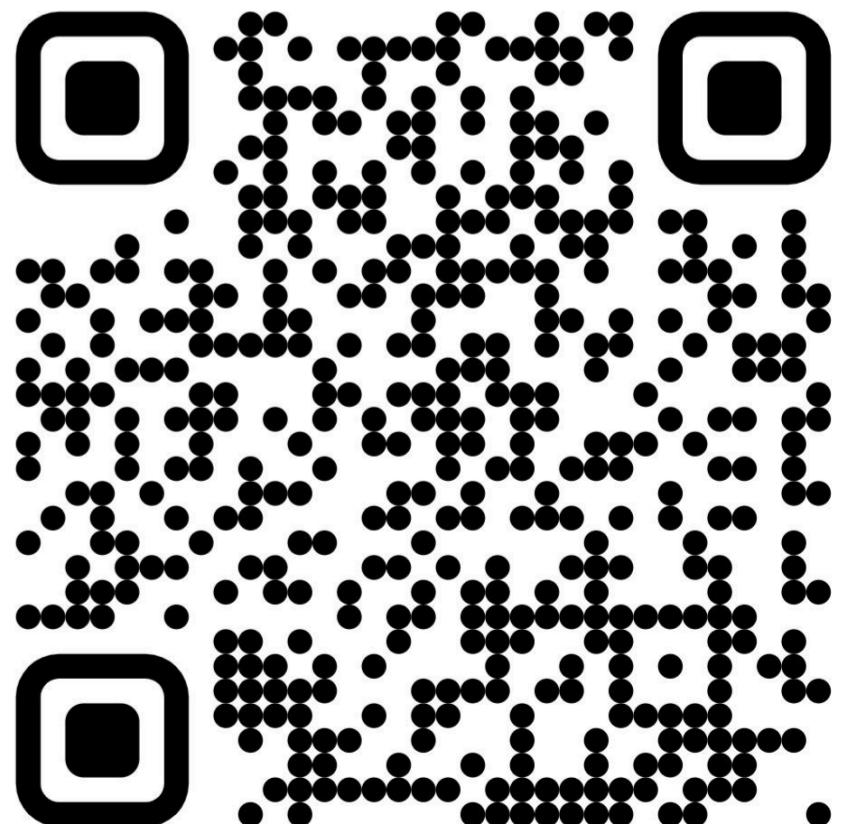


ASHAs' questions remain unanswered

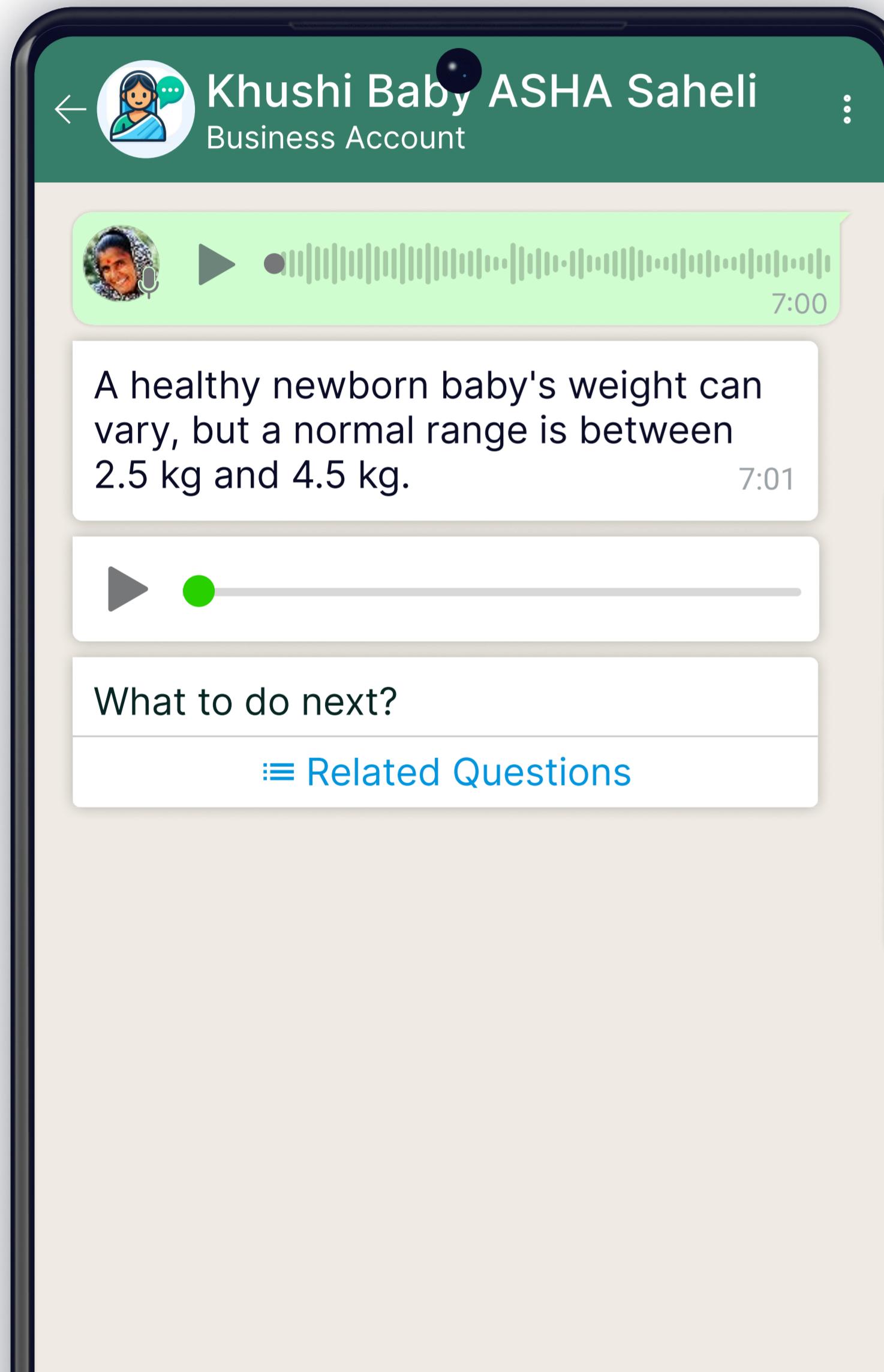


OUR SOLUTION: ASHABOT EXPERTS-IN-THE-LOOP CHATBOT*

* <https://github.com/microsoft/byoeb>



DESIGN DECISIONS



ASHAs are...

Not always
(English) literate

ASHABot is...

- Multilingual
(Hindi and English)
While these examples are in English, all ASHAs and supervisors interacted with ASHABot in Hindi.
- Multimodal
(Text and Audio)
- Built entirely on
WhatsApp

DEPLOYMENT SAFEGUARDS

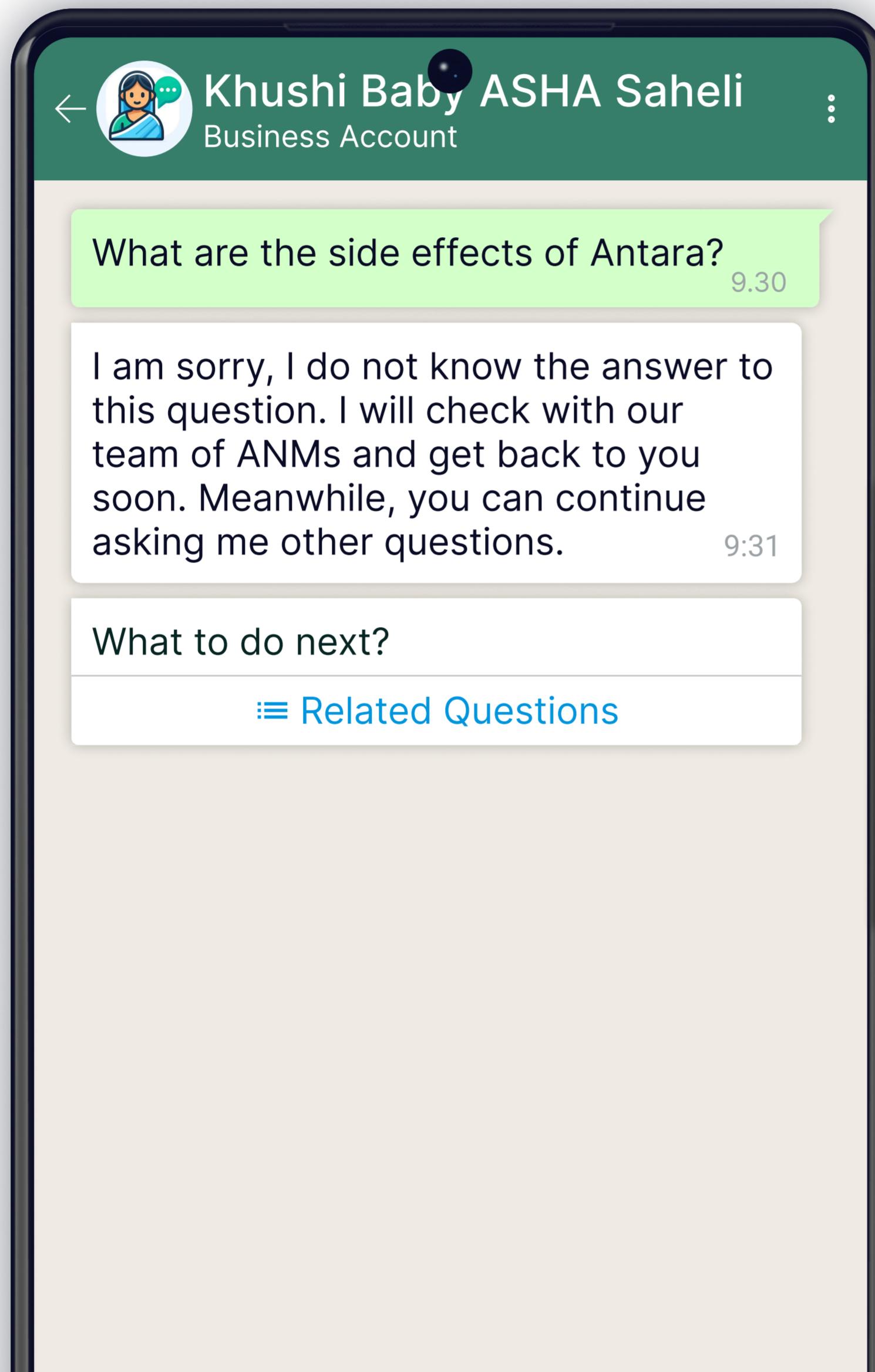
Knowledge Base curated by medical doctors, Expert evaluation of answers

| Ground truth | ASHABot's Accuracy | |
|------------------|--------------------|-------------------|
| Doctor | 88% | LLM evaluation |
| ASHA Supervisors | 96% | |
| Doctor | 90% | Manual evaluation |

During deployment:

- 85% of response = Generated using Knowledge Base
- 15% of responses = IDK → experts-in-the-loop

EXPERTS-IN-THE-LOOP



EXPERTS-IN-THE-LOOP

The image shows a mobile application interface for a business account named "Khushi Baby ASHA Saheli". A purple arrow points from a user's question to a separate box labeled "ASHA Supervisors" where they provide a detailed response.

User Message: What are the side effects of Antara? 9:30

ASHA Supervisor Response: Nothing dont worry 🙌 10:30

ASHA Supervisor Response: For many women, bleeding each month reduces. When they stop shots, periods become fine but it can take 4-6 months to get pregnant. 10:55

ASHA Supervisor Response: Hi good morning 🌸 11:03

ASHA Supervisor Response: Periods will become irregular 13:00

ASHA Supervisor Response: weight gain, dizziness, pain in stomach. 13:39

ASHA Supervisors

Nothing dont worry 🙌 10:30

For many women, bleeding each month reduces. When they stop shots, periods become fine but it can take 4-6 months to get pregnant. 10:55

Hi good morning 🌸 11:03

Periods will become irregular 13:00

weight gain, dizziness, pain in stomach. 13:39

EXPERTS-IN-THE-LOOP

Khushi Baby ASHA Saheli
Business Account

What are the side effects of Antara? 9:30

I am sorry, I do not know the answer to this question. I will check with our team of ANMs and get back to you soon. Meanwhile, you can continue asking me other questions. 9:31

What to do next?

Related Questions

You
What are the side effects of Antara?
Thank you for your patience!
There are no serious side effects of Antara. Possible side effects include weight gain, dizziness, stomach pain, and reduced or irregular monthly bleeding. Periods usually return to normal after stopping Antara, but pregnancy can take 4-6 months. 13:40

ASHA Supervisors

Nothing dont worry 10:30

For many women, bleeding each month reduces. When they stop shots, periods become fine but it can take 4-6 months to get pregnant. 10:55

Hi good morning 11:03

Periods will become irregular 13:00

weight gain, dizziness, pain in stomach. 13:39

DEPLOYMENT

25 ASHAs, 10 ASHA supervisors
Salumbar, Rajasthan, India

May - August 2024 (3.5 months)
1700+ queries



SEMI-STRUCTURED INTERVIEWS

18 ASHAs, 10 ASHA supervisors

- (RQ1) How did ASHAs and their supervisors use ASHABot?
- (RQ2) What factors influenced their engagement with ASHABot?
- (RQ3) How effective is ASHABot in addressing ASHAs' information needs?

Key findings →



ASHAs

Reasons for bot usage

Anytime, anywhere access

ASHAs

Reasons for bot usage

Anytime, anywhere access

I use it while traveling by bus.

I can use it at night also.

ASHAs

Reasons for bot usage

Anytime, anywhere access

I use it while traveling by bus.

I can use it at night also.

ASHA Supervisors

More workload

ASHAs

**Reasons
for bot
usage**

Privacy

ASHAs

Reasons for bot usage

Privacy

“The bot is better... I **cannot openly ask the Doctor about white discharge**, about itching and burning...”

ASHAs

Reasons for bot usage

Privacy

“The bot is better... I **cannot openly ask the Doctor** about white discharge, about itching and burning...”

“(e.g., Once) there was a crowd, it was chaotic, and **I mistakenly gave the vaccine (intended) for a 3.5-month-old child to a 2.5-month-old and vice versa.** I asked ASHABot... It said that ‘You can give the missed vaccine next month... so the babies can get vaccinated within 6 months.’ I was relaxed... Otherwise, I would have visited those children’s homes again and again to make sure that they were okay.”

ASHAs

Reasons for bot usage

Privacy

“The bot is better... I **cannot openly ask the Doctor** about white discharge, about itching and burning...”

“(e.g., Once) there was a crowd, it was chaotic, and **I mistakenly gave the vaccine (intended) for a 3.5-month-old child to a 2.5-month-old and vice versa.** I asked ASHABot... It said that ‘You can give the missed vaccine next month... so the babies can get vaccinated within 6 months.’ I was relaxed... Otherwise, I would have visited those children’s homes again and again to make sure that they were okay.”

ASHA Supervisors

“Sometimes there are **so many silly questions...** ASHAs have years of experience, they should know these things.”

ASHAs

ASHA Supervisors

**Barriers
to bot
usage**

———— Translation and transcription technologies ————

ASHAs

ASHA Supervisors

Barriers to bot usage

Translation and transcription technologies

ASHAs said...

“Tell me about **Antara**.”

“The baby’s **breath (saans)** is slow. What to do?”

ASHABot understood...

“Tell me about **Antarctica**.”

“The baby’s **mother in law (saas)** is slow. What to do?”

ASHAs

**Barriers
to bot
usage**

ASHA Supervisors

Accountability

ASHAs

Barriers to bot usage

Accountability

Asked as many questions as possible

ASHA Supervisors

“Everyone will know that I don’t know the answer... What if it is a simple question? They will judge me.”

ASHAs

**Manner
of bot
usage**

As an authority

ASHAs

Manner of bot usage

As an authority

“Because most women don’t take Antara... and they [the ones who have taken Antara] ask us about their [irregular] periods... How to make them understand? **I asked about this yesterday to the bot. It told me, ‘Irregularities are just the side effects of the injection... it is temporary and does not cause infertility.’ In the evening I explained to the two women about this,** even showed them the bot’s answer... and this morning both of them came to get the injection.”

SUMMARY

Findings: ASHABot..

- provided detailed responses
- facilitated (peer) learning
- supported decision-making

Discussion

- over-reliance?
- value alignment and surveillance
- limited multilingual/multimodal support
- overburdened supervisors

Future Directions

- visual modality, personalization...

👉 **LLMs as supplemental, fallible tools** within the community health ecosystem. 👈





Pragnya Ramjee*

Microsoft Research Lab India

pragnyar@stanford.edu



Mehak Chhokar*

Khushi Baby

mehak@khushibaby.org



Bhuvan Sachdeva

Microsoft Research Lab India

b-bsachdeva@microsoft.com



Mahendra Meena

Khushi Baby

mahendra@khushibaby.org



Hamid Abdullah

Khushi Baby

hamid@khushibaby.org



Aditya Vashistha

Cornell University

adityav@cornell.edu



Ruchit Nagar

Khushi Baby

ruchit@khushibaby.org

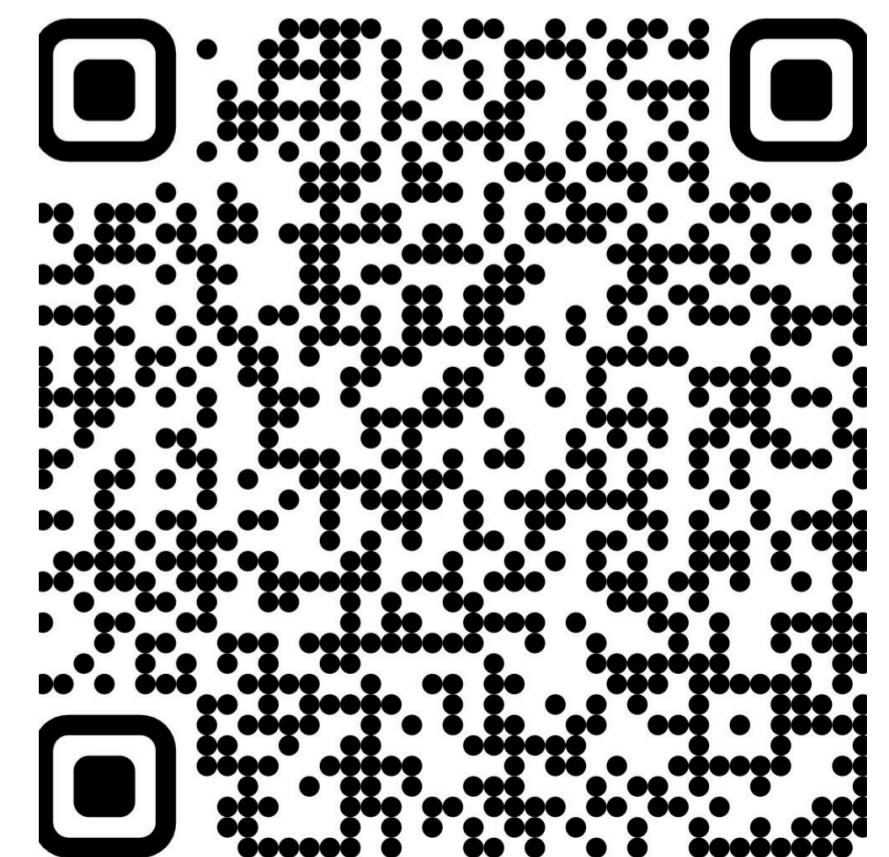


Mohit Jain

Microsoft Research Lab India

mohja@microsoft.com

⭐ full paper ⭐



OVERRELIANCE?

Deployment safeguards: expectation setting during onboarding

| ASHA's belief (factually incorrect) | ASHABot's advice (factually correct) | What next? |
|---|--|------------------------------------|
| Take iron tablets at night after food | Take iron tablets in the morning on empty stomach. | Supervisor confirmed ASHAs' belief |
| ASHA's responsibilities are only health-related | ASHA's responsibilities include assisting victims of domestic violence | ASHA ignored bot |

ACCOUNTABILITY?

Technology for frontline health workers = usually focused on tracking and monitoring.

“I want to ask (the bot), but I can’t, because it will take a toll on the woman’s family... **I was scared that if I ask the bot, you will have all the details that (this) ASHA has asked certain questions...** It’s in the records... If that gets leaked, then I will be asked more questions.”

ASHA

REASON FOR USAGE: DETAILED INFORMATION

“I asked about haemoglobin deficiency... The bot said ‘If you eat this vegetable, this will happen, eat daal [lentils], eat this, eat that.’ **It’s a detailed explanation, so I understand it well. But ma’am [supervisor] only tells me the main point:** ‘The haemoglobin needs to be at this level... take the medicines, done.’ The (bot) is better, because the patient might not even need to take medicines.”

ASHA