

# A Descriptive Analysis of Cohesion within Virtual and Physical Small Groups of Mothers in Bandwidth-Constrained Communities in Cape Town.

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## ABSTRACT

Isolation contributes to deteriorating health outcomes during the first 1000 days of a child's life (the period from conception to two years). Mothers and their growing babies are at risk of pregnancy-related complications and malnutrition during this sensitive period due to inadequate information. This study describes how a faith-based organization (FBO) in Cape Town leverages available resources in both physical and virtual spaces to support mothers through antenatal classes. We observed seven small groups in their physical spaces, interviewed seven mothers and analyzed fifteen WhatsApp chat groups to understand the group structure, dynamics, and interactions. When the model was introduced to the mothers in the physical and virtual spaces simultaneously, cohesion was achieved and sustained. However, during the COVID-19 pandemic, where strong indications of stress and isolation were evident, a strange paradox was noted: all groups showed weak ties (with minimal communication among members). It was hard to explain the non-commitment despite efforts from the moderators to encourage sharing among mothers. We identified two underlying causes: a minimal sense of belonging to the group and bandwidth constraints. Further analysis showed that bandwidth constraints digitally excluded some mothers from active participation. These findings indicated the need for HCI and technology designers to design less bandwidth-intensive interactive platforms for inclusivity.

## KEYWORDS

Bandwidth-Constrained, Cohesion, FBO, Small groups

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## 1 INTRODUCTION

Addressing the *First 1000 Days Researchers' Forum* in Melbourne, Arabena [8] remarked that poor antenatal engagement among women leads to poorer health outcomes at birth and throughout childhood. Maternal and child health advocates have identified the first 1000 days (FTD) – a period from conception to a child's second birthday, as being a key period for brain development in children. Nutrition, safety, and play/stimulation all contribute to improved neural development, which has been shown to lead to better life outcomes in adulthood [8, 37, 46]. During the months of pregnancy and early childcare parents naturally isolate to adjust to the changing phases of pregnancy and childcare. This isolation contributes to poor health outcomes in the FTD. This is made worse by low health literacy and a lack of information about FTD. Expanding health care access to ensure that the poorest, least educated, and hard-to-reach mothers and their infants get accessible, timely, and quality health care remains a challenge for the South African government [11, 45]. Hence, there is a need to explore alternate cost-effective options to support and extend antenatal and postnatal care (ANC/PNC) education to mothers, particularly those at higher risk of poorer health outcomes.

During the peak of the COVID-19 pandemic, South Africa was one of the hardest hit, with over 3.7 million documented cases and over 90,000 deaths [15, 57]. The strain on the health-care system, exacerbated by the COVID-19 pandemic, had a negative impact on ANC/PNC visits. According to Kotlar et al. [28] pregnant women are at a higher risk of infection and have more severe conditions than non-pregnant women. This abrupt shift complicates the role of mothering and care. It increases anxiety and stress, as well as reports of gender-based violence. Finding safe spaces where women can seek support and share their experiences aids in the reduction of mental stress.

Gazit and Amichai-Hamburger [21] state that support groups can benefit mothers who want to express their feelings. Hwang et al.[25] assert these small groups are a source of information, empathy, and support. Furthermore, recent studies within the human computer interaction (HCI) scholarship have highlighted the importance of developing non-judgmental peer support networks. For example, Younas et al. [68] emphasizes the importance of moderated online peer-support systems as safe spaces for interactions about sensitive reproductive health issues, abuse, and women's well-being in patriarchal and low-resource communities. The HCI literature abounds with studies of mothers' interaction via social media platforms [7, 41, 44] and peer support groups to access information [5, 24, 44, 67]. But there is little information on how

non-governmental organizations, such as faith-based organizations (FBO), are utilizing social networking sites to create spaces for small ANC/PNC groups in underserved communities. We focus on FBO interventions because access to health services is limited in low resource communities. FBO resources can be used to support maternal and child health (MCH).

Increased use of social media for health information and support indicates a change in the manner people form close networks to share and discuss their experiences. We describe one such intervention, launched by a FBO in Cape Town which focused on relationship building in small groups of mothers during the ANC/PNC periods. This FBO focused on three interventions to support mothers during the FTD: home visits, group ANC and PNC classes, and support groups. Since its inception, the interventions have been coordinated in both a physical and virtual environment. Because of the high cost of data, virtual interactions are conducted via WhatsApp, which is also the most popular and affordable social media platform in South Africa [62]. Thus, the study seeks to answer the following research questions (RQ):

- RQ1: How are FBOs utilizing social networks to facilitate FTD education among low-income mothers? We concentrate on WhatsApp because it is FBO's communication medium for their ANC and PNC classes.
- RQ2: What are the distinguishing features of small group participation on physical and virtual platforms?
- RQ3: How does FBO-moderated engagement help mothers build their community?

We present a rich description of the intervention, participants' experiences, and interactions using observations, interviews, and WhatsApp group chat logs. We give a detailed account of the group's structure and function, and how realities on the ground influence the way the FBO facilitates community building among mothers. The study also contributes to an in-depth understanding of small group interactions and engagement in physical and virtual settings. It highlights how FBOs can use existing technologies to engage with hard-to-reach communities with FTD education.

Section 2 discusses related work and how this study adds to the discourse in existing HCI literature. Section 3 explains the methodology and ethical considerations. Sections 4 and 5 present our findings and discussions. The conclusion lists key takeaways and limitations of the study.

## 2 RELATED WORK

### 2.1 Maternal and Child Health

The United Nations established the Sustainable Development Goals (SDG) to encourage national and global-level targets for reducing poverty, inequality, and maternal mortality. The SDG 3 target mandates fewer than 70 maternal deaths per 100,000 live births by 2030 [16]. Continued investment in maternal health research and long-term interventions at the global, national, and community levels are needed to address inequality, particularly in the global south.

During the transition to parenthood, mothers experience isolation amidst the challenges and complexities of pregnancy and postnatal care. Poverty, low health literacy, poor quality of care, and limited access to public health services all contribute to complications such as stunted growth and child mortality [69]. Several

digital interventions within the HCI scholarship show promise to improving maternal health in low-income communities, such as: online health information, social support, and access to tangible resources. For example, text messaging services and mobile apps send stage-related information to mothers [9, 26, 47]. Video on tablets and phones delivered via agents such as community health workers, [29, 40, 49] have improved education and communication with health professionals. Additionally, Burleson et al. [12] advocate for new approaches offering holistic support to low-income pregnant women while incorporating contextual factors into the existing health ecosystem. Ramachandran et al. [49] use videos as medium to encourage key community members to be agents for change. Similarly, videos motivate and persuade health workers and community members to convey maternal health information by Projecting Health in India and Bophelo Haeso in Lesotho [29, 39].

Our study deviates slightly from the dominant client-medical professional mediated interactions in existing HCI studies. We focus on examining the role of religious groups in supporting maternal wellbeing. This builds on Mustafa's [42, 43] and Sultana's et al. [59] research on maternal health and religion. We place our study in-between social computing and faith-based initiatives to aid MCH schemes in the local community. We explore the role of FBOs as change agents in providing maternal health support to their communities. This helps us understand how FBOs use technology to provide peer support to women in local communities.

### 2.2 Cohesion and Digital Support

Social computing is a popular way for mothers to seek advice and support during their pregnancy and infant care. We summarize HCI research on social media to target moderated peer support for mothers in low-resource communities. Several HCI studies [4, 6, 60, 68] have investigated the design and implementation of social computing for peer engagement. They emphasize the significance of support groups and the risks of disclosing sensitive information such as sexual abuse, harassment, or infertility. For example, Andalibi et al. [5] found that most responses to depression-related photo sharing on Instagram were positive. When sharing sensitive data online, users preferred throwaway accounts [2]. The studies emphasize the role of moderators in reducing bullying and harassment on social networks. The moderators help keep conversations thoughtful and orderly and protect the anonymity of members (particularly around sensitive topics). Younas et al. [68] describe how Pakistani women in closed, moderated, women-only Facebook groups could anonymously share harassment and abuse stories and receive emotional and material support from one another. It is critical to emphasize that technology alone will not be able to overcome the social, economic, and cultural barriers that low-income women face in developing countries. They, thankfully, also benefit from existing social structures and informal interactions with community care groups, family members, and friends.

Social networks often work best in response to a major life change or a specific stressor, such as pregnancy or parenting during early childhood, when isolation is likely. Social support can come from both existing and new social networks. In this regard, parenting is a joint responsibility of the community, with shared

values established on cooperation, collective existence, collaboration, and solidarity. This interrelatedness of community members contributes to and underscores the overall understanding of cohesion. Lipman et al. [35] suggest that the concept has a positive association with mood, self-esteem, social support, and parenting in the context of maternal health. Other studies characterize cohesion as neighborliness, a sense of belonging, accommodating diversity, and relationship building [13, 18, 53, 61]. As people begin to identify attributes of common interest, shared identity, trust, and a sense of belonging, their participation and description of group members change from acquaintances (weak ties [17, 23]) to friends and neighbors (strong ties [18]). However, the level of familiarity and contextual influences may affect the social connection.

Communitarianism is a force in empowering small groups of women [20, 24, 44, 65]. Likewise, in this study we emphasize the value of community and relationship building among small groups. The FBO and the women leverage the existing assets [20] in the physical and virtual spaces to create a community where mothers can support one another during the FTD period. Online peer support is sought by new parents for intimate pregnancy and infant care issues, e.g.: parenting, breastfeeding, and postpartum depression. Recently, more HCI studies examine aspects of online peer support seeking among parents [4, 5, 65]. They find that online forums are particularly useful during pregnancy and postpartum for discussing sensitive topics. Virtual spaces offer group members anonymity and a non-judgmental forum to share intimate details [6, 12, 52, 65]. However, no study focuses on the role of FBOs to support group ANC/PNC classes. Our study aims to fill this gap by examining small groups of ANC/PNC mothers in low resource communities moderated by the FBO.

Notwithstanding, the peer groups in our study require members to reveal their identity to build relationships and trust. Digital support groups, as mentioned above, require the use of a smartphone and reliable internet access. Unfortunately, not all the women enrolled in the ANC/PNC intervention studied had such access, which can impede active participation virtually. Therefore, based on hybrid interactions, we argue that internet access benefits women in developing countries, but also excludes low-income mothers, amplifying existing social inequalities [64, 66]. Indeed, Tilly and Wood [63] contends that internet access requires ongoing expenses and is thus unaffordable for disadvantaged people. This means that poor women may participate less in online and social media interactions due to financial and time constraints.

### 2.3 Competing Commitments

There are numerous behavioral change theories that attempt to explain why people choose one thing over another. One such theory is used to explain why social connections are weak among certain groups even when they express support for it. To address this challenge, one must first understand why it exists. Individuals may claim to support change while demonstrating otherwise. This indicates the presence of competing commitments, which occur when an individual professes a commitment to a course of action while acting in ways that contradict that commitment [27]. A situation in which people unintentionally devote productive energy

to unspoken commitments. According to Luke et al. [36], individuals have beneficial but overlapping relationships that necessitate continuous decision-making about what to choose among scarce resources. Based on this understanding, we interpret the mothers' participation in physical and virtual space, emphasizing how the unique contexts influence participation and cohesion.

## 3 METHODOLOGY

This qualitative study was enabled by partnerships with FBOs in Cape Town, South Africa. We sought to understand community cohesion among small groups of mothers participating in the FBO's programs through participant observation, interviews, and analysis of WhatsApp group chats shared by these groups.

### 3.1 Recruitment

We created an inclusion criterion based on the study objective to help select a partnering organization. The main criteria were to find an existing community-based organization involved in MCH interventions to facilitate relationship building and community familiarization. More importantly the goal of the FBO was to support parents within the FTD period which also needed to be aligned to the research goal. Thus, the study leveraged an existing collaboration between the FBO and the University of Cape Town. The church was keen to collaborate with the research team. As a result, the researcher volunteered four hours per week to help with the ANC and PNC classes at the physical location. The mothers in the study were recruited from the FBO's ANC and PNC classes and the church's mothers' group, which received similar support but with minor curriculum changes. For example, the mother's group had no set end date, whereas the ANC/PNC classes ran for 10 weeks and followed a strict study plan. The convenience sampling technique was used to recruit one person from each observed group for an interview. Mothers were selected based on their availability. They were recruited from churches, community centers, and hospitals via word of mouth, flyers, and posters. Irrespective of location, participants partaking in the program came from diverse townships (peri-urban), with four unique characteristics 1. pregnant women only – i.e., antenatal phase/ANC, 2. mothers with infants younger than six months – infancy phase/PNC, 3. mothers with children up to two years – early childhood phase/CMC, and 4. a blend of mothers who were either pregnant or with infants – virtual moms' groups/VMC. The participants are diverse racially, economically, culturally, and religiously.

### 3.2 Participants

There were three categories of participants with distinctive roles – FBO staff, facilitators, and mothers.

Firstly, the FBO is a subsidiary of a local non-denominational Christian church working closely with the immediate community to promote employment, education, and early childhood development. The first author observed one of the FBO programs supporting parents during the FTD, as well as a congregation-based outreach linked to the FBO program. The subsidiary FBO worked in unison with the church and a community-based organization (CBO) to structure the roles and functions of the facilitators and mothers participating in their program. They designed project-specific curricula

and trained community-based activists as facilitators. The FBO supported mothers with maternal health education. Their mission is to encourage churches and faith-based communities to support mothers and families within the FTD period.

Secondly, the facilitators are referred to as '*connectors*' by the FBO – a woman from the church or community who volunteers to build a supportive and caring relationship with families during the FTD. The facilitators are deeply committed to the health and well-being of mothers and children. Another requirement for becoming a facilitator is prior experience with their own children. This allows the facilitators to be practical, empathetic, and relatable to the other mothers in the group [50]. They used a hybrid mode to moderate these support groups. Prior to the COVID-19 pandemic, meetings were hybrid (i.e., at a physical location and on WhatsApp) to allow mothers to stay in touch beyond their weekly physical meetings. Meetings were shifted to virtual only during the peak of the pandemic because it was impossible to meet in person. The first author observed two types of interventions: ANC and PNC classes. Separate training was provided to the two facilitators observed (F1 and F2). The CBO trained F1. She was a salaried employee of the organization. The FBO trained F2, a stay-at-home mom, to support postnatal mother groups within the church. Unlike F1, F2's role was adaptable; as a mother for the group, she volunteered to support other women through their FTD journey. Because classes were designed to last 10 weeks, there were strict guidelines to follow. The goal was for mothers to have bonded so well by the end of the 10 weeks that they could support each other after class ended. (See Table 1).

Thirdly, the first author observed approximately 46 mothers in seven separate facilitated classes of antenatal, postnatal, and 'peer-moms' groups in their physical meeting places. In all, she interviewed seven mothers from this group.

**3.2.1 Physical and Virtual Space.** ANC/PNC group meeting were held weekly for about two hours in the physical space. The session followed a structured plan of activities with specific content for ANC/PNC education. The sessions used participatory approaches to allow for flexibility and empower the active involvement of all the mothers. The first author observed participants in the physical space as a participant observer, prior to lockdown due to the COVID-19 pandemic. Fortunately, the mothers also concurrently interacted on WhatsApp. Besides these in-person observed groups, the FBO also moderated other virtual-only groups, which started during the COVID-19 lockdown. Table 1 lists all 15 groups categorized into four unique clusters.

**Category 1 and 2** comprised ANC1-9 and PNC1-5, respectively; Participants in ANC1-9 were all expectant mothers, whereas in PNC1-5 comprised of breastfeeding mothers with babies under six months.

**Category 3 (CMC):** This group consisted of mothers with children under two years already familiar with each other and the facilitator (F2) before commencing the group to support mothers within the church. Data from this group consists of observations in person for one week just prior to lockdown as well as interviews with some participants.

**Category 4 (VMC):** This group comprised four mothers (from first-time pregnancy to experienced mothers). Recruitment was

done virtually using snowball and convenience sampling from the F2's circles. All interactions were limited to the virtual space due to the COVID-19 lockdown. Table 1 below provides an overview and unique characteristics of each group, including the duration of observations, total number of chat messages at the time of study, type of meeting (hybrid or virtual only), total number of participants in each group, and group categories (antenatal, 0-6 months, and 0-2 years).

### 3.3 Data Analysis

All audio recordings from the interviews were transcribed and cleaned. Additionally, 15 WhatsApp group chats were exported into text format. The number of WhatsApp messages analyzed is approximately 1,853 (text only), equivalent to 48 A4-pages. All self-identifying data was removed or anonymized to comply with confidentiality conventions in handling qualitative data. For example, the names of the participants were replaced with codes adopted for the study. The first three letters, ANC and PNC, represented the antenatal and postnatal groups. The fourth character is a unique identifying digit. Names of babies were replaced with 'baby'. Data was analyzed in NVivo 12; initial codes were inductively generated, focusing on the substance of the message. We iteratively re-coded aligning linking codes to form themes and categories, comparing nodes and themes until no new codes or categories emerged. The iterative process of data search illuminates meanings of concepts as new insights emerge from and are grounded in the data [10].

The transcripts were broken down into manageable sections in the first round of initial coding, as shown in Table 2. This first round of coding provided a sense of the conversation around teething among mothers. The first author applied the sort and filter schema to the initial codes, re-arranging by type, sequence, or pattern. Similar codes were put together to form broader themes in the subsequent thematic analysis phase, see Braun and Clarke [10].

Table 2 shows creation of final themes and overarching concepts, categories link together to form themes then concepts.

### 3.4 Ethical Consideration

This study received ethics approval from the University of Cape Town's (UCT) institutional review board before initiation. The aims, objectives, and study procedures were fully explained in English to all participants in the study whilst obtaining consent. We assured participants of the anonymity and confidentiality of the information they provided. They were also told that participation in the study was voluntary. Unanimously, partner organizations and mothers involved in the study gave their written or oral consent. Audio recordings were encrypted and stored on UCT's secured server. Identifiable details within transcripts were removed, and names replaced with codes. Each transcript is encrypted with a password and can only be accessed by the first author and supervisors.

## 4 FINDINGS

Beyond the current discourse of faith and spirituality within the HCI literature, this study focuses on the influential role of faith-based organizations (FBO) in facilitating bottom-up intervention. Religious communities are one of the most important sources of 'social capital' in many countries. Their roles, however, may differ

**Table 1: Group ANC/PNC Distribution**

| Category  | Small Group | Total members | Type of meeting | Virtual Observations                |                              |
|---|-------------|---------------|-----------------|-------------------------------------|------------------------------|
|   |             |               |                 | Number of messages and sources      | Duration                     |
| F1 (CBO trained facilitator)<br>1<br>(Antenatal)                  | ANC1        | 10            | Hybrid          | 343 Messages from FBO, F1 & mothers | Nov 2019 – May 2021          |
|   | ANC2        | 6             | Hybrid          | 216 Messages from FBO, F1 & mothers | Nov 2019 – May 2021          |
|   | ANC3        | 3             | Virtual only    | 1 Message from FBO only             | May 2021 (1 day)             |
|   | ANC4        | 6             | Hybrid          | 147 Messages from FBO, F1 & mothers | June 2020 – May 2021         |
|   | ANC5        | 8             | Hybrid          | 368 Messages from FBO, F1 & mothers | Mar 2021 – May 2021          |
|   | ANC6        | 3             | Virtual only    | 2 Messages from FBO & mother        | May 2021 (1 day)             |
|   | ANC7        | 7             | Hybrid          | 264 Messages from FBO, F1 & mothers | Mar 2020 – May 2021          |
|   | ANC8        | 3             | Virtual only    | 1 Message from FBO only             | May 2021 (1 day)             |
|   | ANC9        | 4             | Virtual only    | 15 Messages from FBO & F1 only      | Mar 2021 – May 2021 (6 days) |
| 2<br>(Postnatal<br>0-6 months)                                    | PNC1        | 4             | Hybrid          | 120 Messages from FBO, F1 & mothers | Nov 2019-May 2021            |
|   | PNC2        | 4             | Hybrid          | 6 Messages from FBO only            | May 2021 (4 days)            |
|   | PNC3        | 4             | hybrid          | 231 Messages from FBO & mothers     | May 2021 (4 days)            |
|   | PNC4        | 4             | Virtual only    | 1 Message from FBO only             | May 2021 (1 day)             |
|   | PNC5        | 5             | Virtual only    | 14 Messages from FBO & F1 only      | Mar 2021 – May 2021          |
| F2 (FBO trained facilitator)<br>3<br>(Church group,<br>0-2 years) | CMC         | 4             | Hybrid          | (Closed group)                      | (Closed group)               |
|   | VMC         | 4             | Virtual only    | 123 Messages from F2 & mother       | Oct 2020 – Dec 2020          |
| 4<br>(Virtual group<br>0-2 years)                                 |             |               |                 |                                     |                              |

**Table 2: Themes and concept development**

| Category development    | Final themes     | Overarching concepts | Quotes   |
|-------------------------|------------------|----------------------|--|
| Baby shower             | Baby development | Common interest      | “Hello aunties I’m 6 days old today and I’m excited about life ahead. Thank you for sharing your Mondays with me we miss u.” (ANC1MOM7, Chat logs) |
| Baby birth              |                  |                      |  |
| Birthday wishes         |                  |                      |  |
| Developmental milestone |                  |                      |  |
| Women’s Day             | Mother           |                      |  |
| Mother’s Day            | encouragement    |                      |  |
| Gift vouchers           |                  |                      |  |

from community to community as they strive to foster various types of social connection and cohesion, which may have varying implications for health-related outcomes in resource-constrained communities. Their participation in these communities can act as a buffer against a variety of stressors such as disasters, violence, discrimination, and inequality. Thus, we present the group structure and roles within the intervention.

#### 4.1 Group Structure

The group was organized in three hierarchical layers, with the FBO/CBO at the top. The FBO’s staff, including the facilitator, reports to the organization’s leadership. Mothers mostly interacted with the facilitator directly. Although the FBO has an open-door

policy that allows mothers to interact freely, they were more accustomed to the facilitator. Each layer contributed in its own way to the overall development of the group, but their roles were also intertwined. The success of one layer depends on the success of others. The unique characteristics of the FBO, facilitators, and the mothers are presented below. Each category had its own method of interaction to aid cohesion.

*4.1.1 The FBO.* Within this triad, the FBO served as manager. They oversaw all administrative tasks, such as creating ANC and PNC course materials, training facilitators, organizing logistics and reviewing reports and the organization’s performance. Their direct interaction with the mothers is accomplished through announcements to WhatsApp groups. The FBO shared four types of information with the mothers on the WhatsApp group. Three of them are

announcements because they were mainly generic broadcast messages. The first thereof was promotional in nature, raising awareness of who is eligible to participate, and when and where the next round of group ANC/PNC classes will take place. These were designed to recruit participants from the existing pool of mothers or to leverage previous sessions to snowball other mothers for future cohorts. The second such announcement included scripture-based words of encouragement for mothers. The FBO assigned two of their administrative staff to post content similar to the following message in order to uplift and express care for mothers.

“Morning mommies today, let us remind ourselves of Psalm 127, “Children are a heritage from the Lord.” and treasure, celebrate and invest in these gifts from God. Have a great week!”

(ANC4FBO, Chat logs)

“Dear mommies It has been a long time since we have seen one another, and we may not have met your little ones yet - but we hope you know how special and treasured your little ones are valued by us and so are you! Keep going mommies and we hope you have a great week ahead. Luke 12:7 Why, even the hairs of your head are all numbered. Fear not; you are of more value than many sparrows.” (ANC7FBO, Chat logs)

“Dear mommies! We pray this blessing over you and your little ones. May the Lord bless you all this week, in ways you could never imagine. Numbers 6: 24 – 26 The Lord bless you and keep you; the Lord make his face shine on you and be gracious to you; the Lord turn his face toward you and give you peace.” (PNC2FBO, Chat logs)

The mothers were receptive to such inspirational content because it served as an implicit reminder that someone cares about their well-being, such posts rarely sparked conversations about the subject. “Thank you” and “Amen” were their standard responses. The FBO also showed concern towards the wellbeing of the infants and kept track of their developmental milestones. The FBO used interactive messages to encourage mothers to share pictures or videos of both themselves and their babies, as well as stories about their journeys and the FBO’s ongoing support. These were the messages that elicited the most interaction on the WhatsApp chats. Mothers were ecstatic to share photos and videos of their children, as well as to congratulate other mothers and their children. These types of posts sparked conversations about birthdays, teething, and other developmental milestones. We found that photo sharing facilitated mother-to-mother connection. It also provided a platform for them to share their developmental milestone challenges and successes, as well as create a digital archive. Corroborating Lampe’s et al. [34], suggestions that the primary motivation for sharing these photos appears to be strengthening of existing social ties, they also mentioned similar findings of mothers who shared pictures of their adorable babies on Facebook groups. Finally, the FBO supported the mothers with R250 (about \$17.54) in monthly gift vouchers. As a result, future payment dates would be announced when the payments are due. The facilitator would usually post the following message:

“Some good news: You have each received a gift voucher from our organization.”

(ANC1F1, Chat logs)

These messages ensured that the participants communicated consistently. It also made the mothers feel valued, celebrated, and gave them a sense of belonging. Mothers in the hybrid group almost always contributed to and provided feedback on these ongoing conversations. They also placed a high value on the financial assistance. One of the mothers expressed how helpful the assistance was in providing for her family’s needs. She had the following to say:

“I just used my last blessed R250 voucher this afternoon. I would sincerely like to thank you for the gift voucher provided to us these last 5 months. I am so grateful... always been able to buy all those baby stuffs with the voucher received” (ANC4MOM4, Chat logs)

Her statement supports the impact of gift-giving in developing and maintaining cohesion. Its influence fosters a sense of belonging. The mothers appreciate the FBO’s generosity and tangible support. They show their appreciation and respect by providing positive feedback and being active participants. These gifts made a significant difference to the mothers who participated in the program. Another mother describes her plans and use of the gift voucher as follows:

“Thank you so much for the vouchers. It helped so much with baby food veggies and the essentials baby toiletries too. My last voucher I’m hoping to save to buy ingredients for baby’s birthday cake” (PNC3MOM4, Chat logs)

The availability of such tangible resources assists mothers in negotiating their care roles and responsibilities, as well as in planning ahead. According to Bursleson et al. [12] providing holistic support is empowering for women. Financial planning and small-scale home-based start-ups were also included in the ANC/PNC curriculum, empowering the women to be self-sufficient and support their families’ upkeep. Two of them used these ideas to market their products on social media (e.g. Facebook, Instagram, and WhatsApp Business).

**4.1.2 The Mothers.** For the participants, getting to know each other on a personal level had a significant impact on virtual communications. These findings are contrary to prior studies on self-disclosures and sensitive discussions using throwaway account [1, 2, 5]. Before we present the various dynamics of interactions and how these communications were influenced by the spaces, we begin by describing the general features of the mothers and their digital use prior to the COVID-19 lockdown.

During the observation period, only two participants used laptop computers. The first is a CBO representative who came in on a regular basis to conduct quality checks and appraisals. During her observation, she entered data into her laptop. The other is the FBO representative, who occasionally came with a laptop to play music for specific events such as cooking or baby showers. The phones used by the mothers ranged from shared phones to the most recent Android phone. The state of repair of phones ranged from feature phones held together by elastic band to smartphones with cracked surfaces and pristine models of the most recent smartphones. The

facilitator quickly scans the room at the start of the class and calls or sends messages to check on mothers absent from the class. Some mothers use their phones during class to make calls, send messages, browse the internet, or take pictures of the day's activities. Beyond the class activities, some of the mothers send audio recordings and messages to the facilitator, mostly concerning their struggles at home.

Within the physical space, the mothers also form cliques. Thus, aside from the general group where participants express their views, the smaller cliques, with mostly two to three members, share more intimate stories behind the scenes (i.e., outside the group page). Mothers share more general content on the general group and the more sensitive issues with their inner circles. Some of the generic content shared are photos, videos, birth announcements, developmental milestones, and baby birthdays. The women also engaged in regular check-ins, experience sharing, and reminiscing about what they miss most. They also express a desire to meet in person after lockdown to socialize and meet babies, but this is yet to happen due to restrictions on social gathering. The mothers freely exchanged information about themselves, their children, and their pregnancies on the WhatsApp chat. These communication channels enabled the women to learn from one another and from the FBO, which shared learning resources regularly. One of the interviewees, for example, shared some of what she had learned.

"I learned to plan my birthing, create little playthings to stimulate my baby. Things like what to eat, how to exercise or destress, even how to apply for grant."  
(ANC5MOM2, Interview)

ANC5MOM2 appreciated how different learning approaches impacted her understanding of her mothering role, childcare, and the FTD period as she shared learning experiences. Other mothers also discussed their pregnancies with their cohorts. When mothers are overwhelmed or stressed about their pregnancy, they share their vulnerabilities. One mother's statement exemplifying this is:

"I was in even more pain today than I was two weeks ago, and the baby is ready to come, and my tummy has dropped." I didn't take my bed rest seriously and assumed I could go about my normal routine. I've learnt my lesson. I just wanted to share with you ladies." (VMCMOM2, Chat logs)

Sharing her flaws and mistakes with the mothers increases their self-awareness and accountability. Similarly, it alerts the other women to be cautious through learning from one another's experiences. Their access to the WhatsApp chat group allows for real-time experience sharing and responses. Like VMCMOM2, other mothers also expressed their anxiety weeks leading up to delivery. The following conversation thread exemplifies their feelings.

ANC1MOM3: I'm due next week Saturday but I'm scared this baby won't come because she's so chilled. . . It's getting hard by the minute lol. Guys please pray for me that baby comes before Friday."

ANC1MOM6: "I'm also praying I don't go over my date on Sunday. . . I'm really trying to keep a positive mindset but it's hard."

In a separate chat thread the pregnant women discuss the following.

ANC5MOM5: I will be so excited. . . I'm sitting here counting the days. I just want this baby to come already. Is anyone delivering before the due dates? This one love being inside me.

ANC5MOM4: You must be patient darling

ANC5MOM3: You and I both

ANC5MOM5: It's getting hard by the minute

ANC5MOM5: Seems the 20<sup>th</sup> doesn't want to come

ANC5MOM3: Me too on the 22nd

The waiting period is stressful for expectant mothers. They have limited understanding and knowledge of labor experience and express concern because they get more tired and anxious as the due date approaches. They quickly respond positively when their cohort encourages and shows concern for them. These interactional spaces have become a space for knowledge building, therapy, and a community for sharing of information and experiences both in-person and via WhatsApp. Gui et al. [24] found similar traits in their study with pregnant women, emphasizing how the women shared advice as well as formal and informal knowledge about pregnancy-related topics. Similarly, F2 was regarded by the participants as a mother and source of spiritual support. Formal inquiries were directed to her by the mothers in her cohort, while the informal ones were discussed among the mothers only. The mothers also discussed their parenting stress, anxiety about pregnancy, and challenges with developmental milestones of babies both in-person and via influencing other mothers to also share. The following chat thread depicts some of the worries some mothers expressed:

"Gosh the teething is hectic shame my baby will be 7 months next week and not one tooth. Drooling for days and it aggregated eczema now. Waiting patiently for my poor baby's tooth to show itself." (PNC1MOM3, Chat logs)

"Mine is 9 months still no teeth. But it's so bad, we have teething water pimples" (PNC1MOM1, Chat log)

"Hey ladies missing all of you mine is 8 months now and she has two teeth. She doesn't want to crawl" (PNC1MOM4, Chat logs)

The WhatsApp platform provided the mothers an opportunity to openly discuss their childcare and pregnancy-related frustrations among themselves. These ongoing conversations reassure the mothers that although they themselves are challenged, other mothers experience similar situations. Interacting with mothers who are dealing with similar issues helps the mothers cope. Contrary to our findings, Kumar and Schoenebeck [33] suggest that mothers refrain from sharing seemingly negative content (e.g., crying) about their babies as they enact and receive validation of "good mothering." Suggesting that the benefits of receiving validation from their peers outweigh other concerns.

*4.1.3 The Facilitators.* Like the FBO, the facilitators (F1 and F2) share some generic resources with mothers, ranging from encouraging and empowering words and quotes from scripture to learning resources. More importantly, they developed customized methods of

communication with mothers. Because of this customized approach, the mothers felt valued. As a result, the CBO-trained facilitator (F1) is the first point of contact if a member is experiencing difficulties or has birth announcements. She is regarded as an authority figure (an expert), the group's leader, and the group's grandmother, and as a result, participants are always ready to respond to or follow up on her advice. Mothers in the F2 cohorts, on the other hand, were picky. They talked about marital issues, particularly spousal stress, as well as motherly challenges and responsibilities, with their facilitator (F2). The relationships with the facilitators are mutually beneficial. F1, for example, expresses appreciation to the mothers. This is what she had to say:

“I want to thank each one for your wonderful love and support. I received an award last week. I am very thankful and privileged to have been part of a very special time in your lives.” (ANC1F1, Chat logs)

Her words indicate a strong relationship with the mothers, suggesting a sense of we-ness. The ongoing interactions allow for flexibility based on a sense of trust and mutual support. The facilitator gains recognition from oversight bodies for her efforts towards the well-being of mothers, and the mothers gain support and knowledge about parenting.

## 4.2 Developing Cohesion

At the inception of the intervention the FBO embarked on getting communal spaces for the physical gathering within the communities for ANC/PNC mothers. By incorporating virtual platforms, the FBO expanded the group's existing capabilities with the WhatsApp. Thus, all groups formed prior to the pandemic were hybrid. This opened the possibility of extending support, conversation, and friendship beyond the physical space. Toyama terms this 'technology amplification' – a situation where technology amplifies existing capabilities of society.

Similar to the in-person discussions in the physical space, the WhatsApp conversations allowed for both formal and informal interactions with the FBO, facilitators, and mothers in real-time. We identified three overarching concepts relating to cohesion within the hybrid groups. This includes 1) relationship building, 2) group identity, and 3) trust. We elaborate on this below.

**4.2.1 Relationship Building.** The participants were culturally and racially diverse, a mix of natives and foreigners. Their mothering abilities ranged from experienced with older children to first-time mothers. As a result, it was important to cultivate social connections to facilitate interactions. The 10-week program provided the mothers with a space to bond and learn together. Drawing from their conversations, members have built relationships beyond acquaintances.

“We have come to the end of our class which is so sensitive, meeting new friends, new sisters. It was so beautiful. I think this program must be given to all mothers.” (ANC1MOM7, interview)

Sharing and learning new ways of mothering, infant care, and birth preparedness, as well as practical skills on finance and home management formed the foundation of building relationship and a sense of belonging.

**4.2.2 Group Identity.** Description of the group and its identity highlights how much the mothers value peer interactions. An indication of satisfaction with the care and peer support. The participants felt empowered to be in a supportive environment where they could speak up, listen, and be heard as they shared ideas and discussed their experiences from diverse viewpoints and opinions. This is illustrated in the narrations below.

“My dear remember you are in good hands. Your Flourish sisters are praying for you, and we are looking forward to meeting that big boy. All the best.” (ANC7MOM2, Chat logs)

“Hello family, my twins are here, and they are fine. I thank God” (ANC7MOM5, Chat logs)

Women, mothers, friends, sisters, flourish sisters, and the flourish family are a few of the identities of the participants. Each of these identities is unique to each individual while also serving as a common denominator for all. There was always a common ground for conversation, sharing, and mutual respect as pregnant women or lactating mothers. A place for guided learning and interactions in which the women felt valued and a part of something they could call "theirs." A construction of a sense of we-ness; where the women have cultivated shared experiences over time. As one of the mothers narrates.

“I was very hesitant at first, what can I be taught, this is my fourth pregnancy. (I had that attitude). But I was wrong, I had the most loving, trustworthy host. A woman who makes you feel comfortable, where you feel her motherly love, where you can say antenatal classes feels like home.” (ANC1MOM4, interview)

From the narration of ANC1MOM4, her initial expectations about group ANC/PNC classes were skewed. We find the mediating role of trust underpins her motivation for interaction and communication. She joined out of curiosity, albeit with minimal expectation for relationship building or learning new things beyond what she already knew over the years.

**4.2.3 Trust.** ANC1MOM4 also expressed value for group meetings and friendship, signifying a place of attachment and identity. A basis for community building. More so, her expressions, 'feel comfortable,' 'motherly love,' and 'feels like home' encapsulate a sense of belonging and social trust. These findings corroborate Sherchan et al. , [56] who found a correlation between trust and social interactions. The group fosters community cohesion by building relationships that work towards all members' well-being. Her characterization of home reinforces a secured environment and place of solitude. The extension of such relationships via WhatsApp means that the mothers continue to support and share their joys and challenges. For instance, through birth announcements, birthdays, and their frustrations. The WhatsApp group has become an extended space to reach out for support or give support.

The virtual platform extended the mothers' ability to reach out to their peers and maintain the relationship and trust they had developed over the course of ten weeks. As a result, the mothers kept in touch months after the physical meetings had ended. This woman's comment is an example of this:



“Good morning you beautiful mommies. How are you doing? I still miss you guys.” (ANC5MOM1, Chat Logs)

The mothers had built a trusting relationship, kept in touch and maintained their friendship beyond the lifecycle of the intervention. They continue to check-on each suggesting ways to get to gather in separate conversations.

“When we all given birth, we should have a reunion and a baby play date” (ANC7MOM2, Chat logs)

“Guys we should set a picnic date for winter” (PNC1MOM3, Chat logs)

This demonstrates how, in addition to learning, WhatsApp has evolved into a tool for group bonding and intimate sharing. Their expression embodies appreciation for each other and value for their meetings.

### 4.3 Maintaining Cohesion

We identified two types of interactional spaces during our analysis of the WhatsApp group chats. Eight out of the fifteen, representing 53%, were inactive (fewer than 10 messages in a chat or mostly from FBO and F1 or F2, with minimal or no interactions among mothers; see Table 1). Here participants rarely contributed to ongoing discussions. Participants in these eight (virtual only) chats were predominantly recipients of FBO announcements rather than active participant in the virtual activities. In some cases, participants are hesitant to share since they had no prior relationships with the other members. This is contrary to Ammari [1, 2] and Adanlibi's [5] assertion that using disposable identities allowed parents to interact freely and protect their privacy when discussing sensitive reproductive health issues. In this study we find that the mothers were willing to be actively participates only after they build relationships and trust with their cohorts. Thus, although, the hybrid group and virtual-only group received the same communications from the FBO or facilitator, the members in virtual-only chat groups rarely responded or followed up on any information. On the other hand, the hybrid group were actively engaged in the ongoing conversation. To gain a deeper understanding of the two distinctive traits, we further analyzed the individual context of each chat group. All inactive groups were formed during lockdown.

The findings also identified bandwidth constraints as critical to 'isolation'. Some mothers could not actively participate in group activity on the WhatsApp platform. They sometimes missed discussions on the WhatsApp platform due to insufficient data. Others were using feature phones with no support for WhatsApp. These challenges digitally excluded some participants from active participation in the WhatsApp groups. One of the mothers said the following:

“Hi ladies I didn't have data I will bring salad and chips” (ANC1MOM6, Chat logs)

Another pregnant woman indicated:

“I buy 10-20 rand and it lasts a day or two, when my husband was working but now, I don't think I would be buying that much data because the funding won't be there. We don't have free Internet.” (ANC7MOM3, Interview)

For participants meeting in the physical space, the weekly meeting made up for their lost interaction time. Some of the mothers in the group were unemployed. Hence spending extra money on data to join in the virtual conversations were challenging. During the interview one of the participants explained how she was selective in her use of WhatsApp. She describes her usage:

“Most of the schools have free Wi-Fi I make use of that when I use WhatsApp. . . , when I need to send out messages.” (ANC7MOM4, Interview)

Certain social groups have trouble accessing social media or other online resources due to low income. Hence, they were disadvantaged because access to the internet necessitates ongoing expenditures. Similar to ANC7MOM4's comment, the ladies who cannot connect virtually use the time during the physical session to catch up on what they may have missed. Our findings also indicated that participants had varying experiences, and this impacted their interactions on the virtual or the physical space, such as conflicting commitments [36].

We further examined the data to confirm alignment between interview data and the field observations. Asking the question: 'did their non-verbal cues align with the interview responses?'. We found that participants belonging to the hybrid group were more enthused every time. They valued the shared space and interactions for varying reasons. For instance, for two mothers who were foreigners, this was the only time their spouses would allow them to leave their homes. For others, it is a non-judgmental space for sharing. These observations confirm the interview responses. However, poor connectivity and data issues affected the user experience of some participants in the virtual space. The virtual space required participants to have video live streaming to see and hear others on the call. For some mothers, these meetings were data-intensive and unaffordable.

## 5 DISCUSSIONS

The group dynamics of ANC/PNC mothers who engaged in facilitated peer support in the physical and virtual environment are described in our study. These interactional spaces enabled mothers to receive support, share, and learn from one another. They provided some important insights into the use of closed WhatsApp groups by FBO in bandwidth-constrained communities to foster digital safe spaces for mothers. In addition, this study offers technology design recommendations to encourage active virtual group interactions for mothers and investigates the role small groups can play in reducing isolation through community building.

### 5.1 Supporting Mothers

Mothers need support to reduce the occurrence of isolation as well as preventable pregnancy and childcare-related complications, such as malnutrition and underweight babies. Prior studies have highlighted inadequacies in information for mothers contributing to low self-efficacy and isolation in low-resource communities and those at risk of adverse health outcomes [12, 24, 48] The findings correlate with prior HCI studies that emphasize the unmet information and communication needs of pregnant women and expectant mothers [31, 32, 38]. For example, Burleson et al. [12] through their studies with pregnant African American women in Detroit, explored the

information needs of low-income pregnant women. They found that most pregnant women use social media platforms to find information and support. Similar studies underscore the experiences of stay-at-home-dads (SAHD) in America, who resort to Facebook groups to overcome isolation and judgments they experience in other contexts [3]. According to previous research as well as the current study, social support and adequate information are critical components for reducing isolation. These findings point to the potential value of support interventions which may be especially important for low-income women with limited access to health care.

Similarly, Grady [22] highlights the importance of peer assistant programs in enriching members' knowledge base as they share experiences among themselves. Support intervention (e.g. FBO intervention) provides a space for learning and sharing among mothers. Beyond meeting the need for information and social support, the FBO also provides financial aid to mothers. For instance, ANC4MOM4 appreciated the FBO for giving financial aid. In low resource communities the provision of holistic support (i.e., meeting their informational, material, and emotional needs) helps to set the mothers up for success. Similarly, our findings suggest that when mothers have enough information about the FTD, they are empowered to set their children up for success and ensure their well-being, as echoed by ANC5MOM2. She voiced satisfaction with the support, care, and interactions around pregnancy, health, and parenting education.

During the peak of the COVID-19 pandemic, communication in bandwidth-constrained communities worsened as the need to cultivate cohesion among members of groups remotely became more important. Due to the economic downturn and data cost, maintaining existing groups or forming new ones virtually was problematic. For others, social interactions became stressful; too many groups were set up almost simultaneously, hence many people experienced information overload at some point. Further, attributes such as homeschooling, childcare, working from home, physical and mental health were some of the issues underpinning the seemingly passive interactions in the virtual space. These attributes partially demonstrate why the virtual only groups, experienced a lack of personal connection and minimal commitments.

## 5.2 Digital Safe Spaces

One of the ways we may address issues women in low resource communities face during the first two years of their child's life is by creating remote solutions for them. Kumar et al. [31] emphasizes the need to create safe spaces for like-minded people to allow for 'freedom of expression and learning' among women. Similarly, our findings show that women allowed themselves to be vulnerable because they considered the place or group safe, a non-judgmental space to provide and gain emotional and psychological support. Scheurman et al. [52] advocate for the design of safe spaces for underrepresented groups like trans-people and stay-at-home dads[3]. Ammari and Schoenebeck [3] found that Facebook provided a safe space for stay-at-home dads to ask questions and discuss their parenting vulnerabilities virtually.

Like Younas et al. [68] who argue for designing digital safe spaces for women in a patriarchal context, we suggest that WhatsApp

should be zero-rated [19, 51, 54] in bandwidth-constrained communities for specific information transfer and maternal and child health interactions. Giving mothers free access will ensure a more inclusive intervention. We are aware that this advocacy may cause controversies such as found of Sen et al. [55] who suggest that the free versions of Facebook had limited functionalities, reducing the quality of user experience. Our interview findings indicate that participants were generally satisfied with the intervention and better understood FTD and MCH information. However, we believe that zero-rating WhatsApp without degrading its features or quality of experience will increase its potential as a support system for maternal health in the global south. Our collective responsibility as technology designers and HCI researchers is to ensure we create a safe, secure, interactive, and informative support space for mothers during this sensitive period of their lives.

Being a part of the group gave the mothers a sense of self-identity that they could claim. Within these spaces, women's primary identities are as mothers and women, blurring racial, cultural, educational, and economic identities. Because of their common interests, members felt a sense of belonging. They shared interests in pregnancy, parenting, childcare, friendship, and social connection. Being a group member allows mothers to reimagine themselves by providing learning resources and the knowledge that other women, regardless of differences, are going through similar experiences. Membership in these groups thus empowers and boosts women's self-efficacy.

## 5.3 FBO as Channels of Support

The FBO is a powerful social capital network, positively influencing the community and supporting maternal health in low-resource communities. The FBO studied leverages the resources available in physical and virtual spaces to provide cost-effective support and relationship-centered care for mothers taking a decentralized, bottom-up approach. The group ANC/PNC classes ensure the FBO can reach more women with FTD education and peer support in a facilitated environment. Further, our findings show how the FBO, facilitators, and mothers use WhatsApp and tangible resources to share knowledge and foster cohesiveness within the small groups. Beyond community cohesion, the group antenatal classes eliminate feelings of isolation among mothers as they draw on the collective support of the FBO, facilitators, and other mothers to learn, share experiences, and encourage one another.

Cohesion exists in all groups, albeit to varying degrees. Mothers who participated in the hybrid group sessions prior to the COVID-19 pandemic continued to have strong cohesion characteristics several months after the physical meetings ended. Their interactions increased on the WhatsApp group chats as they drew strength from each other. Unlike the virtual-only most of which were formed during the lockdown, members rarely interacted. This phenomenon was a strange paradox. We expected more engagement, mainly because of the heightened stress during the COVID-19 strict lockdown. We conducted further analysis to help explain the paradox that revealed two main challenges impeded cohesive interactions on the virtual platform. These were technological and behavioral attributes discussed in the following section.

**5.3.1 Behavioral challenges.** In this study we adopt the theory of competing commitment [27] as a lens to interpret seeming inactivity on virtual-only platforms during the unprecedented lockdown. In the lockdown there were clear indications that most mothers were confused and isolated and needed avenues to unburden. Thus, reaching out to them through telephone calls and WhatsApp chats were critical ways to reduce mental strain and uncertainty they were experiencing. At the start of the virtual moms' groups (VMC), we noted an initial commitment by all the mothers to participate and support each other, but as time passed, their commitment dwindled. Similarly, we observed minimal participation in almost all the virtual-only WhatsApp group chats at a time where due to social and physical distancing restrictions, mothers were isolated. This phenomenon was puzzling; how can we explain the failure of the intervention at this time? We infer from Luke's [36] framing that, mothers have several commitments competing for their scarce time, which impedes their productivity in other areas. These unconsciously draw them away from the one they commit to. Commitments such as work-life balance, care, and family responsibilities tend to cloud their judgments about well-being. These findings are confirmed by those of Sultana et al. [58] in India, where the rural women she interviewed described how their health was the least of their priorities, amidst all the chores in their homes. Their responsibilities with regards to traditional caregiving, family, and nurturing still form the basis of their identity as wives and mothers. Thus, the mothers focused on their competing commitments reducing their participation in, and their perceived usefulness of the intervention.

Reemphasizing Schwanda's et al. [53] argument that attaining cohesion within a virtual group can be hard. It takes a deliberate continued effort for group members to actively engage in activities on the virtual platform [14]. As highlighted in prior studies, weak indicators of virtual cohesion were underpinned by minimal engagement in conversational space. Therefore, drawing on the theory of competing commitments [27, 36] we can better explain why attaining virtual cohesion is hard. During our further analysis, we also note that none of the participants left the group, although interactions on the virtual-only WhatsApp groups were rare. By staying, they implicitly showed continued commitment to the group.

**5.3.2 Technological challenges.** Due to prevailing socio-economic inequalities, women are less likely than men to own digital devices (laptops, tablets, or smartphones). For some of our mothers, mobile phones are shared resources within the home [32, 38, 66]. Secondly, the sudden enactment of a lockdown also meant that mothers were overwhelmed with numerous notifications from other groups, causing message overload. Mothers also needed to be prudent with their spending due to the economic uncertainties during this period. They had competing commitments on their data use, between meeting up with other mothers and using the available data to support the distance learning needs of their older children when schools went virtual. Others were worried about their privacy and felt uncomfortable discussing their problems with people they had no relationship with. All these competing commitments on data usage highlight that design and use of social media in bandwidth-constrained communities can amplify existing inequalities in availability of digital resources in low resource settings.

Unlike in Europe and the Western context, where internet access is ubiquitous, developing regions are different. While virtual spaces help to extend the reach of the intervention, especially hard-to-reach areas, consistent internet access is hampered by infrastructural deficiencies, poor connectivity, and high data costs. Physical spaces, on the other hand, provide interactional spaces for strong community building. As a result, post-COVID, it is critical to leverage existing assets to support the design and implementation of hybrid interventions that promote peer engagement in low-income communities. Future work in this area could include developing communication platforms over community wireless networks that take advantage of communal spaces like churches, mosques, community halls, and libraries to disseminate information.

## 6 CONCLUSION

This study gave new insights into how an FBO uses existing assets like physical spaces and WhatsApp chat groups to provide FTD information to mothers and pregnant women. To encourage peer engagement and community cohesion by mothers, the FBO used the group ANC/PNC model. Our findings also suggest the model effectively reduces isolation, enhances the knowledgebase of mothers, and fosters mutual support among participants. Even within small but diverse groups of mothers, physical cohesion appeared to be easier to achieve. Sharing common interests, by itself, is insufficient to forge strong bonds when collaborating on a virtual-only platform. This is especially true when the participants are under-resourced and have limited bandwidth. More so, with COVID-19 still looming, poor mothers continue to be digitally excluded and at risk of worse health outcomes. Consequently, we reiterate the call from HCI scholars [12, 30] to create digital safe spaces to support the activities of mothers in low-resource communities. We advocate for the design of zero-rated closed WhatsApp groups as digital safe spaces for mothers in bandwidth-constrained communities to support maternal health information sharing and peer interactions. Finally, other competing commitments of women such as their mothering roles, marital responsibilities, and career have a significant impact on their virtual interactions. This research has improved understanding of group processes and experiences, which has facilitated cohesion and ICT-enabled interventions in low-income settings. Future research should explore how other non-Christian religious organizations leverage technology to support maternal and child health in similar contexts.

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