Threats, Abuses, Flirting, and Blackmail: Gender Inequity in Social Media Voice Forums

Aditya Vashistha
University of Washington
adityav@cs.washington.edu

Abhinav Garg
University of Washington
aagarg@uw.edu

Richard Anderson
University of Washington
anderson@cs.washington.edu

Agha Ali Raza
Information Technology University
agha.ali.raza@itu.edu.pk

ABSTRACT

HCI4D researchers and practitioners have leveraged voice forums to enable people with literacy, socioeconomic, and connectivity barriers to access, report, and share information. Although voice forums have received impassioned usage from low-income, low-literate, rural, tribal, and disabled communities in diverse HCI4D contexts, the participation of women in these services is almost non-existent. In this paper, we investigate the reasons for the low participation of women in social media voice forums by examining the use of *Sangeet Swara* in India and *Baang* in Pakistan by marginalized women and men. Our mixed-methods approach spanning content analysis of audio posts, quantitative analysis of interactions between users, and qualitative interviews with users indicate gender inequity due to deep-rooted patriarchal values. We found that women on these forums faced systemic discrimination and encountered abusive content, flirts, threats, and harassment. We discuss design recommendations to create social media voice forums that foster gender equity in use of these services.

CCS CONCEPTS

• **Human-centered computing** → **Empirical studies in collaborative and social computing**.

KEYWORDS

IVR; Voice forum; Social media; Gender; Women; HCI4D; India; Pakistan.

1 INTRODUCTION

More women than men in the world are subjected to intimate partner violence, early marriage, unpaid care and domestic work, and workplace discrimination [8]. These structural limitations, lack of agency to take life decisions [7], and limited access to education, healthcare, and financial resources [5, 6, 8] perpetuate the vicious cycle of gender inequality and discrimination. The United Nations has identified gender equality as a development goal fundamental to the foundation of a peaceful, prosperous, and sustainable world, and has advocated using Information and Communication Technologies (ICTs) to promote women empowerment [8].

Unfortunately, gender inequality also manifests in adoption, access, and use of ICTs. For example, women in South Asia, the region of our research interest, are 38% less likely than men to own a mobile phone [9]. Even when they own a phone, they make and receive fewer calls, send fewer text messages, and use the Internet sparingly than men. Moreover, they perceive barriers to phone ownership and usage, such as cost of devices and the Internet, security and harassment concerns, and limited digital literacy, more acutely than men [9].

While mainstream social media platforms have revolutionized how people communicate with each other in a wide range of contexts, such as crises [36], politics [3, 41], and civil disobedience [2, 37], these platforms exclude those who experience literacy, socioeconomic, and connectivity barriers. Moreover, socio-cultural norms driven by patriarchy impede the adoption and use of these platforms by women. For example, only one-fourth of all Facebook users in India are women [9].

Recognizing these structural limitations, Human-Computer Interaction for Development (HCI4D) researchers have used Interactive Voice Response (IVR) technology to create *voice*

forums that overcome connectivity barriers by using phone calls, literacy barriers by using local language speaking and listening skills, and socioeconomic barriers by using toll-free (1-800) lines. These services let users call a toll-free phone number to record audio posts in their local language, listen to posts recorded by others, and act on posts (e.g., like, dislike, comment, or report posts). They find applications in diverse domains, such as health information systems [22, 24], civic engagement portals [12, 21, 29], agriculture advisory services [31], and job portals [33, 40]. Collectively, these services have received millions of phone calls, audio posts, and associated actions such as likes, dislikes, and comments on the posts.

Despite their inclusivity, accessibility, and usability, the user analyses of several of these voice forums revealed extremely low-participation of women on these services. For example, *CGNet Swara* [27] and *Sangeet Swara* [38] in India have only 12% and 6% female contributors, respectively. Similarly, *Baang* [32] and *Polly* [33] in Pakistan have only 10% and 11% female contributors, respectively. *Ila Dhageyso* [21], a voice forum to connect government officials and tribal people in Somaliland, has only 15% female users.

In this work, we examine why the participation of women is almost non-existent on social media voice forums that are designed to be inclusive, accessible, and usable for everyone. To do so, we focus our attention on *Sangeet Swara* (or simply *Swara*) and *Baang*, two widely popular social media voice forums in India and Pakistan, respectively. Using a mixed-methods approach spanning quantitative analysis of usage logs, content analysis of 10,361 posts containing 140 hours of audio data, and qualitative analysis of 50 surveys and interviews, we examine how men and women interacted with each other, what content they posted and voted, and what factors affected their participation. Our work also highlights the differences and commonalities in experiences of female voice forum users in India and Pakistan.

Our mixed-methods analysis indicate that women on *Swara* and *Baang* faced systemic discrimination and harassment in the form of abusive, threatening, and flirty posts directed at them. Most women lacked agency to retaliate due to deep-rooted patriarchal values and most men who behaved inappropriately ganged up on those men and women who criticized their behavior. Most male users condoned unruly behavior by men and disapproved of abusive, flirty, and threatening posts less strongly than did women. Using a feminist HCI lens [13, 14], we investigate how these services could be redesigned to provide an equitable and inclusive platform to women.

2 RELATED WORK

Although several scholars have studied the use of social media platforms by low-income communities, rural residents, and people with disabilities [17, 26, 30, 39, 44–46], there is a scarcity of research at the intersection of gender and social

media use in developing regions. Only a few scholars have examined the viewpoints and experiences of female social media users in low-resource environments. For example, Melissa et al. examined the potential of social media platforms to support Indonesian women in establishing business from their home [28]. Bosch examined the role of social media platforms in enabling young South African women to express and experience their sexual identity [16]. Bidwell et al. examined existing oral practices, interactions with voice-based prototypes, and gendering processes in technology production and consumption [15]. They reported how preferences and styles of men are more dominant in the design of technology artifacts since more technologists are men. Our work also highlights how the user interface design of *Swara* and *Baang* had limited support for women's needs and styles, primarily because all designers and most users of these services were men.

A few scholars have outlined online harassment and coping strategies of women on social media platforms. Abokhodair and Vieweg examined privacy practices of Saudi Arabian women and highlighted how women leverage prevalent social cultural norms to prevent themselves from harassment [11]. For example, some female users posted photos of babies as the profile picture or used their children's name to veil their online identity [10]. We saw similar coping mechanisms by female users on *Swara* and *Baang* who recorded their children's voices or used pseudonyms to protect their identity. Wyche studied the experiences of female Facebook users in Kenya and found that they faced online harassment and stalking [43]. Similar to the Kenyan women, female users on *Swara* and *Baang* were also targeted with sexually suggestive content and unwanted attention. Our work contributes to this growing scholarship by qualitatively as well as quantitatively characterizing how men and women interacted with each other on social media voice forums, what content they posted, liked, and disliked, and how women users negotiated their identity in patriarchy driven social spaces in India and Pakistan.

Several HCI4D researchers have leveraged voice forums to create digital social spaces for marginalized people in resource-constrained settings [1, 4, 20, 21, 31, 33, 40], however, the knowledge about how women experience these services, how interactions with other community members shape their participation, and how these services reinforce or undermine patriarchal norms is notably absent from the existing literature. Although prior works have raised concerns about low-participation of women on these services and harassment they encountered [29, 32, 38], and a few have provided scattered insights (e.g., how posts by women received more votes due to flirting from men [38]), no prior work has examined the factors that result in the limited use of these platforms by women, characterized women's participation by analyzing usage logs, and outlined design recommendations for creating inclusive and inviting social media voice forums for women. Our work

presents the first in-depth account of how social media voice forums were used by women in India and Pakistan.

We use a feminist HCI lens to examine the design of *Swara* and *Baang* and to make recommendations for creating services that foster gender equity in their use. Bardzell introduced the feminist HCI research agenda and presented a range of feminist interaction design qualities such as pluralism, participation, advocacy, ecology, embodiment, and self-disclosure [13]. Bardzell and Bardzell presented a feminist HCI methodology and outlined key methodological positions, such as commitment to scientific and moral objectivies, connection to feminist theory, self-disclosure, reflexivity, and participatory design [14]. The feminist HCI lens has been adopted by several HCI scholars to investigate the adoption and use of HCI artifacts [19, 23, 25]. We also use an intersectional HCI lens [35, 42] to examine marginalities within marginalities in the use of these services.

3 BACKGROUND

We now briefly discuss the purpose, design, and deployment details of two social media voice forums, *Swara* in India and *Baang* in Pakistan, that are the focus of our inquiry.

Swara

Since voice forums have thousands of audio posts in local languages with limited training data and speech recognition models, it is difficult to automatically manage local content produced on these services. *Swara* was designed to examine whether a community of low-income, low-literate users of a social media voice forum can categorize order, and moderate audio posts recorded in local languages on the service. In addition to posting and listening to local content, *Swara* users also voted on a wide variety of user-generated content including songs, poems, jokes, among others [38]. *Swara* relied on users' votes to filter low-quality content and leveraged micro tasks completed by users to categorize posts. In an 11-week deployment in India, *Swara* received about 25,000 calls, over 5,300 posts, and 140,000 votes from 1,521 people living in 11 states. The community moderation was 98% accurate in content categorization, and made meaningful distinctions between high-quality and low-quality posts. Most of the users were from low-income families living in rural and peri-urban regions, and over 40% of the users had less than 12 years of education. *Swara* found unexpected uptake among blind people, who were passionate about building and maintaining the community and used the service to expand their social network in far-off locations [39]. Because of its voice-based implementation, *Swara* was perceived as an inclusive portal for low-literate people, rural residents, people with visual impairment, and indigenous communities. Although *Swara* was a toll-free service that could be accessed from any phone without requiring airtime or the Internet, only 6% of the posts were recorded by women.
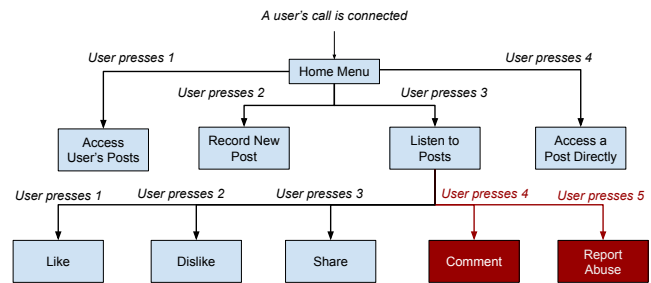

Figure 1: High-level simplified user interface (UI) design of *Swara* and *Baang*. Additional components in *Baang*'s UI design are represented in red color.

Baang

Baang was designed for hard-to-reach and low-literate populations with a goal to achieve greater spread and adoption as well as deeper and long-term engagement [32]. *Baang* and *Swara* had similar user interface (UI) design with one main exception. In addition to liking, disliking, and sharing posts, *Baang* allowed its users to record audio responses on posts and provided them a feature to report abusive posts (see Figure 1). In an eight-month deployment in Pakistan, *Baang* spread virally to over 10,000 users who called *Baang* 269,000 times for recording about 44,000 audio posts and 124,000 audio comments, and casting 343,000 votes. Although *Baang* was designed to be *"inclusive, versatile, and flexible platform of social connectivity to provide hard-to-reach populations"* [32], it also failed to gain traction among women. Almost 90% of its users were men, most of whom were blind, low-income, and low-literate. In this work, we investigate whether *Baang* succeeded in being an inclusive social space for those women who used it.

While low usage of these services among women could be attributed to factors like comparatively lower number of female mobile phone subscribers [34], and phone sharing where the usage of phone is dictated by male family members [9], we explore whether there could be additional factors affecting women's participation in otherwise inclusive voice forums like *Swara* and *Baang*. By comparing two very similar services in different geographies and sociocultural contexts, we aim to examine the differences and commonalities in the patterns of interaction between men and women.

4 METHODS

We used a mixed-methods analysis spanning quantitative and qualitative methods to examine how men and women used *Swara* and *Baang*.

Quantitative Analysis

We selected all 5,361 posts on *Swara* and randomly sampled 5,000 posts on *Baang* to conduct an in-depth content analysis. We recruited three coders (one male and two females) each

in India and Pakistan to analyze these posts. The coders were familiar with local socio-cultural norms, languages, and colloquial terms. On average, the coders in India and Pakistan were 32 years old and 27 years old, respectively. They had at least a bachelor's degree and were from middle-income families.

We requested coders to use the following rubric to analyze audio posts. For each post, a coder noted content type, gender of the recorder, how the post is related to women, and whether the recorder is threatening other users. The coders could select content type as 'abuse', 'blank or unclear post', 'flirt', 'self-introduction', 'joke', 'news', 'poem', 'question and answer', 'song', 'a message to other users', and 'pre-recorded content'. The coders could select the gender of the recorder as 'female', 'male', 'unsure', or 'blank'. The gender was coded 'blank' when the recorder did not speak anything (e.g., in a blank post or for pre-recorded content). When a post had multiple speakers, the coders were asked to mark the gender of the person who spoke for the most time. If a recorder referred to specific female users in the post, the coders marked the post as 'directed at female users'. If a recorder referred to women generally in the post, the coders marked the post as 'directed at women in general.' If a recorder had a conversation with other male users on topics that followed prior conversations with female users or on women, the coders marked the post as 'discussion because of women'. The coders marked posts as 'threatening' when the recorder threatened other users in the post.

Initially, we assigned 100 audio posts to each coder to fill the rubric. We then computed inter-rater agreement using Cohen's Kappa coefficient. The lowest kappa coefficient in India and Pakistan was 0.90 and 0.88, respectively, indicating high agreement between coders. We thus divided the remaining dataset into three non-overlapping partitions and assigned one partition to each coder. Collectively, the six coders listened to nearly 140 hours of posts to generate metadata that is central to our analysis. We analyzed this data on several interesting probes, such as the number of female and male contributors, similarities and differences in content recorded by women and men, content of messages directed at women, and interactions between female and male users, among other things.

To examine how female and male users reacted to non-inclusive posts such as abuse, flirts, threats, or verbal harassment, we mapped each anonymized phone number with the gender of the person who used that phone number to record posts. We only considered a phone number if it was used by the same gendered users (male or female), and discarded if it was used by both male and female users.

Qualitative Analysis

To recruit participants for interviews and surveys, we randomly selected users who used these services more than ten times and recorded at least one post. We conducted semi-structured telephonic interviews with 32 *Baang* users and

structured telephonic surveys with 18 *Swara* users. The interviews and surveys explored several aspects including demographic information, limits imposed by family members in using these services, attitudes towards flirty, threatening, and abusive posts, inclusion and safety perceptions, and suggestions to make these services more inclusive for women. The interviews and surveys were conducted in Urdu and Hindi, and lasted anywhere from 10 minutes to 40 minutes. We took detailed notes and audio recorded their responses. We provided mobile airtime worth 100 PKR in Pakistan and 100 INR in India to the participants.

We transcribed audio recordings and translated transcripts to English. We subjected our data to thematic analysis as outlined by Braun and Clarke [18] and rigorously categorized our codes to identify factors that affect women's participation on these services. We engaged in regular discussions and iterated on our codes. Our first-level codes were specific, such as *"women ignored abusive messages," "women did not respond to flirt,"* and *"men hesitated to recommend the service to women in their family."* After several rounds of iteration, we condensed our codes into high-level themes, such as *"lack of agency," "structural limitations,"* and *"systemic discrimination."*

Twenty *Baang* participants were male and 12 were female. Ten *Swara* participants were male and eight were female. On average, participants were 24 years old. A majority of them (62%) were unmarried and nearly one-fourth had children. About 40% of the participants had less than 10 years of education. Half of the participants were employed, and the rest were homemakers, students, or unemployed. Among employed participants, nearly 33% were farmers, 20% were teachers, and 14% each were in private jobs or government jobs. On average, the monthly family income for a family of nine people was USD 160. About 42% participants had basic phones, 40% had smartphones, and the remaining owned both a smartphone and a basic phone. Among the smartphone owners, 70% used Facebook and 40% used WhatsApp.

Limitations

Our analysis has a few limitations. First, the coders assigned gender based on the masculine or feminine characteristics of the voice in the audio posts. Our analysis thus excluded non-binary gender identities. Second, since we could not determine the gender of the users who did not record any post, our analysis on how men and women reacted to audio posts is based on those users who recorded at least one post.

Ethics

Users of *Swara* and *Baang* were informed in the first call that their posts will be publicly available and will be used for research purposes. The services requested users to not record any private information such as their address or gender identity or phone numbers. The data we used for analysis did not

Table 1: Usage statistics by gender for *Swara* and *Baang*.

Voice Forum	Gender	Total posts	Unique users	Likes	Dislikes	Shares	Comments	Report
Swara	Male	4,764	419	21,630	58,644	189	NA	NA
	Female	275	31	270	2,636	15		
Baang	Male	4,142	376	8,181	5,541	778	1,942	2,061
	Female	325	31	508	253	2	25	25

have any personal identifiable information. The phone numbers were replaced with anonymized strings. Both *Swara* and *Baang* spread organically and no specific efforts were made by providers to recruit people belonging to any particular social strata or gender. Our study also received institutional review board approval. We also anonymized names of users and participants for use in this paper.

5 FINDINGS

We analyzed 5,361 posts on *Swara* and 5,000 posts on *Baang*. An overwhelming majority of these posts (89% on *Swara* and 83% on *Baang*) were recorded by men. Only 5% posts on *Swara* and 6% posts on *Baang* were recorded by women. The remaining posts were either blank or unclear or contained pre-recorded content. *Swara* and *Baang* users recorded posts from 506 and 510 unique phone numbers, respectively. We discarded data for 159 phone numbers that were used by both men as well as women to record posts. Assuming a one-to-one mapping between remaining phone numbers and users, *Swara* and *Baang* had 450 and 407 unique contributors, respectively. *Swara* had 419 male and 31 female contributors, and *Baang* had 376 male and 31 female contributors.

High-Level Usage Patterns

Table 1 shows how men and women participated on *Swara* and *Baang*. Men on *Swara* recorded 17 times more posts, and liked and disliked these posts 80 times and 22 times more than women. On average, they recorded 1.5 times more posts, and liked and disliked posts 6 times and 1.6 times more than women. We found similar usage patterns on *Baang*, indicating that the participation on both services was dominated by men. Even the most fervent female users were far behind their male counterparts. For example, the number of posts contributed by top 25 female contributors combined were less than the number of posts recorded by the most prolific contributor among men. Figure 2 shows the distribution of the number of posts recorded by top 25 male and female *Swara* contributors. The median number of posts recorded by these men and women were 81 and 4, respectively. A Mann-Whitney's U test indicated a significant difference between the number of posts recorded by top 25 male and female contributors, $(U = 615, Z = 5.8, p < 0.001)$. We also found significant effect of gender ($p < .001$) on total calls, total likes, and total dislikes by top 25 male and female users on both *Swara* as well as *Baang*.
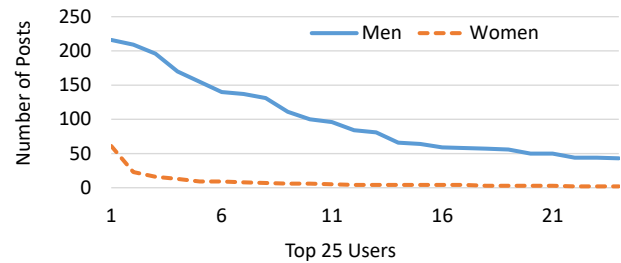

Figure 2: Distribution of the number of posts recorded by top 25 men and top 25 women contributors of *Swara*.

Content created by users: Figure 3 shows the number of posts of different types (on a log scale) recorded by male and female contributors. A Fisher's exact test indicated significant differences in the content recorded by men and women ($p < .0001$) on *Swara* as well as *Baang*. On *Swara*, most posts by women contained songs (34%) and most posts by men contained messages for other users (39%). The second-most popular category was poems among female contributors and songs among male contributors. Poems and songs together accounted to 66% posts among female contributors and 39% posts among male contributors. On average, we found that men recorded more posts containing abuses, flirts, introductions, messages to other users, news, and informative general knowledge questions and answers than women. In contrast, women recorded more songs, jokes, poems, pre-recorded content, and unclear or blank posts than men.

On *Baang*, most posts by women (31%) and by men (40%) were messages for other users. Poems were the second-most popular category among female contributors (22%) as well as male contributors (14%). While songs were the third-most popular category among male contributors, abusive posts ranked third for female contributors. This is in sharp contrast with *Swara* where none of the abusive posts were recorded by women. Men on *Baang* recorded four times more abusive posts and three times more flirty posts than women.

Compared to women on *Swara*, women on *Baang* recorded more posts containing abuse, flirts, introductions, and messages for other users, and lesser posts containing songs, jokes, poems, and questions. Women on both services did not record any posts to discuss regional or national news. A Fisher's exact test indicated a significant difference between the types of posts recorded by women on *Swara* and *Baang* ($p < .001$).

Votes given by users: *Swara* users voted on posts six times more than *Baang* users. This is probably because they could listen to the next post only after liking or disliking the current post, whereas *Baang* had no such requirement. *Swara* users disliked posts more than liking them, whereas *Baang* users
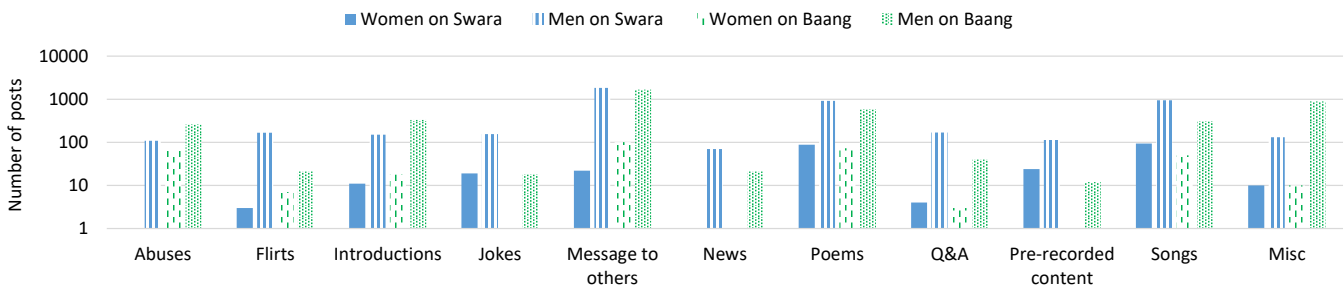
Figure 3: Distribution of posts (on a log scale) by content types and gender for *Swara* and *Baang*.

liked posts more than disliking them. A Chi-square test revealed that the distribution of likes and dislikes differed significantly between *Swara* and *Baang* ($\chi^2(1, N = 97,663) = 6497.8$, $p < 0.001$). This is probably because the top-ranked content on *Swara* (chosen based on the likes and dislikes given by users) was featured as 'the best post', leading to unhealthy competition among users who disliked posts recorded by others to improve their chances to get a higher rank.

On *Swara*, women were more disapproving of content than were men. While men disliked 2.7 posts for each post they liked, the ratio of dislike to like was 9.8 for women. On *Baang*, women were more approving of content than were men. They liked 2 posts for each post they disliked while men liked 1.5 posts for each post they disliked. A Chi-square test indicated a significant effect of gender on the distribution of likes and dislikes on *Swara* ($\chi^2(1, N = 83,180) = 449.72$, $p < 0.001$) and on *Baang* ($\chi^2(1, N = 14,883) = 14.9$, $p < 0.001$).

Comments by users: *Baang* had a feature where users could leave comments on posts. Men recorded 55 times more comments than women. Most of the comments by men were on posts containing messages to others (40%), abusive content (21%), and poems (16%). In contrast, most of the comments by women were on posts containing poems (23%), songs (23%), and messages to others (23%). A Fisher's exact test indicated a significant effect of gender on the number of comments posted on different types of content ($p < .0001$).

Reporting abuse: *Baang* also had a feature where users could report abusive posts to administrators. Men reported posts more than 2,000 times, while women used this feature only 25 times. Although *Baang* had 323 abusive posts, women reported these posts only five times (20%). Women also reported posts containing messages to others (52%) and miscellaneous content (16%). In addition to reporting such posts (75%), men also reported poems and songs nearly 300 times (15%). These findings indicate that women did not use this feature completely and men misused it even to report acceptable content. Our interviews indicated that many female users were unaware about the process once a post was reported.

Table 2: Examples of posts focusing on women or on topics that follow prior posts involving women.

Type of posts	Example post
Mentioning women user	Hello, my name is Roshan. Reshma I want to know your mobile phone number.
Discussing women generally	Why do women wear revealing clothes? Why they want to show skin? Why are they following western values? An Indian girl should feel ashamed for exposing her skin.
Spiraled from conversations on women users or women generally	Hello, some fool was just abusing in the last post. Do not abuse. Women and men from all over India listen to your messages. Do not misbehave here. (A user reprimanding another user for abusing women in a prior post)

Those who reported posts did not receive any follow-up message about the status of the reported posts. They expected that they would speak to a system administrator, who would then delete the post and block the user. Some female users were unsure if other users could know that they reported a post and were fearful of retaliation from them.

Our content analysis also indicated that a notable number of posts were directed at women and a significant number of posts contained abusive, flirtatious, and threatening messages. In the next subsections, we analyze who recorded posts directed at women, how users were flirting with each other, and why they were threatening and abusing other users.

Posts Directed at Women

Our coding indicated that male and female users recorded 602 posts on *Swara* (11%) and 335 posts on *Baang* (7%) that were either directed at other female users or discussed their participation. We classified these posts in three categories: (1) posts that called out female users, (2) posts that referred to women generally, (3) posts that followed topics spiraled from prior conversations centered on women. Table 2 shows examples of posts for these categories. The first, second, and third categories had 372, 147, and 83 *Swara* posts, and 276, 49, and 10 *Baang* posts, respectively.

Female *Swara* users recorded 19 posts (3%) to appreciate other female users for recording good content or to celebrate womanhood and motherhood. For example, a woman recorded the following poem on female infanticide:
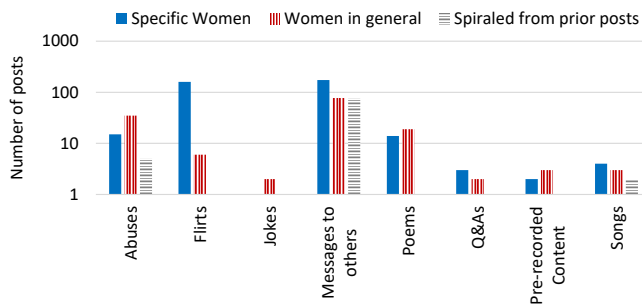
Figure 4: Distribution of different types of posts (on a log scale) directed at *Swara* female users.

> *Daughters are our pride, they make a home happy.*
> *They are not a burden, they bring us prosperity.*

Figure 4 shows the distribution of *Swara* posts (on a log scale) for the three categories. Male *Swara* users recorded 500 posts (83%) that were directed at female users or that discussed women in general. About 95% of the posts that called out female users had abuse, flirts, and adulation. Many men also recorded posts criticizing women in general for receiving *"more votes because of preferential treatment from other men."* They often actively encouraged other users to dislike all posts recorded by women. About one-fourth of the posts referring to women in general had abuse. Male users recorded 83 posts on topics that spiraled from prior conversations centered on women. About 90% of these posts had male users fighting with each other to impress other female users or requesting troublemakers to avoid recording abusive and flirty posts.

We found a similar pattern on *Baang*. While most women recorded supportive comments for other female users, the majority of posts from men were abuse, flirts, or verbal harassment directed at women. In ten posts, men either supported or rebuked other male users for abusing women.

These results indicate that although *Swara* and *Baang* users had only 11% and 7% of all posts targeting or discussing women, most of these posts were harassment in the form of abuse, flirts, and threats. Often these posts spiraled several heated arguments among community members, creating an acrimonious environment for female users.

Flirty Posts

Swara and *Baang* had 171 and 28 flirty posts, respectively. Men recorded 98% of the flirty posts on *Swara* and 75% on *Baang*. A Fisher's exact test indicated a significant effect of gender on the number of flirty posts recorded on *Swara* ($p = .02$, odds ratio = 0.3) as well as on *Baang* ($p < .01$, odds ratio = 4.3).

We also analyzed who were the target of these flirty posts. On *Swara*, men flirted with women in 166 posts (97%) and with other men in two posts, and women flirted with men in three posts. On *Baang*, all flirty posts by men were directed

at women and vice versa. On both services, a Fisher's exact test indicated a significant effect of gender of the recorder on the number of flirty posts sent to men and women ($p < .0001$).

Men flirted with women in several ways. For example, many male users inundated female contributors with adulation and incessantly requested them to record more content. Many of them requested female users to dedicate a song or poem to them. Some men requested other users to like posts from women with whom they were flirting. For example, a man posted this messages on *Swara*:

> *Sapna, your voice is so sweet. I want to be your friend. Everyone, please upvote all posts from Sapna.*

Some men were forceful in sharing their feelings with women. They often harassed female users by repeatedly professing love, proposing to them, and asking them to reciprocate their feelings. They shared their phone numbers publicly and asked women to call them. In a sample of 100 random recordings, we found that men on *Swara* and *Baang* shared their phone numbers in 21 and 18 posts, respectively. For example, a man recorded:

> *Saroj, please call me and tell me how are you. You have to become my friend. Where are you from? Where do you live? I am in love with you. Call me on xxxxx xxxxx or give me your personal number.*

We found two *Swara* posts where men flirted with other men and shared their number publicly inviting them for offline conversations. We also found three posts where women flirted with men; two women recorded posts stating that they are looking to make male friends and another woman expressed excessive admiration for a male user. We saw similar patterns in seven *Baang* posts where female users flirted with men. In our entire sample, we found only one post each on *Swara* and *Baang* where a woman shared her phone number and asked male users to call her.

We also analyzed users' votes to examine their reactions to flirty posts. A Fisher's exact test indicated a significant difference between the proportion of dislikes and likes given by male and female users to flirty posts on *Swara* ($p < .01$, odds ratio = 3.1), suggesting that women disliked flirty posts more than men. We did not find any significant effect of gender on how users voted flirty posts on *Baang*. All female participants in our surveys and interviews reported flirting to be a cause of distress and a key reason for their low participation. In contrast, several male participants disregarded that flirty posts created an uninviting environment for female users . A male participant stated:

> *"When guys and girls are together, flirting can't be stopped and should not be stopped."*

Although many interview participants stated reporting flirty messages on *Baang* as soon as they encountered them,

we could not find any quantitative evidence for the claim. While women did not report any flirty posts, men reported such posts only 22 times. Male and female interview participants gave different reasonings for why men were flirting with women. Some male participants held movies responsible for flirtatious behavior of men. One of them stated:

> "Men see films and TV shows and think that the only way to gain attention of a woman is by teasing and pursuing her. That is what they see and do."

On the other hand, four female participants blamed women for flirtatious behavior of men. One of them stated:

> "Some women don't leave a good impression based on how they talk and what they say. We are also at fault. Not all fault is of men."

To summarize, these results indicate that most of the flirty posts on *Swara* and *Baang* were directed at women. Often these posts were disturbing and some posts had a sexual undertone. Most male users condoned flirting and many female users showed stronger disapproval for these messages than male users. While men avoided responsibility for unjust behavior by blaming television soaps and movies, women engaged in victim blaming to justify flirtatious behavior of men.

Threatening Posts

Swara and *Baang* had 104 and 36 threatening posts, respectively. All threatening posts on *Swara* were recorded by men and the majority of these posts (62%) were directed at women. We found a significant difference between the proportion of threatening posts directed at women and men ($\chi^2(1, N = 5,361) = 332.3, p < 0.0001$). On *Baang*, nearly 92% of the threatening posts were recorded by men and 19% of these posts were directed at women. A Fisher's exact test indicated a significant difference between the proportion of threatening posts directed at men and women ($p = .02$, odds ratio = 2.83).

Most threatening posts (45%) on *Swara* were abusive in nature. In 56% of these posts, users called out the names of intended recipients. Some men threatened other users indirectly by singing songs and reciting poems. For example, a man recited the following content as a poem:

> Don't pluck the flowers, you will get stung by thorns. Don't tease my girl, you will get a slap. If anyone troubles Maya, I will behead them.

We found three main reasons why users were threatening others. First, several men who were trying to impress female users were threatening each other when others flirted with women they liked. Second, some men recorded sexually suggestive content, sparking sharp criticism from other male users. Often these arguments resulted in a series of abusive and threatening posts. Third, a few men threatened women

who did not respond to their flirty posts or who condemned their behavior. A female participant shared her ordeal:

> "A man posted offensive content, when I did not respond to his advances. It is my wish if I want to talk to him. How can he force me? When I could not tolerate the misbehavior, I left the service."

While no female *Swara* users threatened men, we found three posts where women on *Baang* threatened male users; two abused male users who misbehaved with them and another threatened to report a male user for recording abusive content. In our interviews, many male participants indicated that women should not record posts containing threats and abuse, instead *"they should tolerate it."* Female participants, on the other hand, supported women who recorded threatening posts. They felt that these women had no choice but to defend themselves from the abuse and misbehavior directed at them by men.

The analysis of how users reacted to threatening posts indicated that men on *Swara* condoned these posts by not disliking them as much as did women; while the ratio of dislikes to likes for women was 42, the ratio was only 4.4 for men. A Fisher's exact test indicated a significant difference between the proportion of likes and dislikes given by men and women on these posts ($p < .0001$, odds ratio = 14.8). We found that men on *Baang* gave more dislikes when women recorded threatening posts. In contrast, men gave more likes when other men recorded threatening posts. A Fisher's exact test indicated a significant effect of the gender of the recorder on the number of likes and dislikes given by men on threatening posts ($p = .03$, odds ratio = 3.2).

These results indicate that women encountered substantial number of threatening posts that were either directed at them or were because of men fighting with each other to gain their attention. We also found an evidence of systemic bias present in patriarchal societies where unruly behavior by men was not only condoned but often appreciated. However, the same behavior by women received an immediate disapproval.

Abusive Posts

Swara and *Baang* had 109 and 323 abusive posts, respectively. All abusive posts on *Swara* and 80% of such posts on *Baang* were recorded by men. We found a significant difference between the proportion of abusive posts recorded by men and women on *Swara* (Fisher's exact test: $p < .01$) as well as on *Baang* ($\chi^2(1, N = 4,467) = 75.2, p < 0.0001$), indicating that men recorded more abusive posts than women.

We also analyzed who were the target of these abusive posts. About 46% of these posts on *Swara* and 34% on *Baang* were directed at women. Flirting by men transpired several abusive messages. Almost half of these posts on *Swara* and

one-third on *Baang* were because of flirting. Some men constantly harassed women to share their phone numbers. When these women did not share their number, men felt rejected and recorded abusive messages directed at these women. Some men also abused women who thanked or appreciated other men instead of responding to their flirty messages. When other users admonished these men for abusing women, they ganged up on those who were berating their unruly behavior. A man shared in the interview:

> *"I saw some men poorly treating a woman. I raised my voice but did not anticipate the extent of retaliation. They said horrible things about me and her."*

In contrast to female *Swara* users, women on *Baang* retaliated when men abused them or treated them unjustly. About 73% of abuse recorded by women were directed at men. Although women on *Baang* also abused other female users in 17 posts, most of these posts spiraled from one incident where a woman shared her phone number publicly on the service. A few men and women recorded posts condemning the woman for sharing her number stating *"how such action is against Islamic values."* Soon other men and women came in her support and defended her liberty to share the number. These arguments soon snowballed into abusive and threatening posts between members of the two groups.

We also analyzed the votes given by users to examine whether they condemned or condoned abusive posts. The ratio of dislikes to likes given by female and male *Swara* users was 15 and 3, respectively, meaning that women disliked abusive posts more strongly than men. A Fisher's exact test indicated a significant effect of the gender of users on the proportion of likes and dislikes given on the abusive posts ($p = .01$, odds ratio = 0.19). On *Baang*, women expressed solidarity by giving more likes and less dislikes on the abusive posts recorded by women. In contrast, men expressed their disapproval by giving more dislikes and less likes on the abusive posts recorded by women. When men recorded abusive posts, women gave significantly more dislikes in proportion to likes than men (Fisher's exact test, $p < .01$, odds ratio = 0.31).

These findings indicate that women encountered substantial abusive posts that were either directed at them or were exchanged between men arguing over women. We found a systemic bias where men disapproved abuse recorded by other men less strongly than did women. We also found that women on *Baang* expressed solidarity by liking abusive posts recorded by female users.

Blackmailing

Our interviews indicated that a few women on *Swara* and *Baang* were blackmailed by men. As previously outlined, several men shared their phone numbers publicly and requested

female users to call them. Some men also recorded posts suggesting that they could help women in finding jobs or that they need *"talented female singers for their orchestra"*. A few women willingly gave their phone numbers to men. When the women stopped talking to men after unpleasant phone calls, they were threatened that their phone numbers will be publicly released if they do not continue the private conversations. When these women ignored the threats, men posted their phone numbers on the service, suggested romantic relationships with them, and assassinated their character. A woman stated:

> *"The man told me that if you stop talking to me, then I will share your number with others. When I did not pick his phone calls, he recorded a post saying that I am not a good woman and people should stay away from me."*

These incidents were also corroborated by several male participants we interviewed. One of them shared:

> *"I have heard men saying to women that 'if you won't talk to me then I will share your number with everyone'. I have heard them abusing women and talking dirty stuff with them."*

Such posts and predatory behavior by men strongly discouraged women to use these services. Such posts prompted a few female users to assume a different identity on these services by using a pseudonym and a different phone number.

Agency

Although only some men participated in unruly behavior, the abusive, flirty, and threatening posts tremendously damaged perceptions about the *"inclusivity and safety"* of women on these services. Some male interviewees prohibited women in their family and social circles from using these services because of the indecorous content by other male users. A male participant stated:

> *"I will not allow women in my family to get exposed to these abusive messages."*

Since both *Swara* and *Baang* spread virally by the word-of-mouth, negative experiences of early female users adversely affected the adoption and use of these services by women since most female users stopped recommending these services to their female friends and relatives. A woman shared in the interview:

> *'How can I ask my family and friends to listen to these posts where men are abusing women and other men. I would be in trouble, if my family learns that Baang has such posts. Family members are accepting of these behaviors if a man does it, but not when it is done by women."*

Our interviews also indicated that women were extremely hesitant to object to abusive, threatening, and flirty posts

directed at them, primarily due to deep-rooted patriarchal values that discourages women to argue and question others. Most women were worried that they will face backlash, on the service from predatory men and in real life from family members, if they record threatening responses or responded to flirty posts. They lacked the agency to retaliate unruly behavior or explore friendships with people from the opposite sex due to socio-culutral sensitivities shaped by patriarchy. Most men took the participation of women for granted and viewed them as objects of desire, reinforcing patriarchy in these digital social spaces.

We now examine the design of these services using the feminist HCI lens and discuss several design suggestions to create more vibrant, inclusive, and equitable social media experience for women.

6 DISCUSSION AND CONCLUSION

There are several practical barriers in digital inclusion of women in low-resource communities. Such barriers include comparatively lower literacy and financial agency among women than men which results in lack of access to mobile phones and connectivity [9]. A large fraction of women in such communities only have access to shared mobile devices where usage is directed by male family members. Social media voice forums such as *Swara* and *Baang* have been successful in reaching some women in such communities. Once connected, these women enjoy access to community-generated content and play an active role in creating and moderating content. These platforms provide them a voice, a digital social identity, and more independence. Their social inclusion leads to greater connectivity and access to entertainment, employment, education, and health opportunities on equal terms as men.

However, our study highlighted significant secondary barriers to women's digital inclusion beyond the basic hurdles of literacy, connectivity, and availability of devices. Once connected through social media voice forums, these women faced harassment, abuse, threats, and systemic marginalization. Using an intersectional HCI lens [35, 42], we found that certain groups within marginalized communities are more marginalized than others. For example, several male *Swara* users abused other users based on the gender, caste, or religion. A few *Swara* users exhorted the community to downvote posts of a female user belonging to a minority group in India after an argument with her. Similarly, while *Swara* and *Baang* empowered a section of marginalized communities (e.g., low-income people, blind people), at the same time these services disenfranchised the rights, voice, and liberty of women in these communities. We found that *access* is just a first step towards actual and meaningful social inclusion, and these voice forums are still a long way from providing a welcoming, vibrant, safe, and enriching environment to women.

We faced significant barriers in reaching female *Swara* and *Baang* users for follow-up surveys and interviews. Most of our phone calls were answered by male family members. Even when women answered the call, many of them handed over the phone to a male family member as soon as they realized that there is an actual person (a female surveyor) calling them from these services. We found that most women users were comfortable engaging in an asynchronous social interaction through the mediation of a social media service compared to actual conversations with unfamiliar men and women. Even among the women who agreed to participate in our surveys, a few did not acknowledge that they had used the service and some made an excuse to hangup to avoid the conversation. We believe that these women had a bad experience with the service and did not want to admit that they used it, or did not want their family to know about their experience.

The design of *Swara* and *Baang* was partially compatible with the principle of **pluralism** from the feminist HCI framework. Although the services were designed to be inclusive of low-income people by making it toll-free and low-literate people by enabling speech-based interactions, no special provisions were made to welcome participation from women. The prompts were recorded in a male voice, reinforcing the perception that men are the primary target users. Simple adaptations in prompts, for example, enabling users to select between prompts in male voice or female voice and explicitly inviting participation from both men and women, could lead to significant changes in perceptions about inclusivity of these services. Another way to encourage participation of women is by rewarding them with soft incentives for their participation. For example, a post recorded by women could be rewarded with extra virtual airtime to access the forum for free. Although it is expected that male users may come up with ways to deceive such gender recognition filters to earn additional free access, we still expect such incentives to encourage female participation. This would also convey to users that these services are not exclusively designed for men and warmly welcome participation of women. Even changing the perception about a service may lead to an improvement in users' behavior.

Another way to promote participation of women in voice forums might be to provide optional audio filters to mask their gender identity. Such disguise could allow them anonymous access hence alleviating their fears regarding gender-specific targeted abuse. These filters could also provide them agency to retaliate against harassment while protecting themselves against patriarchy driven social abuse. However, anonymization is a double-edged sword. Men can also use it to hide their identity and post inappropriate content targeting women. Similarly, the very fact that a post is gender-anonymized could signal vulnerability and be taken as a cue that it is recorded by women. Moreover, voice is not the only gender-cue in audio

posts and the use of gender pronouns, linguistic constructions, and women-specific discourse could also reveal their identity. We believe that anonymization might not be a viable solution to mask users' gender identity, however, it may help with masking their personal identity from people who oppose their use of voice forums. Since nuanced treatment of identity and self are one of the central tenets of feminism, we also feel that taking away a woman's gender identity is not a solution to a problem that must be solved through an acceptance of her identity and rights that it entails.

From a standpoint of **participation** from the feminist HCI framework, both *Swara* and *Baang* enabled users to participate equally in deciding whether posts adhere to community standards. Both services masked the information from users about who liked, disliked, or reported their posts, putting every user on equal footing, a decision reflecting the feminist commitment to equality. Although community moderation in *Swara* and *Baang* showed promise since users disliked blank and unclear posts, it did not work well for abusive, flirty, and threatening posts. Most of these posts involved multiple users in a heated exchange, and many users did not objectively vote on these posts. Instead, the voting was based on the sides users picked among people involved in the argument. Similarly, the 'report abuse' feature in *Baang* was seldom used primarily because users expected immediate action on abusive posts once they report them. Community voting and abuse reporting was also misused by some users who lobbied to downvote or report posts of their opponents. Despite its current limitations, we expect community moderation to play an active corrective role in voice forums. We believe that a service that enables the community to set its own rules and implement them through community moderators, has a chance of evolving into an inclusive platform for women. The service could also allow members to hold regular elections for voting on community rules and roles. The service could also have a user reputation system that is based on community votes and directly linked to concrete outcomes like additional virtual airtime. Assigning weights to votes based on the number of female and male users could also put judgments by men and women on equal footing.

In our surveys and interviews as well as in prior works on voice forums [32, 33], women requested a dedicated voice forum for them. Such a gendered model matches the pattern of their daily social lives where they have women-only carriages in trains and dedicated compartments in buses. Dedicated services for women is not an alien concept even in developed countries where special interest groups around maternal health, pregnancy, and breastfeeding are often women-only forums. We believe a women-only service could encourage more meaningful participation from women in low-resource environments who are afraid to raise their voice on mixed-gender voice forums due to the fear of harassment driven by patriarchy or simply because they are shy to openly express themselves in situations where men are expected to hear and comment. A women-only service could only be successful if it blocks uninvited participation of men. Although it is possible to identify and remove male-recorded audio posts using natural language processing and community moderation techniques, preventing passive male users from listening to posts and expressing their opinions via non-verbal means (e.g., likes, dislikes, reports) is far more challenging. A passcode-based access to the service could make it too complex for the primary target user group of low-literate women. Instead, the service could require users to announce themselves every time they access the service. The audio could be then gender-identified to allow or deny access.

Both *Swara* and *Baang* lacked in values of **self-disclosure** and **advocacy** from the feminist HCI framework. *Swara* and *Baang* did not explain the importance of votes to its users, confusing them how posts are ranked and ordered. Similarly, *Baang* did not explain to its users how the 'report abuse' feature works, leading to mismatched expectations of designers and users. These limitations could be overcome by leveraging participatory design processes and integrating low-income, low-literate men and women in the design process, something that these services neglected. From a standpoint of **ecology** from the feminist HCI framework, there is a need to reflect how the design of voice forums like *Swara* and *Baang* could transfer social injustice and patriarchy driven harassment from offline social spaces to digital social spaces.

The interface and features of current voice forums are not modelled to prevent harassment of women and to make them feel safe and included. However, such services do connect women who otherwise have no means of participating in digital social spaces. Design considerations such as the ones suggested above could create voice forums that welcome women, prevent harassment, and evolve the behavior of the connected user-base through policies and practices that originate from better values of the society itself.

7 ACKNOWLEDGEMENTS

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