

Maa-Loomat: Designing a Culturally-Grounded Motherhood Support App for Pakistani Mothers

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ABSTRACT

Despite the proliferation of maternal support apps in global contexts, none address the specific cultural, informational, and emotional needs of Pakistani mothers. We conducted a qualitative study involving early-stage Pakistani mothers, collecting qualitative data through semi-structured interviews (N = 15) and quantitatively analyzing the frequency of themes and subthemes present in its transcriptions. Our study reveals significant gaps in current parenting resources, such as conflicting advice, emotional isolation, and a lack of culturally relevant guidance. Through thematic analysis of interviews, we identify key challenges and translate these into actionable design features such as localized guides, milestone tracking, and peer support forums. Using these insights, we design a prototype of the Maa-Loomat app. The design prioritizes ease of use, emotional reassurance and personalization, offering a tool aligned with the lived realities of Pakistani mothers. Our work contributes to HCI literature by (1) empirical insights into Pakistani mothers' support needs; (2) a culturally informed design framework for maternal apps; and (3) the Maa-loomat prototype.

CCS CONCEPTS

• **Human-centered computing** → **User interface design**; *Empirical studies in HCI*.

KEYWORDS

Motherhood support, cultural design, Pakistan, mobile health, HCI4D

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1 INTRODUCTION

Motherhood, particularly in its early stages, is a period marked by emotional intensity, constant learning, and significant social expectation. For many new mothers in Pakistan, this transition is further complicated by limited access to culturally relevant guidance, social support, and trustworthy digital resources [1, 2]. Research shows that cultural expectations often emphasize academic achievement and strict discipline over emotional development, creating an “unhealthy mix of care and competition” [1, 5].

While mobile health and parenting applications have proliferated globally, they often reflect Western parenting norms and assumptions, rendering them less useful—or even alienating—for users in

South Asian contexts [4, 19]. This issue is compounded by usability challenges and a lack of localization, which alienate parents in non-Western contexts and prevent meaningful engagement with digital tools [4, 16].

This paper introduces *Maa-Loomat*, a prototype for a motherhood support app co-designed through insights drawn from qualitative research with young and early-stage mothers in urban Pakistan. Our aim was to understand the emotional, informational, and technological needs of mothers navigating parenthood in a patriarchal, collectivist, and digitally evolving environment [20]. Through a series of in-depth interviews and thematic analysis, we surfaced challenges such as time poverty, conflicting parenting advice, lack of peer support, and low digital literacy—issues that are not addressed in existing parenting apps [3, 13].

In response to these findings, Maa-Loomat integrates design features such as a culturally grounded, personalized guide and tracking system that includes video-based tutorials and gamified learning elements, along with voice-enabled navigation and moderated forums for emotional sharing. These features are not merely functional, but serve as culturally attuned responses to the lived realities of Pakistani mothers [4, 20].

Our work contributes to the growing body of Human-Computer Interaction (HCI) research that seeks to design with, rather than for, underserved populations [21]. Specifically, we explore how motherhood can be supported through digital tools that are not only informative but also emotionally and socially resonant [6, 7, 8]. We also highlight how culturally embedded values—such as familial expectations, modesty norms, and language barriers—can be thoughtfully addressed in interface and content design [16, 20].

2 RELATED WORK

The design of digital tools to support parenting and maternal well-being is a growing area within HCI [18]. However, creating effective interventions requires navigating complex intersections of cultural norms, socio-economic realities, and individual user needs, particularly in non-WEIRD (Western, Educated, Industrialized, Rich, Democratic) contexts like Pakistan [4]. Our work on Maa-Loomat builds upon existing research in parenting support, digital health interventions, gamification, and culturally sensitive design, while specifically addressing the unique challenges faced by new mothers in Pakistan.

2.1 Parenting Challenges and Support Needs in Pakistan

Parenting in Pakistan is deeply influenced by cultural expectations that often emphasize academic achievement and strict discipline over emotional expression and development [1, 5]. Practices like

the "flying chappal" [2] reflect traditional authoritarian approaches, which can create stress for both parents and children and may not align with contemporary child development principles. Parents report feeling pressure from societal expectations and often lack access to mental health support or resources tailored to managing children's emotional needs [1]. This is compounded by the universal challenge new parents face: navigating a deluge of conflicting advice, which can lead to confusion and undermine confidence [3]. Existing digital resources often fail to bridge these gaps, lacking localization and cultural relevance for Pakistani families, echoing findings on the limitations of applying generic solutions in specific cultural contexts [4]. This paper aims to explore these issues in greater depth, with a specific focus on a Pakistani context through a qualitative study.

2.2 Digital Interventions and Gamification for Parenting

Digital platforms hold significant potential for delivering accessible parenting support, especially in low and middle income countries (LMICs) [4]. However, the effectiveness of such tools hinges on careful design and validation. Scoping reviews highlight that many existing maternal and infant apps lack rigorous, evidence-based validation, potentially limiting their credibility and impact [13]. Furthermore, usability issues and a failure to address cultural specificity can hinder adoption [4, 13], particularly in contexts with varying digital literacy and access constraints such as Pakistan.

Gamification has emerged as a promising strategy to enhance engagement and learning in adult education, including parenting support [9, 10]. Research shows that game-based approaches can improve parental confidence and knowledge retention by simplifying complex information through interactive scenarios [6, 14]. Platforms incorporating gamified elements, like the Triple P program, have demonstrated success in improving parenting skills and reducing parental stress [7]. Game mechanics foster motivation [10], enable safe experimentation with parenting strategies ("ambiguous play") [11], and facilitate scenario-based learning [12]. Moreover, integrating gamification with peer interaction can enhance social support and practical skill application [8], creating a collaborative learning environment. This paper aims to explore the possibility of uptake and utilization of these principles to address the issues faced by Pakistani mothers.

2.3 Designing Culturally Relevant and Validated Tools

While examples like BabyThrive [14] and The Happy Child [15] demonstrate the potential of gamified parenting apps, many existing tools fall short in cultural adaptation [17] or rigorous validation [13]. Successful interventions require balancing global best practices, such as those outlined by UNICEF [16], with a deep sensitivity to local norms, values, and constraints. This necessitates a design approach grounded in the lived realities of the target users.

Designing for Pakistani mothers requires acknowledging the influence of patriarchal structures, resource limitations (including potential shared device usage), varying levels of digital literacy,

and specific cultural and religious values that shape family life and privacy expectations [19]. Prior HCI research in Pakistan and similar contexts has consistently shown that technology interventions must be contextually situated to be effective [19]. The purpose of the paper therefore is to propose a design based on a participatory process, focusing on the emotional, informational and cultural needs identified by Pakistani mothers themselves, with the aim of providing a validated, culturally resonant and supportive digital resource that addresses the gaps left by existing tools.

3 METHODOLOGY

3.1 Research design

This research adopts a qualitative approach to explore the experiences of new and expecting mothers in Pakistan about early parenthood and newborn care. The study aims to identify gaps in support available for mothers, with a focus on identifying where digital solutions could be developed to address these gaps. Thematic analysis was employed to analyze the data collected through interviews, enabling the extraction of meaningful patterns and insights.

3.2 Participant Selection

Participants for the study were new and expecting mothers, inclusion criteria: currently pregnant or less than 36 months postpartum. A purposive sampling method was used, by posting the study invitation on various online platforms and communities. Mothers who expressed interest in the study who fulfilled the criteria were invited to participate. Snowball sampling further helped in reaching additional participants, resulting in a sample size of 15 mothers.

3.3 Data Collection

Data was collected through semi-structured online interviews. The interviews were conducted via the medium of choice for the participants, primarily video conferencing tools (Zoom and WhatsApp), with the mothers selecting their preferred language (Urdu or English) for communication. Each interview lasted approximately 30-45 minutes. The interviews were audio-recorded with the participants' informed consent and later transcribed in English for analysis.

3.4 Interview Protocol

The interview protocol consisted of six key sections:

- (1) Demographics and Verification: Questions focused on basic demographic details, including age, education, and number of children.
- (2) Pre-Motherhood Concerns and Preparation: Mothers were asked about their concerns before becoming a mother and the resources they used for preparation.
- (3) Experiences as a New Mother: Questions aimed at understanding the challenges of being a new mother, the level of support received, and areas where they needed more guidance.
- (4) Community and Postpartum Support: Mothers were asked about their postpartum experiences and the support systems they found most helpful.

- (5) **Digital and Gamification Preferences:** The interview included questions on the potential of a digital platform, such as interactive learning tools, to support mothers in their parenting journey.
- (6) **App Design and Accessibility:** Questions related to app features, language preferences, and concerns about trust in digital advice were explored.

Table 1: Demographics of 15 participants interviewed for the study

Category	Attribute	Count
Age (years)	18–28	8
	29–38	7
Education	Bachelors	8
	Masters	4
	PhD	2
	MBBS	1
Marital Status	Married	15
Occupation	Housewife	9
	Doctor	2
	PhD Student	1
	Businesswoman	1
	Freelancer	1
	Architect	1
Family Type	Joint	8
	Nuclear	5
	Living w/ mother	1
	Not specified	1
Number of Children	1 Child	11
	2–3 Children	4

4 FINDINGS

Our study, grounded in qualitative interviews with early-stage mothers in Pakistan, aimed to uncover the nuanced challenges, needs, and preferences surrounding early parenthood for women in Pakistan. Thematic analysis of this data provided critical insights that directly informed the problems faced by women in Pakistan related to parenthood, and how HCI4D can be used to help in these regards to fill the needs presented by the interviews.

The theme 'problems faced', was divided into multiple subthemes according to the type of challenges faced, plotted in figure 1. An explanation of the following subthemes is as follows:

- (1) **Conflicting advice:** Participants mentioning receiving different advice from different sources, usually with varying levels of credibility and often unwanted advice.
- (2) **Expectation to keep:** Participants mentioning a disparity between the expectations that they had kept, and the lives experiences of their own that they faced during parenthood.
- (3) **Lack of cultural representation:** Participants mentioning current resources, either physical or online not representing the specific lived realities of their communities.
- (4) **Lack of support:** Participants mentioning a lack of direct physical or emotional support as a reason for problems faced during parenthood.

- (5) **Lifestyle shifts:** Participants mentioning the stark difference in their lives from before childbirth to after, and the difficulty in transitioning to it.
- (6) **Medical problems:** Participants mentioning medical issues faced by themselves or their baby.
- (7) **Time constraint:** Participants mentioning a lack of time to be a core problem, manifesting in multiple ways such as a lack of time to access parental information resources, a lack of time to take care of the child fully, and a lack of time to practice self-care.

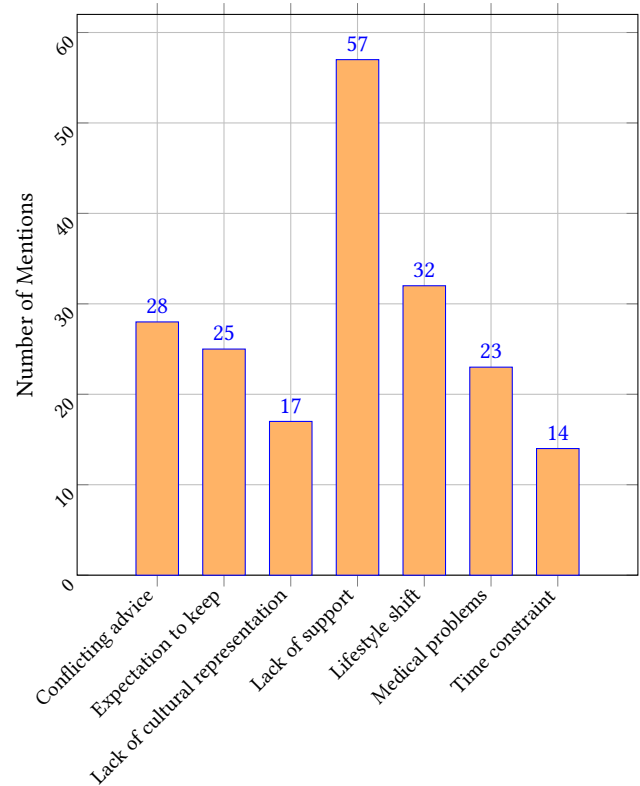


Figure 1: Occurrences of subthemes of the theme 'problems faced'

4.1 Conflicting advice and misinformation

Mothers reported being faced by conflicting advice from multiple sources, leading to symptoms such as confusion and anxiety.

"My mother has been telling me one thing to cover the baby, to cover the baby. Somebody else would just come and walk to me and tell me that you covered the baby too much, the baby is overheated."

An analysis of the theme: 'information sources' gives us some more context of this problem as well. While mothers consulted various sources for information, online resources was the predominant source of information. This provides some insight over a disconnect between the advice received by mothers from in-person sources, instead choosing to rely on online resources for help. However, this

often results in misinformation being propagated, given the lack of standardization of online sources of information [13, 4].

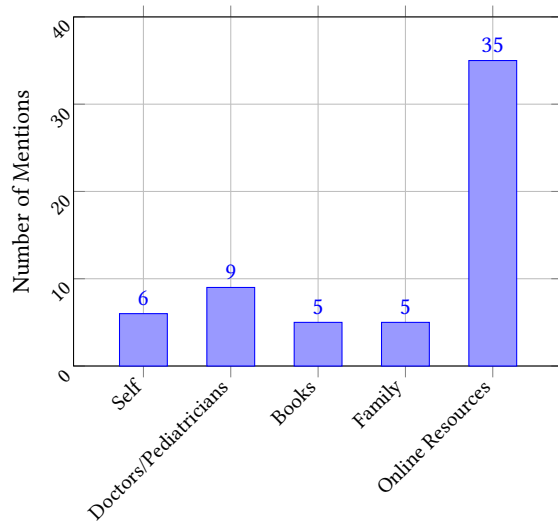


Figure 2: Sources of information mentioned by participants.

4.2 Lifestyle Shift

The interviews mentioned that the transition to motherhood brought significant lifestyle shifts from their experience before birth, to immediately being thrust into parenthood with a multitude of expectations laid out. The lack of information and expectations set regarding what to expect after childbirth itself were very limited, which further exacerbated the problem, instead all of the resources seemed to be more focused on setting expectations for the act of childbirth itself. Participants mentioned that if there were clear expectations set for the experience of parenthood for them, the transition could have been easier.

"Before motherhood, I had my own life, did things my way. But after becoming a mother, your priorities completely shift. Now, my kids come first. That version of me before motherhood doesn't exist anymore. I feel like I've given birth to a new version of myself too."

4.3 Lack of emotional support

A predominant theme, with 60% of mothers explicitly mentioning a lack of emotional support as one of the key problems faced with parenthood. The underlying reason for this had both medical reasons, such as postpartum depression, and societal reasons, such as a lack of support from family and relatives resulting in feelings of loneliness and other negative emotions.

"Even after having a baby, I have to cook food in the morning and at night. And I have to do all the work. And at the same time, I have to take care of the baby."

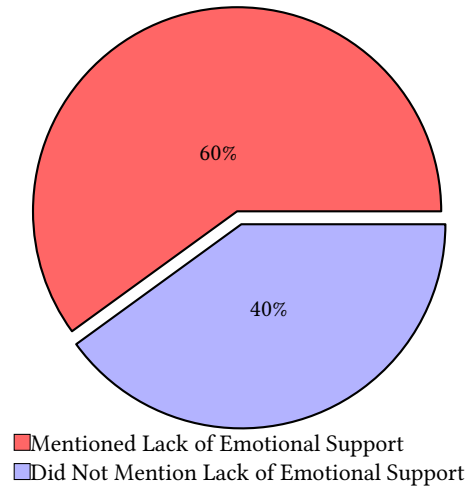


Figure 3: Proportion of Participants Mentioning Lack of Emotional Support

4.4 Time constraints

Nearly half of the mothers (46.7%) identified time constraints as a major challenge. This presented itself in multiple ways, from limiting the amount of care that the mothers could provide for their children, or limiting the time they had to access readily available sources of parenting information. It also manifested itself as a lack of time available for self care and "me time" which could further lead to the problems mentioned in section 4.2.

Although this was mentioned to be mitigated in part if an extensive social net or family was present for support; however, it remained a big part of the conversations regarding problems faced in early parenthood.

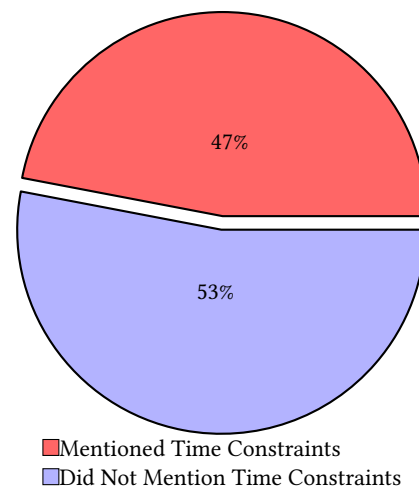


Figure 4: Proportion of Participants Mentioning Time Constraints

4.5 Outlook towards gamification

Another interesting theme discovered was when we inquired the participants about their thoughts on gamification compared to step by step tutorials: "Would you prefer an app that simulates real-life parenting decisions through a game or one that provides step-by-step tutorials?". We found our results did not exactly align in the interviews with prior preconceptions based on literature which outlines a more positive outlook towards gamification features during the perinatal period [6]. Instead, the response in the interviews was a lot more mixed, with differing views in different interviews.

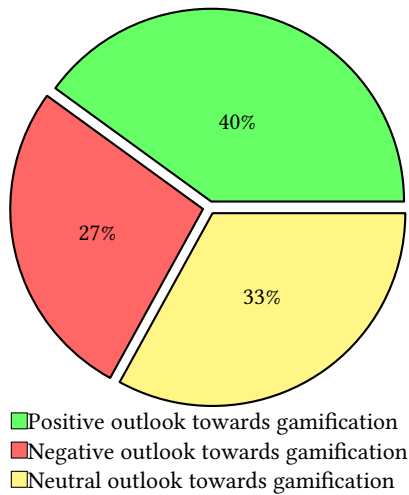


Figure 5: Distribution of Participants' Outlooks on Gamification versus step by step tutorials

5 DISCUSSION

The identified challenges and user needs directly shaped the design philosophy and feature set of Maa-Loomat, which prioritizing an interface that is specific to our target audience.

5.1 Mitigating time constraints

Stemming from the finding of "Time Constraints" and the general need for user-friendly tools for a diverse population, the overall app design emphasizes:

- **Simplicity and Ease of Use:** Intuitive navigation and a clear interface are prioritized to ensure mothers can quickly find the information and support they need.
- **Minimal Time Investment:** Features are designed to be efficient, respecting the limited time available to new mothers, aiming to augment the experiences of parenthood rather than intrude upon them.
- **Layout:** The layout is specifically designed to have a maximum of depth of 3, to prevent users from having to sift through menus for any resources they may need.

5.2 Tackling misinformation

To address the issue of conflicting advice and misinformation, and catering to the preference for accessible online information, the "Guides" feature was developed.

- **Curated Content:** The guides aim to provide reliable, evidence-based information on various parenting topics that are specific to the current stage of parenting.
- **Gamification for Engagement:** Simple gamification elements, such as interactive quizzes and scenario based questions (e.g., identifying correct sleep positions) are incorporated to stimulate active learning and make information consumption more engaging and less overwhelming [10, 12]. The gamification elements are kept simple to align with the results in the app preferences for gamification features identified in the broader thematic analysis in section 4.5, being packaged not as games but as interactive guides to enable easier adoption.
- **Culturally Relevant Content:** A core aim is to ensure these guides are localized and culturally sensitive to the Pakistani context, addressing the gaps identified in "Lack of Cultural Representation."
- **Strong sources:** All sources used in the content in guides, are mentioned at the bottom of the relevant guide itself, to ensure transparency, and empower users to do their own research and not feel constrained to a single app for all of their information.

5.3 Combating emotional isolation

Previously mentioned in section 4.3, to combat this issue with the constraints present in an app as the medium to do so, "forums" for preventing isolation, and "tracking" and "analytics" features for positive reinforcements were developed.

Forums:

- **Peer Support:** This feature allows mothers to connect, share experiences, ask questions, and offer support to one another, creating a sense of community.
- **Moderation:** Emphasis is placed on creating a safe and supportive environment, with clear guidelines and reporting mechanisms for any inappropriate activity.
 - (1) Reports immediately flag accounts and hide all of their posting history until moderator approval.
 - (2) A feature to send personal messages was not included, to prevent harassment and exploitation in a platform targeted to women.
 - (3) Disclaimers are presented to all users whenever they access the forum to be wary of the dangers of online communication.

Tracking and Analytics for Positive Reinforcement:

To help mothers manage the practical aspects of infant care and provide positive reinforcement, the "Tracking + Analytics" feature was introduced. This aims to provide constant reminders of the progress that has been made in parenthood by the mother, and to feel better about herself.

- **Milestone Tracking:** The app allows mothers to record their baby's weight, height, head circumference, and other important milestones, often in conjunction with pediatrician visits.
- **Progress Visualization:** Analytics provide an easy way to monitor the baby's progress over time.
- **Supportive Messaging:** The feature is designed to encourage mothers by showing their progress and incorporating supportive messages (e.g., "You're doing great!"), addressing the need for positive reinforcement.

5.4 Providing personalized support

In order to tackle the need for personalized support presented, due to the very different natures of different children, the features "reminders", "vaccines", and "tips" provide insights that are specific to the user of the app.

- **Reminders:** Integrated reminders for vaccinations and other important events help mothers stay organized and on top of their baby's health needs according to their current stage of their parenting journey. All reminders that are generated by the system itself are flagged as AI generated. The user can also add and remove reminders at their own discretion.
- **Tips:** AI generated tips, which use insights and the information entered by the user at startup of the app itself to provide tips, is built to ensure that users are provided plentiful advice that is curated for their child.

6 LIMITATIONS

As with any qualitative, exploratory study, our research carries limitations that affect the generalizability of our findings. As detailed in the methodology, participants were recruited primarily through Facebook parenting groups and snowball sampling, which unintentionally resulted in a participant pool skewed toward mothers who were already interested in learning, had access to online platforms, and possessed some degree of digital literacy. Consequently, the perspectives of lower-literate mothers, women without smartphone access, and those outside urban or social media circles may be underrepresented. Our sample size of 15 mothers, while sufficient for thematic saturation, may not fully capture the breadth of parenting experiences across Pakistan. Moreover, because the data is self-reported, it may be influenced by social desirability bias, particularly around culturally sensitive topics such as emotional health and parenting practices. Finally, Maa-Loomat remains a high-fidelity prototype; it has not yet been field-deployed, so its long-term usability, engagement, and behavioral impact are yet to be evaluated.

7 FUTURE WORK

This study is a first step in understanding the postpartum support needs of Pakistani mothers through a culturally grounded lens. Future directions of work include conducting usability evaluations of a functional Maa-Loomat prototype to ensure accessibility across varying levels of digital literacy. Moreover, further work should empirically assess the effectiveness and appropriateness of gamification elements in encouraging sustained engagement and learning

within this cultural context. Additionally, there is a need to design and test adaptive personalization algorithms for this setting that adjust content complexity and feature recommendations based on each mother's literacy level, socio-economic background, and stage of motherhood to improve relevance, usability, and long-term adoption.

8 CONCLUSION

Maa-Loomat responds to the unique emotional, cultural, and informational needs of Pakistani mothers by translating rich qualitative insights into a locally grounded, thoughtfully designed support app. By addressing key challenges such as time constraints, conflicting advice, emotional isolation, and lack of culturally relevant resources, our design offers an inclusive, empathetic digital companion for early motherhood. This work contributes to HCI4D by centering non-Western maternal experiences and demonstrating how participatory, context-sensitive design can foster both usability and emotional empowerment in low-resource settings.

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