

Psychological First Aid via Offline-Capable AI Chatbot in Disaster Zones

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1 Introduction

- **7,348 natural disasters** (2000-2019) affecting more than 4 billion people [15]
- Exposure triggers fear and distress in most individuals [1, 11]
- Possible **Long-term effects**: PTSD, depression, anxiety, substance abuse, and suicidal ideation [1, 3, 12]

Psychological First Aid (PFA)

- **Psychosocial Support** offered immediately after a crisis to **reduce distress** and **help people cope** [17, 5]
- Not professional counselling or debriefing [17]
- Positive effects on anxiety, depression, PTSD, distress, safety, connectedness and sense of control, limited RCT evidence [2, 4]
- Considerable **shortage of PFA providers** [14, 16]

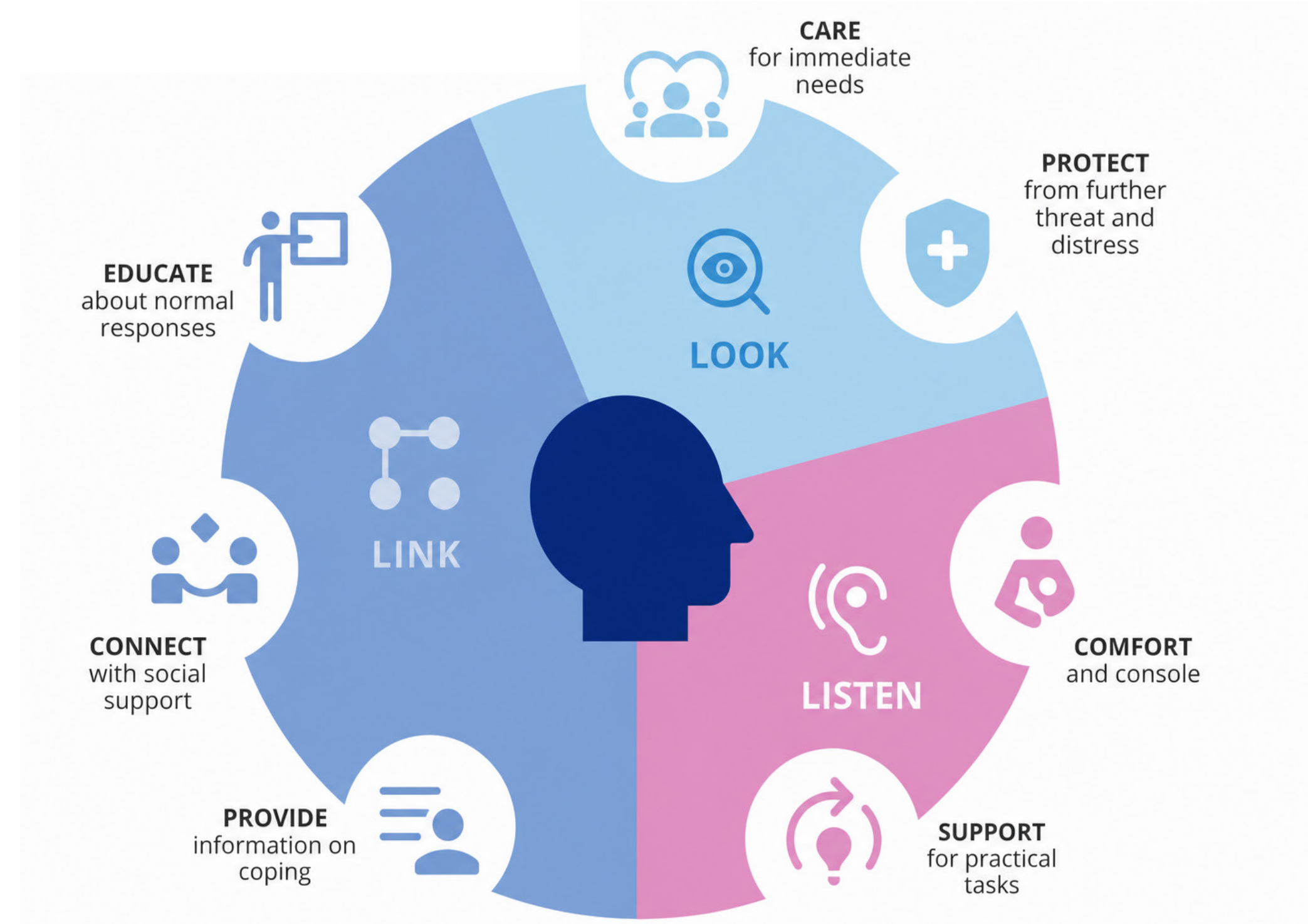


Figure 1: WHO Endorsed Look, Link, Listen principle corner stones [10]

PFA Disaster Bot

- Disasters destroy **communications infrastructure** for days [6]
- Previous work on PFA chatbots show feasibility but inability to deliver offline care [7, 8, 13]
- **Proposed PFA-AI Chatbot system**:
 - Local, quantized language model
 - **Cellular mode**: SMS
 - **Offline mode**: LoRa mesh networking
 - Response generation grounded in WHO psychological first aid guideline

Objective

- Provide insights into the feasibility of offering scalable, infrastructure-resilient, AI-based mental health support in post-disaster settings.
- **Hypothesis**: Adults with prior lived experience of natural disasters will perceive the PFA AI chatbot as feasible, acceptable, and helpful for delivering Psychological First Aid.

2 Methods

Functional architecture

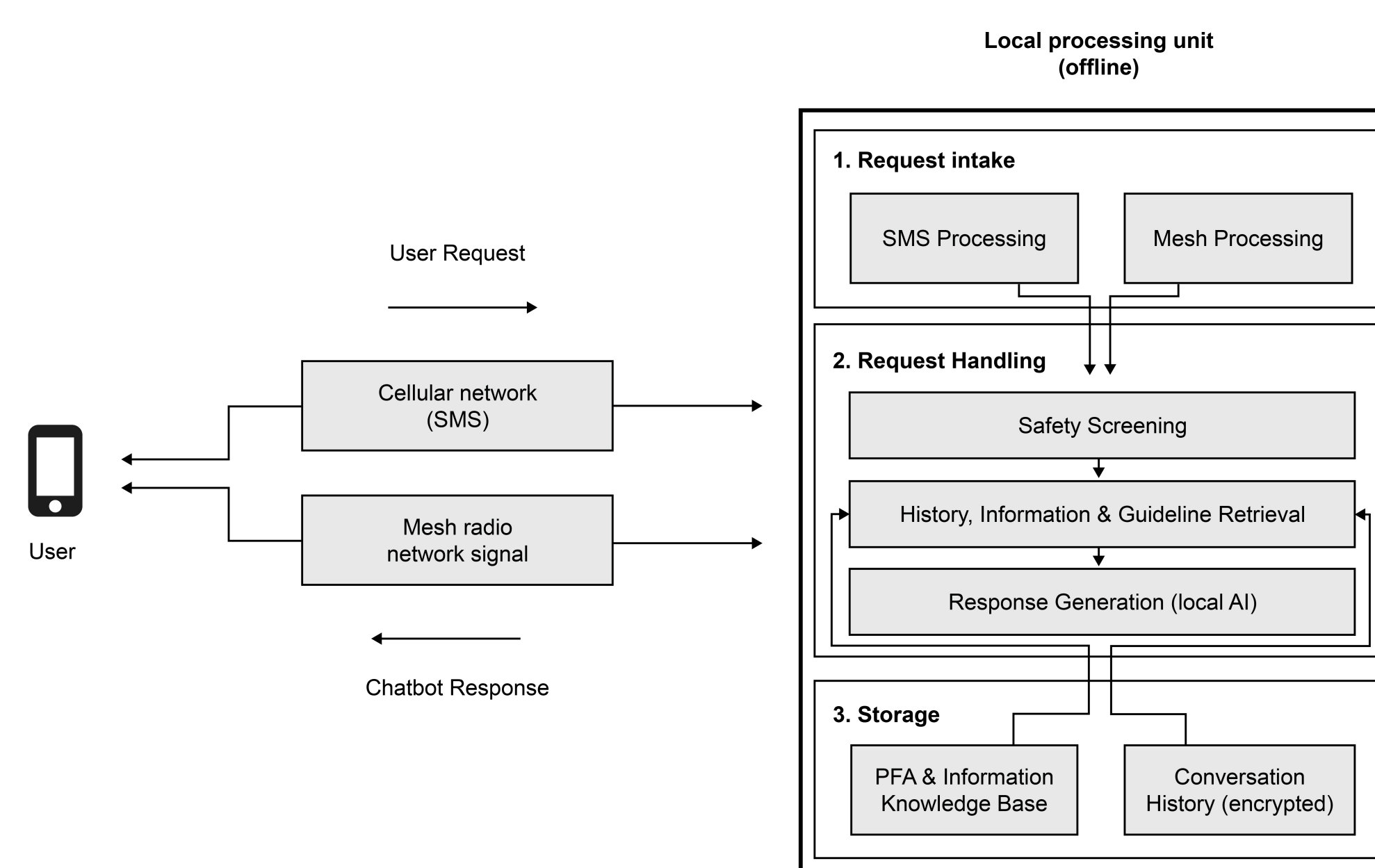


Figure 2: Architectural overview of the PFA chatbot's local processing pipeline; executed entirely without external connectivity.

Study Design

- Formative **feasibility study**, currently in development phase
- **Sample**: N = 20, Adults with prior natural disaster exposure
- **Exclusion Criteria**: PTSD or trauma diagnoses
- Participants will receive a hypothetical climate disaster scenario and engage with the chatbot
- **Outcome Measures**:
 - **Usability**: System Usability Scale, Acceptability of Intervention Measure (AIM) [9, 11]
 - **Perceived helpfulness**: Custom scale aligned with WHO PFA core principles
 - **Qualitative exploration**: Semi-structured interview on user experience and improvement suggestions

2 Discussion

Limitations

- Chatbot cannot deliver **physical PFA components** (eye contact, presence)
- Hallucination risk remains, but reduced by WHO-grounded response guidelines

Future Directions

- Purpose-trained PFA-specific model delivering better accuracy
- **Human-in-the-loop**: user can choose to chat to human support provider+ system updatable with current disaster info

4 Model Speed

Gemma 4 Full-Pipeline Response Latency

Model	Total params	Est. speed on ROCK 5T	1st message (cold)	2nd message (cached)
E2B	~2 B	~35-50 tok/s	~9 s	~5 s
E4B	~4 B	~15-25 tok/s	~19 s	~10 s
26B A4B MoE	26 B	~5-10 tok/s	~51 s	~27 s
31B Dense	31 B	~2-4 tok/s	~2 min 7 s	~1 min 7 s

Note. Comparison on Radxa ROCK 5T (RK3588, 24 GB LPDDR5) via Mesh Pathway

Figure 3: Estimated end-to-end response latency of the PFA chatbot pipeline across the Gemma 4 model family on the Radxa ROCK 5T via LoRa mesh steady-state performance with llama-server KV-cache reuse.

4 Try it out

Mesh Connection

1. Put the smartphone into airplane mode
2. Connect to the Wifi Network: **PFA Bot**
3. Login with Credentials:
Username: demo
Password: demo
4. Scan the following QR code



SMS Connection

1. Text the Bot:
+49 XXX XXXXXXXX

5 References

The full list of References can be found here:



6 Contact

Would you like to know more about the technical architecture we used or the research in this field?

More Information

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