Towards Menstrual Mobilities and Period-Positive Ecologies

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This is to certify that the thesis titled *"Towards Menstrual Mobilities and Period-Positive Ecologies"*, being submitted by *Anupriya Tuli* to the Indraprastha Institute of Information Technology Delhi (IIIT-Delhi) for the award of the degree of Doctor of Philosophy, is an original research work carried out by her under the joint supervision of Prof. Pushpendra Singh (IIIT-Delhi, India) and Dr. Neha Kumar (Associate Professor, Georgia Tech, USA). In our opinion, the thesis has reached the standards fulfilling the requirements of the regulations relating to the degree.

The results presented in this thesis have not been submitted in part or whole to any other university or institute for the award of any degree/diploma.

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CANDIDATE'S DECLARATION

The author hereby declares that the work presented in the thesis titled *"Towards Menstrual Mobilities and Period-Positive Ecologies"*, submitted as partial fulfillment for the award of the degree of Doctor of Philosophy to the IIIT-Delhi is an original research work carried out under the joint supervision of Dr. Pushpendra Singh (Professor, Department of Computer Science, IIIT-Delhi, India) and Dr. Neha Kumar (Associate Professor, School of Interactive Computing and Sam Nunn School of International Affairs, Georgia Tech, USA).

The results presented in this thesis have not been submitted in part or whole to any other university or institute for the award of any degree/diploma.

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"If you have come to help me you are wasting your time. But if you have come because your liberation is bound up with mine, then let us work together."

Aboriginal rights activists from Queensland, Australia, 1970s

"I can imagine a world where periods are loved

Where we eagerly anticipate the ideas and inspiration gathered from them

Where we expect the break like a weekend retreat or an annual vacation

Where we talk about them with affection and warmth

Where we set up our to accommodate and world support them

I can imagine a world where it feels so good to bleed"

—Nikki Tajiri—

Dedicated to each of us questioning, pushing, and laboring to dismantle the chains of menstrual taboos in our unique ways and capacities.

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As I reflect on the completion of this thesis, I feel overwhelmed as my heart brims with gratitude for the many who have played a significant role in shaping this transformative journey.

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My advisors' unwavering belief in my potential, even during moments of self-doubt, fueled my determination to overcome obstacles and reach new heights. There were times, specifically in the initial years, when I feared how people would react to my research, given the stigma. I was unsure if I could even collect data on such a sensitive subject. I vividly remember my advisors saying, "Don't overthink. Just do it [data collection]. If anything happens, we will figure it out. We have your back." I would cherish their endless hours where they patiently listened to my fieldwork experiences, where I felt vulnerable, offered comfort, and advised on action points if I ended up in similar situations. I will always be thankful to them for encouraging and supporting me to take up academic service—as a reviewer, student volunteer, conference organizer, and more. These experiences played a crucial role in shaping me into the researcher I am today.

Thank you, Neha and Pushpendra, for always having my back, for tagging along on all my crazy ideas, and for your immense patience in sticking with me during my health struggles. Your mentorship has not only shaped this thesis but has left an indelible mark on my intellectual growth and personal development.

To my thesis committee members, Dr. Amrit Srinivasan and Dr. Grace Eden, I extend my deepest appreciation for their invaluable contributions. Their critical insights and thought-provoking discussions have pushed the boundaries of my research. Their encouragement and regular checking-

this beautiful campus, I cannot move ahead without a special mention of the colorful neighborhood of Harikesh Nagar and its way of celebrating every festival with such enthusiasm. I couldn't have been able to cope with the pressure of this journey without my three furry friends on the campus, our campus dogs, and my unconditional source of love—Foxie, Snow, and Simba. It didn't matter to them at what time I returned to the hostel. They always greet me with the same affection.

While writing this acknowledgment, I am reminded that this journey is not solitary but one woven by the collective tapestry of compassion and generosity. I humbly extend my gratitude to those whose contributions may remain unmentioned in these pages. Each kind word, thoughtful gesture, and selfless act has played an integral role in shaping this journey. From the professors who shared their wisdom in passing to the friends who offered a listening ear, your presence has been a source of inspiration and motivation.

In closing this chapter of my academic pursuit, I am profoundly aware that this thesis is more than a culmination of research; it reflects the countless hands that have lifted me, the numerous hearts that have embraced me, and the countless minds that have shaped me. Completing this work is a testament to the power of human connection, compassion, and resilience. I embark upon the next phase of my journey with profound gratitude, forever changed by the profound impact of each person mentioned here and the countless others whose fingerprints grace this endeavor.

With deepest appreciation, counting my blessings with gratitude in my heart, I extend my heartfelt thanks.

Anupriya Tuli

May, 2023.

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Abstract

Global organizations have long identified and declared women's health, wellbeing, and empowerment as critical development goals with a push on leveraging information communication technology (ICT) to accomplish the same (e.g., Sustainable Development Goal-5). More recently, women's health has been receiving growing attention in the field of Human-Computer Interaction (HCI), with efforts acknowledging the need and value of studying the social impact of women's health issues. Menstrual health has drawn exponential interest in the last decade, with researchers extensively studying mobile application-based tracking practices and ethical concerns around collecting and managing intimate data through such apps. However, most of these studies represent experiences from the Global North. In this dissertation, I extend these ongoing conversations within the HCI community by investigating how technology can play a role in addressing cultural taboos and systemic barriers toward supporting a menstruator's journey.

In India, as in several other countries, menstruation has historically remained a taboo, making it challenging to facilitate conversations around menstrual health and wellbeing, eventually contributing to negative menarche experiences, low self-esteem, and fear of embarrassment among menstruators. I study the broader ecosystem of the urban Indian middle-class population to investigate how menstrual taboo is sustained, menstrual silence is learned, menstrual literacy is cultivated, and how the design of contemporary ICTs can and does support the emergence and operation of these forms of socio-cultural sensemaking and meaning making. Through a series of qualitative and design studies conducted in Delhi, India, this dissertation broadly attempts to unpack avenues for technology design to build intellectual and human infrastructure and support civic and material infrastructure toward nurturing period-positive ecologies. Here, I engaged with the cis-women and prominent stakeholders in their vicinity to study technology engagement for constructing and disseminating menstrual literacy and seeking support for safe menstrual mobilities and hygiene practices. The findings across my studies inform recommendations for designing menstrual intervention within and beyond the realm of technology, centering emancipation from menstrual taboo

toward facilitating open and respectful communication around the subject.

Drawing on feminist perspectives and the capabilities approach, I tease out lessons for taking a long, embodied, and ecological approach to designing menstrual technologies. In the process, I unpack critical tradeoffs around privacy, agency, and advocacy and raise a pressing question around technology adoption—how much must design abide by societal norms to gain adoption and approval, and how far might it push these boundaries? Drawing attention to the severity of the tradeoffs, I offer a set of socio-technical design recommendations for taking a responsible approach to designing menstrual technologies toward carving positive menstrual futures. The findings of this research could be utilized to bolster and provide insightful guidance for policy frameworks that promote inclusive, just, and equitable menstrual futures.

Chapter 1

Introduction

सबसे बड़ा रोग
क्या कहेंगे लोग

The biggest disease we have is,
'What will people say'.
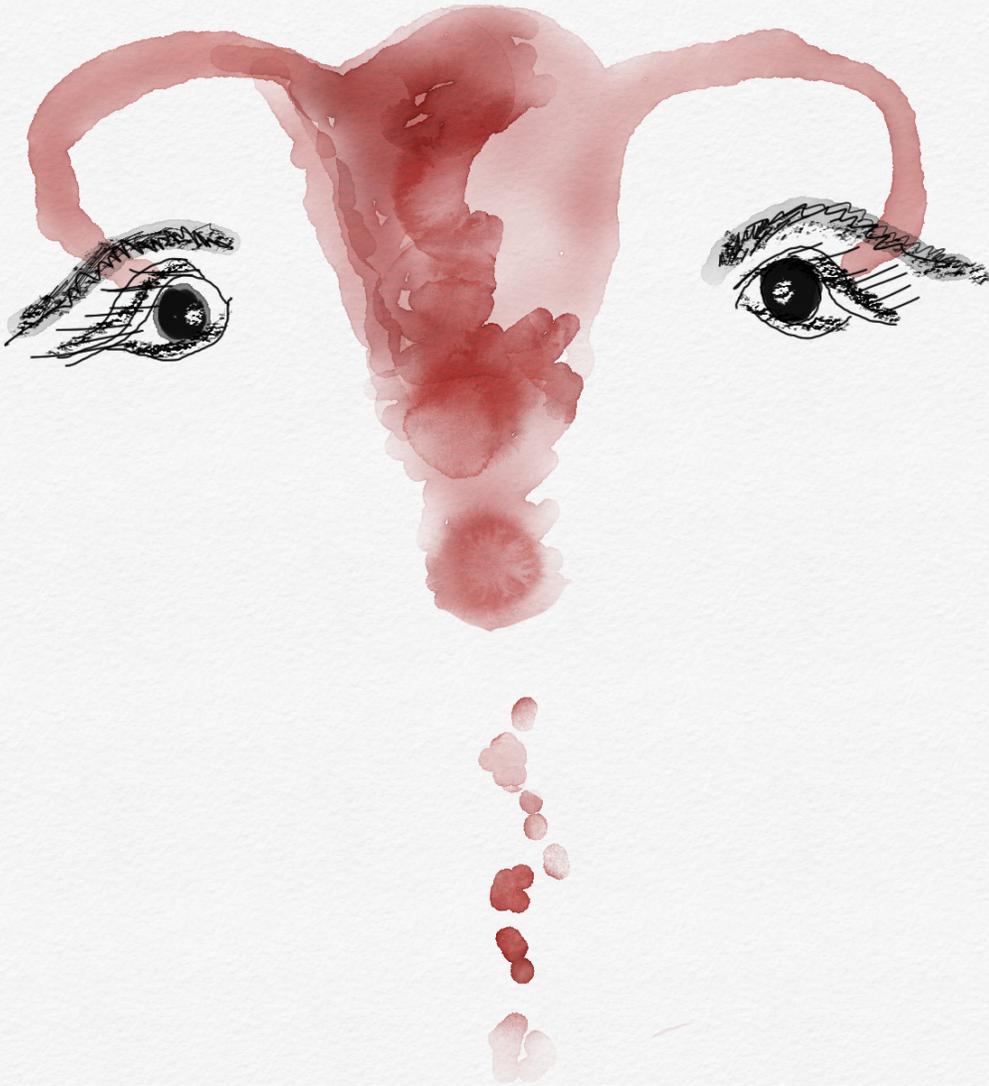
Choose Health
Over Stigma!

Inspiration: #healthoverstigma campaign by HAIYYA

CHAPTER 1

INTRODUCTION

For two decades, global development initiatives have realized women's health, wellbeing, and empowerment as critical factors towards development [219, 190]. Since millennium development goals, now superseded by sustainable development goals (SDGs), we have come a long way (ibid). Still, women are marginalized and face many health problems, specifically reproductive and sexual health issues, rooted in the taboo and stigma associated with their bodies (e.g., [40]). In an attempt to transform the status quo, SDG 5—achieving gender equity and empowering all girls and women—emphasizes ensuring universal access to reproductive health while promoting the use of information communication technology (ICT) to operationalize the same [189].

It is only recently that women's health has been receiving attention in the field of Human-Computer Interaction (HCI) (e.g., [9, 24, 7]), with literature acknowledging the need and value of studying the social impact of women's health issues [9, 144]. The growing domain of women's health in HCI has witnessed researchers investigating technology-based interventions for various issues, including intimate wellbeing [9], maternal health [296], breastfeeding [23], breast cancer [6], pelvic fitness [11], and more. Menstrual health is one such issue that is receiving growing interest from researchers in the Global North, with a majority studying tracking practices (e.g., menstrual tracking [82], fertility tracking [61], menopause tracking [125]), digital trackers [126], and ethical concerns around collecting and managing intimate data through such trackers (e.g., [93, 178]) while unpacking the need for menstrual literacy [84]. However, the majority of these studies are representative of the experiences of menstruators from the Global North. This dissertation research extends the ongoing conversations within the HCI community around developing a deeper understanding of experiencing life as a menstruator and what role technology plays (or could play) in shaping these experiences by presenting a case from India, where menstruation is still a conversational taboo.

1.1 Research Context and Goals

In India, menstruation has long remained a conversational taboo, making it challenging to communicate and disseminate menstrual health education (MHE). With limited to no conversation on the subject, there is a lack of awareness of menstrual health and wellbeing, eventually contributing to negative menarche experiences and mobility constraints for menstruators [198]. In India, like in many countries, the impact of menstrual taboo is visible in statistics on adolescent girls skipping and dropping out of schools due to menstruation [152]. To mitigate the situation, in the year 2014, Prime Minister of India during his Independence Day speech, announced [198]:

> "...I want to make a beginning today itself and that is–all schools in the country should have toilets with separate toilets for girls. Only then our daughters will not be compelled to leave schools midway." —Narendra Modi (Prime Minister of India)

Since then, the Government of India has undertaken multiple initiatives, including adopting National Guidelines on Menstrual Hygiene Management in 2015 [198], and recently drafting a national menstrual hygiene policy, 2023 [203]. These guidelines are directed to *all state, district and local authorities, including schools, communities and families [to] create an environment where menstrual hygiene management is seen as acceptable and normal"* [198]. Despite these efforts, the situation at the grassroots has not improved for menstruators. It is not uncommon for menstruating individuals in India to face mobility constraints and, in exceptional cases, even give evidence of their "purity" (i.e., they are not menstruating) on a given day, either for entering religious premises [192] or educational institutes [256]. The recent cases where adolescent menstruators lost their lives to suicide after experiencing menstrual shame highlight the marginalized treatment routinely received on account of menstrual activity since the formative years [268, 193]. Identifying ways of addressing this systemic, long-standing marginalization of women is the primary motivation underlying our research agenda. Although scholars, practitioners, and policymakers emphasize a dire need for timely education and sensitization on the subject (e.g., [39, 198]), there is a dearth of work discussing the tensions and challenges around communication on the topic. The motiva-

tion to conduct this research comes from the desire to understand how technology design might be shaping the social construction of menstrual taboos and how we can catalyze the technology design to alleviate the tensions and challenges in the design space toward period-positive futures.

Over the past six years, I have been working with the cis-women population and prominent stakeholders in their surroundings to investigate—*how technology can play a role in addressing cultural taboos and systemic barriers toward supporting a menstruator's journey.* Through a series of four qualitative and design studies conducted among India's middle-class population in Delhi, I have studied multiple use cases for menstrual technologies through the research questions presented below. It is important to note that India's middle-class population is expected to form 41% of the national population by 2025 [83].

RQ1: How is menstrual health education imparted in professional (school) and everyday (home and society) settings? How can technology design alleviate the challenges and tensions associated with it?

RQ2: How do individuals seek, construct, and disseminate menstrual health information in online spaces? What are the challenges and opportunities for technology design to facilitate safe-space(s) for user engagement on the subject?

RQ3: How do menstruating individuals practice menstrual hygiene in transit, the factors that shape these choices, and their aspirational public safe spaces for positive period experience? To what extent can existing mobile technologies support menstrual mobility needs?

RQ4: How do menstruators at different points along their menstrual journeys engage in menstrual tracking? What are their experiences with and aspirations of digital menstrual trackers? What avenues do digital menstrual trackers offer to nurture period-positive futures?

Broadly, through this dissertation work, we [1] attempt to unpack how cultural norms and associated

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[1] While my name appears on the cover of this document, its content is a result of collaborative efforts. In recognition of and in reflection upon these collective endeavors, I employ the term "our research" throughout this document. However, when narrating instances where I acted independently, I use the singular form, utilizing "I" or "me." I use the pronoun "we" in instances related to collective decisions and actions.

RQs	Study	Timeline	Methodology	Publication(s)
RQ1	Examining Challenges and Opportunities around MHE in India	Apr. 2017— Mar. 2018	**Methods** Mixed methods study Semi-structured interviews Focus group discussions 55+ hours of qualitative data 391 online survey responses Content analysis **Participants** Young adults, parents, teachers, social workers, and health professionals	Tuli et al., TOCHI 2019
RQ2	Learning from and with Menstrupedia	Sept. 2017—July 2018	**Methods** Mixed methods study Content analysis Think-aloud comic reading sessions Semi-structured interviews 20+ hours of qualitative data Fieldnotes **Participants** Young adults including both male and females	Tuli et al., CSCW 2018
RQ3	Menstrual (Im)Mobilities and Safe Spaces	Feb. 2019—Sept. 2019	**Methods** Qualitative study Content analysis Participatory design activities 35+ hours of qualitative data 139 online survey responses Photographs and fieldnotes **Participants** Adult women menstruators **Field partners** Sachhi Saheli HAIYYA	Tuli et al., CHI 2020
RQ4	Rethinking Menstrual Trackers Towards Period-Positive Ecologies	Aug. 2018—Feb. 2022	**Methods** Mixed method study Multiple surveys 450+ survey responses Review of mobile apps. Cultural probe investigation Narrative interviews 19+ hours of qualitative data Photographs and fieldnotes **Participants** Women menstruators across ages (12 to 65 yrs.) **Field partners** Sachhi Saheli Udayan Care	Tuli et al., CHI 2022

Table 1.1: Timeline and overview of the studies conducted as part of this dissertation work with references to their publications.

taboos shape discourses, prevalent practices and choices related to menstrual health and wellbeing, technology's role in these practices, and the scope for new technologies. Table 1.1 presents the timeline of the work presented in this dissertation. When working on a social problem like ours, it becomes imperative to collaborate with grassroots organizations as they have a deeper understanding of the contextual challenges [19]. Thus, we engaged with grassroots practitioners as co-investigators in our fieldwork, intending to develop "a greater understanding of the setting through engagement in change and production of potential better solutions, iteratively" [118]. Throughout this dissertation journey, we collaborated with multiple not-for-profit organizations including Sachhi Saheli[2] and HAIYYA[3], which work for women's empowerment and sexual health and reproductive rights. Our decision to work with grassroots practitioners aligned with the principles of the action research, which emphasizes *learning through action*, i.e., "research informs practice and practice informs research synergically" [19, 118]. Our collaboration efforts were symbiotic. These organizations offered me an opportunity to participate in grassroots initiatives that informed research questions and experiment designs presented in this thesis, and we shared our learnings with them to shape their efforts, including developing menstrual literacy modules, structuring menstrual awareness workshops, and offering supporting evidence for policy-level discourses at the state level. Before moving ahead, it is critical to acknowledge the role of my positionality in shaping data collection and analysis for this dissertation research.

1.2 Positionality and Reflexivity

Being born and raised in Delhi, India, I have my own set of experiences (positive and negative) around menstrual health education and practicing safe menstrual hygiene as a cis-gender woman. The limited experiences with menstrual health education in my formative years and personal experiences with challenging information delivery and exchange on menstruation shaped my motivation to conduct the research. Having seen women being marginalized repeatedly and on various counts due to a lack of informed-ness and/or social stigma around menstruation, I feel strongly about facil-

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[2]https://sachhisaheli.org/
[3]http://www.haiyya.in/

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itating open and respectful communication around this topic. The initial brainstorming sessions for conceptualizing this dissertation were driven by the individual experiences of the team comprising my advisors and me. Both my advisors are cis-gender, one identifies as a woman and the other as a man, thus bringing emic and etic perspectives to the discussion. We were all born and raised in different parts of India but have had similarly limited experiences with menstrual health education in our formative years. These brainstorming sessions revealed that the social construction of menstruation and the state of silence around menstrual health and wellbeing had remained the same over the last decade. Though the advancement of technology has made information more accessible, still a natural body phenomenon continues to receive taboo treatment. This current treatment led us to explore the factors affecting the discourses of menstrual health and wellbeing while identifying opportunities where technology might be used to encourage and nurture period-positive futures.

Seeking, building, and maintaining collaborations with intermediaries was central to undertaking the fieldwork in the problem space. Through the course of this dissertation, I have worked closely with multiple not-for-profit organizations (NGOs) and practitioners like Sachhi Saheli, HAYYIA, and Menstrupedia [4] to work and contribute at the grassroots level beyond the scope of my dissertation research. For instance, I have closely worked with SachhiSaheli in planning workshop sessions and period fests and designing modules, tools, and artifacts for informing adolescents about menstrual health. Given the menstrual stigma, the fieldwork entailed facilitating hard conversations while navigating gender issues daily and on many levels. As a preparatory measure, in 2019, I underwent training to become a menstrual educator at Sachhi Saheli. Since then, I have conducted multiple menstrual health awareness sessions and workshops and participated in interviews and national-level policy discourses toward the emancipation of the subject. Overall, I approach this dissertation with an emancipatory action research approach and from a feminist standpoint.

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[4]https://www.menstrupedia.com

1.3 Research Contributions, Significance, and Limitations

This dissertation extends and contributes to ongoing conversations at the intersection of women's health, wellbeing, and empowerment, taboo topics, and gender equity in the Human-Computer Interaction (HCI) community. In this work, I investigate and conceptualize technology experiences for seeking menstrual literacy and practicing and supporting menstrual health and wellbeing in a stigma heavy context from Global South. Subsequently, this dissertation offer empirical contributions, where we present a rich socio-cultural understanding of embodied struggles of navigating life as menstruators in a context with deep-rooted menstrual stigma and how these are shaped by prominent stakeholders in the menstruator's vicinity. In doing so, we heavily draw on the principles of feminist HCI [30] and engage with various concepts including that of third space [36, 35], spaces vs places [75], and dignity [196] across our studies. Ultimately, I make a case for the potential of technology design as a catalyst in crafting socially just and equitable societies. The research, situated in India's urban and peri-urban settings, resulted in a set of socio-technical recommendations for designing just, inclusive, and empowering menstrual health interventions—within and outside of the technological realm. My broader claim is that design of menstrual health interventions should be approached taking an embodied, ecological, and long view, only then we can nurture period-positive futures in a heavy stigma context.

While I acknowledge that the study population forms a segment of an expansive but relatively privileged middle class compared to the rest of the country, I would emphasize that even the best-endowed groups in India struggle with a lack of attention to menstrual health (and similarly taboo topics). By addressing their understudied struggles first, we will find ourselves a step closer to addressing the struggles of more vulnerable populations navigating even deeper roots of stigma and where resources are even more constrained and challenging to access. It is also essential to recognize that cultural menstrual practices differ as we move across the geographical boundaries of various states in India. The findings presented in this dissertation are primarily based on extensive data collected from urban and peri-urban areas in Delhi. Therefore, they may only partially

represent the complete spectrum of menstrual practices across different regions, communities, and cultural contexts in India. It is worth noting that this dissertation marks one of the initial attempts to explore technology design for challenging the social construction of menstruation in the Indian context toward nurturing period-positive futures. Consequently, the insights presented here serve as a valuable starting point for approaching the design of menstrual health and wellbeing solutions in other regions of India.

1.4   Thesis Outline and Outcomes

The remainder of the dissertation is structured in the following manner. In Chapter 2, I begin by describing the cultural context of India, focusing on the society's approach to and practices around menstrual health. Here, I offer a detailed description of the deep-rooted menstrual stigma informing the social construction of menstrual phenomenon and menstruating bodies while elaborating on the efforts taken by the practitioners, activists, civil organizations, and the government of India towards disrupting the tabooed approach to the subject. I then present an overview of the HCI scholarship on menstrual health and wellbeing, where researchers have extensively studied technology interaction at different stages of the menstrual journey focusing on information seeking, education, data collection, and more. This chapter sets the stage for the dissertation research presented in this thesis by situating it in the body of HCI literature within the broader themes of women's health, wellbeing, and empowerment.

Chapters 3 to 6 provide details of four fieldworks, including related literature, theoretical framing, methodology, findings, and discussion. In Chapter 3, I present an inquiry into current approaches used to educate adolescents about menstruation, examining the perspectives of young adults, parents, teachers, social workers, and health professionals for identifying design opportunities and potential for impact. Our findings from the content analysis of education and training materials in use, an online survey of 391 adults, 52 interviews, and 2 focus groups indicate that although detailed and descriptive information materials are available for use, there exists a disconnect between parents' and teachers' expectations regarding who will introduce these topics to

adolescents. I also highlight a clear difference in attitudes regarding who must be taught, how, where, and at what stages. Finally, I articulate factors shaping access and receptivity to this knowledge and engage with the lens of feminist HCI to discuss sociotechnical implications for designing menstrual health education initiatives.

In Chapter 4, I then contribute a case study of Menstrupedia, a digital platform designed specifically for an Indian audience. This platform aims to bridge the menstrual literacy gap by imparting menstrual health education via its website and comic. I study the information exchange on its website, the education it aims to provide, and the perceptions of its users. Using a combination of qualitative research methods and engaging a feminist Human-Computer Interaction (HCI) lens, I critically analyze Menstrupedia's affordances and shortcomings. Our learnings informed us about online user engagement and information-seeking practices on a sensitive health topic of menstrual health and wellbeing that shares blurred boundaries with sexual and reproductive health.

In cultural contexts where menstruation is a stigmatized health topic, daily practicing of menstrual hygiene comes with its set of challenges. In Chapter 5, I identified and examined such challenges faced during menstruation in the urban environs of Delhi, India. Through participatory design activities and interviews with 35 participants who identified as menstruating and female, and a survey with 139 responses, I investigate how participants deal with their periods on the go. I also examine participants' conceptualizations of safe spaces where they are able to deal with their period on their terms. Finally, I discuss how menstrual mobilities are being, and might be, supported through technology-based interventions for a third space, targeting the legibility, literacy, and legitimacy of surrounding environments.

In Chapter 6, I investigate the design of digital menstrual trackers toward enabling period-positive ecologies in otherwise stigmatized contexts. I examine menstrual tracking practices across ages (12–65 yrs.) using a combination of methods—3 surveys (450+ responses), a cultural probe (10 adolescents), interviews (16 adults), and a review of (9) mobile applications. Our analysis highlights the diversity across menstrual tracking practices and the role of relationships in influencing these practices throughout the menstrual journey. I also identify menstrual tracking as an

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avenue toward emancipating those who menstruate. Finally, I draw on Martha Nussbaum's central human capabilities to discuss sociotechnical implications for redesigning digital menstrual trackers towards crafting just and period-positive futures.

Finally, in Chapter 7, I synthesize and present integrated learning by building on the empirical findings across Chapters 3–6. I also reflect on the methodological challenges of researching a taboo topic. I conclude this chapter by charting out potential future research directions.

Chapter 2

Background and Related Work

CHAPTER 2

BACKGROUND AND RELATED WORK

In this chapter, I present our study context and situate our research within the HCI literature on women's health and wellbeing.

2.1 Menstruation, Taboo, and India

Discourses on sensitive topics such as menstruation are routinely shaped by locally situated cultural taboos. In India, as in several other countries, the cultural taboos and limiting social norms make it challenging to communicate and teach about menstrual health and wellbeing. Prevalence of limited discourses on the subject, if so, in hushed voice, contributes to negative menarche experiences, low self-esteem, and fear of embarrassment among menstruators [198]. Lack of safe and positive menstrual experiences during early years may cause adolescent menstruators to develop negative association with the phenomenon of menstruation and their bodies [176]. Garg et al., state that such experiences contributes to menstruators "identify[ing] the process of menstruation with embarrassment, stigma, and an undignified recurrent experience until menopause" [103]. In long view, improper menstrual hygiene practices lead to urinary tract infections (UTIs) which might further contribute to conception chances [12, 65]. To mitigate the situation, educational, civic, social, and governmental bodies in India are making efforts to be more progressive, by addressing such practices that are deeply rooted in age-old taboos. I will now elaborate on these efforts before describing the cultural practices and values that heavily shape the experiences of menstruators in our study context.

2.1.1 Efforts to Mitigate the Menstrual Silence

The landscape of efforts to mitigate the silence around menstrual health and wellbeing in India has evolved rapidly. It was in 2011 that the Government of India launched a scheme dedicated to

menstrual health in the form of the Menstrual Hygiene Scheme [201]. This Ministry of Health and Family Welfare (MoHF) scheme focused on creating menstrual health awareness and distributing sanitary napkins to adolescent girls for ₹1 (USD 0.012) per napkin to facilitate easy access to menstrual absorbents in rural India. The scheme was implemented using a community approach where community health workers were the key facilitators, and adolescent girls were the only stakeholders. In 2014, this initiative was supplemented by Rashtriya Kishor Swasthya Karyakram (RKSK) to promote sexual and reproductive health among adolescents "including boys" [202]. Since its conception, the scheme's scope has been expanded from adolescent health to overall wellbeing while focusing on urban and rural settings.

In 2015, the Indian government adopted national guidelines for effective Menstrual Hygiene Management (MHM) [198] under the Swachh Bharat Mission (Clean India Mission) [207]. These guidelines, developed by the Ministry of Drinking Water and Sanitation, provide a framework that suggests integrating civic, material, and information infrastructure at individual, familial, community, and societal levels (see fig. 2.1.1). With a focus on building information infrastructure across genders, the Indian Ministry of Health & Family Welfare, launched the SAATHIYA resource kit in February 2017, which includes a mobile application as part of the RKSK scheme [46]. This application, which uses content prepared in collaboration with the United Nations Population Fund (UNFPA) [100], aims to engage a peer as a mentor to educate all youth about their bodily changes. Extending these efforts, the Delhi government is working to include materials in school curricula towards sensitizing adolescent non-menstruators: "Education Minister said [both] boys and girls needed to be taught about menstruation and puberty" [134].

To ensure proper water, sanitation, and hygiene (WASH) facilities, the Government has recently started taking initiatives and pushing resources for constructing new community toilets with online locators [204]. In 2017, the Government launched *Swachh Bharat Toilet Locator* [1] mobile application to locate public, and community washrooms [72]. Additionally, the Government also launched *Swachhta@PetrolPump* [2] — a dedicated application for collecting feedback on toilets at

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[1]https://play.google.com/store/apps/details?id=in.nic.ihhltoiletlocator
[2]https://play.google.com/store/apps/details?id=com.swachhpetrolpump

Effective Menstrual Hygiene Management

| Access to, Knowledge and Information | Access to safe menstrual absorbents | Water, sanitation and hygiene infrastructure | Access to safe disposal of used menstrual absorbents |

Results in:
• Dignity for adolescent girls and women
• The ability of adolescent girls to stay in school during menstruation

| Societal, community, family and individual awareness | Informed and trained support for girls and women | Supportive policies, guidelines and behaviors |

Figure 2.1: Menstrual Hygiene Management Framework adopted by the Government of India in 2015 under the Swachh Bharat Mission. The framework focuses on civic, material, and information infrastructure at individual, familial, community, and societal levels [198].

the petrol pump across the city. However, the toilet locator only shows the geo-tagged location (not the directions). In contrast, the latter only collects feedback without providing any information. Apart from this, various practitioners have developed versions of similar toilet locator apps available on the Google Play store. Further, in the same year, Google joined the endeavor by agreeing to launch a toilet search feature in its Map application [54]. For the project, Google has adopted an incentive-driven approach where it hired Local Guides (local citizens) to geo-tag the toilets, upload the pictures, write a review, and provide a five-star rating [58]. Currently, Google Maps support 45,000 public toilets across the country [255], including *pink toilets* in Delhi —public restrooms designed explicitly for women and children fully equipped with sanitary napkin vending machines, private child care areas, incinerators, 24/7 lady caretakers, and disabled-friendly facilities [288, 204].

In an effort to supplement the civic infrastructure-building drive, many state-level sanitary napkin distribution initiatives have been adopted to ensure easy access to sanitary products. A few

such schemes are: the Suvidha scheme, Saksham Anganwadi and Poshan 2.0, Asmita Yojana, and Udaan scheme [230]. Sanitary napkin vending machines and incinerators are being promoted under Samagra Shiksha Abhiyan [264]. More recently, efforts are being (re)directed to distribute menstrual cups as an alternative to menstrual napkins to promote a sustainable approach to menstrual hygiene [230]. In 2019, Department of Pharmaceuticals under Ministry of Chemicals and Fertilizers implemented the Pradhan Mantri Bharatiya Janausadhi Pariyojna (PMBJP) to manufacture and provide Oxo-biodegradable sanitary napkins at ₹1 per pad across 8700 Janaushidhi Kendras throughout India [215].

In a more recent effort, the Ministry of Health and Family Welfare has drafted a National Menstrual Hygiene Policy, 2023 to tie all the aforementioned efforts together. This policy takes forward the vision of the National MHM Guidelines 2015 by adopting a life cycle approach to "ensures comprehensive support through the entire menstrual journey, recognizing the unique needs of individuals from menarche to menopause" [203]. The policy is dedicated on taking an inclusive and ecological approach—promoting inclusive language, acknowledging the intersectional challenges of persons with disabilities, and outlining the critical role of research institutes and academic institutions as policy advisors by generating evidence on menstrual hygiene practices, challenges, and interventions. The policy draft emphasizes the importance of adopting *a comprehensive menstrual hygiene communication strategy* to nurture safe and enabling environments for menstruators and *others* in their vicinity "for open discussions and awareness about menstrual hygiene" (ibid).

In addition to government initiatives, a recent rise in menstrual health and wellbeing awareness campaigns by various practitioners has been observed. For instance, Menstrupedia [179] offers a friendly guide on menstruation and its related aspects via an online platform and an educational comic tailored for young girls (9-14 years). Whisper, a sanitary napkin company, launched *'touch the pickle'* campaign to bust period taboos [213]. Various practitioners (such as Sachhisaheli [236], Vikaalp [287], Tarshi [260], among others), self-help groups, and civil body organizations work at grassroots towards spreading awareness on the subject through campaigns, workshops, and the creation and distribution of content. More recently, in 2018, two motion pictures (a Bollywood

movie titled 'Pad Man' [122] and the Oscar-winning documentary 'Period. End of Sentence'
[220]) inspired by the life of Arunachalam Muruganantham—the Pad Man of India were released.
These films played a crucial role in engaging the nation in discourses on the subject. Despite the
progressive initiatives at the policy level, the situation remains the same at the grassroots level,
which I present in the next section.

2.1.2   Menstrual Taboo: Culture and Consequences

There are a variety of beliefs, practices, and rituals that prevail across India, given its cultural and
religious diversity. The onset of menstruation—menarche—is sacredly celebrated as a coming-of-
age ceremony, also referred to as Ritu Kala Samskara [254]. This regionally specific ceremony is
observed in various Indian states, each following its unique customs and traditions. For instance,
in Kerela, it is celebrated as "Thirandukalyanam," in Karnataka as "Half Saree Function," in Tamil
Nadu as "Manjal Neerattu Vizha," in Andhra Pradesh as "Peddamanishi Pandaga," in Odisha it
is known as "Raja Parba," and in Assam as "Tuloni Biya" [42, 254]. All these celebrations have
some underlying notion of impurity and sacredness to menstruation, which are reflected in special
lifestyle changes central to these celebrations across the states, including seclusion, dietary control,
abstaining from sacred activities, and the mandatory purification ritual bath [254]. For instance,
During Assam's Tuloni Biya ceremony, an adolescent girl who has just started menstruating un-
dergoes a period of seclusion lasting 5–7 days. She refrains from interacting with men and avoids
physical contact with others due to cultural beliefs surrounding purity. She abstains from solid
food, nail cutting, and hair combing for the first three days. On the fourth day, she undergoes a
purification ritual involving a bath with gram and turmeric paste. She is then dressed and adorned
in traditional Assamese bridal attire and married to a banana tree. From the fourth to the seventh
day, her diet consists of a single daily meal of boiled rice and lentils cooked by her and consumed
after sunset. On the seventh day, the period of seclusion ends, and women from her family and
neighborhood again give the girl a ritual bath and dress her like a bride. A grand feast is held, and
friends and neighbors offer gifts to the girl as part of the celebration [18, 64, 254].

In a few Indian states, a strong notion of sacredness with menstruation is reflected in dedicated temples, worship rituals, and even the celebration of the menstrual cycle of deities in two to three-day-long festivals. These deities, independent in name and form, are worshipped and celebrated as the mother of the entire universe, thus associating menstruation with the sacred feminine [254]. In Assam, the renowned temple of Goddess Kamakhya (Mother Earth) hosts the Ambubachi festival. During this annual event, the Goddess is believed to undergo menstruation for three days during the monsoon season, leading to the temple's closure to allow her rest [222, 254]. Throughout this period, the naturally formed Yoni in stone, representing the Goddess, is veiled with a red cloth. This cloth is then distributed to devotees when the temple reopens on the fourth day. Likewise, in Karnataka, the Keddasa festival spans three days, during which devotees believe that Mother Earth experiences menstruation akin to women. Consequently, farmers refrain from agricultural activities during this period [254]. In Kerala, the Thriputharattu festival honors Goddess Parvati, who is believed to menstruate for three days (ibid). During this time, the Goddess's sculpture is moved to a separate room and subjected to the same menstrual practices observed by women in the region. Similarly to Ambubachi festival, the Raja festival in Odisha involves the worship of the menstruating Goddess Bhudevi (Earth Goddess) [272, 254]. After three days of rest, the temple priest marks the Goddess's clothing with red color. The sacred water collected from the soaked red clothes is shared among the devotees. Throughout this festival, women are regarded as manifestations of the Goddess, and the celebration revolves around them. Shridhar notes, "these cultures perceive the sacred aspect as complementary rather than contradictory to the impurity aspect [associated with menstruation]" [254]. In his book Menstruation Across Cultures, Shridhar elaborates on this argument by presenting cultural menstrual practices from various Indian communities where at the core "women celebrate menarche, practice monthly periods as austerity and purification, take rest, worship Goddesses and celebrate festivals that glorify menstruation" [254].

It is ironic to observe that religious customs regard the menstrual cloth and fluid of Goddesses as sacred blessings, distributed and consumed as prasad [64]. Meanwhile, within societal norms, bodily fluids and odor during menstruation, and a menstruator's stained clothing is often deemed

impure and dangerous, contributing to the alienation and negative association with menstruating bodies [102]. Literature notes that although menarche is celebrated with grandeur in a few states in India, people there still hesitate to talk about menstruation [64]. In rest of the Indian states, including Delhi, our study context, menstruation has been long associated with impurity, shame of staining, and embarrassment surrounding sexual reproduction [57]. Das highlights that today, specifically in urban Indian settings, people might have slowly begun to question the menstrual taboos but hesitate to celebrate the phenomenon publicly [64]. Consequently, menstruation is one of the primary factors contributing to adolescent girls skipping and dropping out of schools in India, like in many countries [152]. In 2017, a 12-year-old girl in South India committed suicide after she was scolded by her teacher on staining her uniform and bench with menstrual blood [268]. In another incident in 2019, another 12-year-old lost her life to the Gaja cyclone because she was made to sleep in a hut next to her house while she was menstruating [193].

The traditional mobility constraints during menstruation are both metaphorical and literal. For example, menstruating women are barred from entering the kitchen, religious places, washing hair, touching pickles, exercising, eating specific foods, and more [102]. The acutely controversial case of the Sabarimala temple [267, 194, 254]—where women have traditionally not been permitted to enter the temple due to the absence of machinery that can confirm their purity (i.e., that they are not menstruating)—is another manifestation of marginalization on the pretext of menstruating bodies. A similar case of barring entry to an educational institution was reported from a government school in north India, where more than 70 girls were asked to strip naked to find out who was menstruating [256]. In a more recent incident, a male teacher in Maharashtra barred menstruating girls to participate in plantation drive at the school [269]. These instances highlight the marginalized treatment women routinely receive on account of their menstrual activity since their critical, formative years. Unfortunately, such incidents instill a sense of fear within young girls, who associate their period with everything negative. Identifying ways to address this systemic, long-standing marginalization of women is our research agenda's primary motivation.

2.2 Women's Health, Wellbeing, and HCI

A rich and growing body of literature in HCI critically investigates women's health, women's bodily experiences, and women's relationships with their bodies. An initial workshop at CHI 2017 led by Balaam et al. around hacking women's health brought together researchers in this field [24]. Since then, the area has grown to take a broader view of women's health, including taboo topics such as [23, 68, 290], breast cancer [6], pelvic fitness [10], menstruation [82, 141], menopause [160, 28], and more. Recent research has conveyed how HCI must go beyond issues in women's health to also address the social impact these issues may have [9, 144]. This has led to more work being done on a wider array of topics such as intimate care [9, 11, 298], sexual wellness [77, 144], pregnancy loss [14, 15], motherhood [228, 262], mental health [73], and intimate partner violence [98, 99]. Increasingly, we see connections being drawn in HCI literature between women's health topics and the need for a more holistic approach to wellbeing. Kumar et al. stresses on the need of extending the scope of 'women's health' to 'wellbeing' as they highlight the prevalent approach to health, "does not capture the patriarchal societal and organizational structures, which influence how the body is experienced and cared for, and therefore it does not bring these structures into an analytical framework, which can be questioned, critiqued, and worked upon" [7]. There is an ongoing critical discourse around the use to the term "women's health." Keyes et al., argue dropping the term "women" and posit a shift to refer the domain as "marginalised health" [148].

Much of the work at the intersection of women's health is inherently feminist, can often be viewed as having an underlying activist or political agenda [155, 7]. This social justice focus is appropriate, given that women's bodies and concerns have historically been taboo, impacting women's progress in different spheres of life [9, 259]. Several works have employed Bardzell's Feminist HCI framework to identify gaps in current health and wellbeing interventions (*e.g.,* [154, 69, 82]). Others have taken a feminist stance towards the (re)design of technologies for women, such as the breast pump [68] or created feminist spaces for collaboration [129]. However, much HCI research in this space tends to come from or examine WEIRD subjects (western, educated,

industrialized, rich, and democratic) [168] and rarely considers broader systems of oppression and intersections with other identities such as class, race, and more [239, 259, 76, 138, 295, 4]. These are the conversations we seek to advance with this dissertation by presenting the experience of cis-women menstruators from a stigma-heavy context in the Global South. A significant portion of this dissertation research employs and contributes to feminist theory, invariably invoking Feminist HCI principles of pluralism, advocacy, and embodiment, among others [30].

2.3 Menstrual Health, Wellbeing, and HCI

Gendered health and wellbeing have increasingly become topics of interest for HCI researchers in recent years. Menstrual health in particular has been explored extensively through studying the different stages of the menstrual journey, ranging from the early years of menstruation (e.g., [274, 141, 245]) to fertility (e.g., [61, 59, 60]), and menopause (e.g., [161, 28, 56]). Within menstrual health, researchers have explored information-seeking practices (e.g., [278, 94]), intimate data collection (e.g., [93, 82]), education (e.g., [280, 274, 141]), infrastructures (e.g., [96, 95, 279, 91]), product design (e.g., [174]), and menstrual syndromes [55]. Of these wide-ranging aspects, researchers have been actively studying menstrual tracking at different points along the menstrual journey (e.g., [82, 94, 59, 125, 281, 126, 124, 123, 90]). In this section, I present an overview of the HCI literature on Menstrual Health and Wellbeing by structuring it into broader themes of: (i) menstrual transitions, (ii) menstrual literacy, awareness, and sensitization, (iii) material and civic menstrual infrastructures, and (iv) menstrual tracking and intimate data management.

2.3.1 Menstrual Transitions

The HCI researchers have studied different transitions of a menstrual journey—menarche, fertility care, and menopause. Focusing on early menstrual years, researchers have primarily directed their nascent efforts in designing digital interventions in the form of games for prepubescent and adolescent menstruators aimed at bursting myths, creating awareness on menstrual health, and nurturing a safe learning environment (e.g., [141, 165]). For instance, Tran et al. leveraged interactive learn-

ing via an IOT-based model of the uterus to facilitate a safe space for parents to have conversations on the subject with prepubescent menstruators [274]. On a similar line, Rai et al. have shared detailed reflections on how technology design can scaffold information sharing between parents and children while preparing for and during menarche [229]. Taking an embodied approach, Søndergaard et al. explored leveraging—Menarche Bits—a Do-It-Yourself (DIY) kit for adolescents to express, explore, and better understand their embodied experiences [247]. The authors used Menarche Bits as a scaffolding intervention for adolescent menstruators to design wearable technology for their menstruating bodies [245]. I have engaged with this body of literature to draw inspiration for designing non-traditional data collection methods while ensuring I nurture a safe space for my participants (see Chapters 5 and 6).

After menarche, menopause is an important transition in the menstrual journey, where menstruators reconfigure their identities and associate with their bodies. Recent years have seen a growing interest among HCI researchers in studying menopausal experiences. Lazar et al. [160] studied a subreddit forum to understand lived experiences of women with menopause; they found that the social context it occurs in plays a significant role in defining the meaningfulness of bodily experiences. Authors also reported that women experiencing menopause often feel like their bodies are "possessed" and not their own [160]. Bardzell et al. [28] draw from their previous research to produce multiple menopause experience design frames—including concepts for new products, services, and environments— to develop a design theory for women's health. Similarly, Tutia et al. [281], and Trujillo and Buzzi [275] offer insights for designing digital technologies to support phases of menopause by offering self-tracking and educational opportunities. Extending this conversation, Warke proposes to design an "interactive wearable tracking device to help women better navigate their menopausal journey" as a part of their doctoral research [291]. On the contrary, Homewood studied the existing menopause tracking applications and decided against designing another tracker as it "risk resulting in [...] essentializing and medicalizing a non-medical process, and in perpetuating notions of the bodily experience of the menopausal transition as a negative experience" [125]. Homewood illustrates how 'in-action' can lead to knowledge production and

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could be "described as a designer's individual act of protest and even activism" [238]. Extending this conversation, Ciolf Felice et al. explore "how would menopause be experienced in a more feminist future?" Taking a social justice stance, the authors suggest taking embodied approach, i.e., "engaging the body in designing to resist the medicalization of menopause" [56].

In the HCI literature on menstrual technologies, fertility care and period tracking at different points along the menstrual journey have received much attention. For instance, Costa Figueiredo and colleagues have extensively studied the data workflows in fertility care. The authors unpack the user's emotional engagement with their fertility data [60], the role of technology in shaping the fertility data workflows [61, 59], and how the ecologies where the fertility data workflows are situated reflexively influence the fertility data [62]. Given that much HCI research on menstrual health and wellbeing focuses on menstrual and fertility tracking, I further discuss it in detail in section 2.3.4. Despite the strengthening focus on menstruation in the HCI community, enigmatic menstrual syndromes and conditions, including Polycystic Ovarian Disease (PCOD) and endometriosis, remain unexplored. Chopra et al. studied a PCOS-specific subreddit forum to understand the support-seeking, sense-making, and self-experimentation practices [55]. The authors unpack the opportunities, including tracking, self-discovery, and co-management, where technological interventions could support the diverse needs of individuals living with PCOD (ibid). Apart from PCOD, researchers have also explored technology design to support the needs of individuals living with endometriosis. McKillop et al. unpack the potential of self-tracking technologies for endometriosis where it is unclear which data types or parameters are relevant to track the condition [175]. Building on this, Pichon et al. studied the care work–independently and in partnership with medical professionals–when living with endometriosis to understand how technology design could support these care efforts [225].

It is important to note that the general approach to studying menstrual health within the HCI community is to independently focus on the specific transition of a menstrual journey. In this thesis, I posit taking a long view when designing interventions for menstrual health and wellbeing as menstruators have unique menstrual journeys shaped by varied experiences, life goals, and/or

menstrual syndromes/conditions.

2.3.2   Menstrual Literacy, Awareness, and Sensitization

In particular, topics related to menstrual health, hygiene, and education have received increased attention in recent HCI research. Researchers have taken a playful approach to encourage and felicitate conversation on the taboo topic of menstrual and reproductive health. To encourage early discussions between children and parents about menstruation, Tran et al. [274] created an interactive model of the uterus. To impart menstrual health education, Jain et al. [141] created *Help Pinky*, a support-seeking tablet-based game—a close adaptation of *Snakes and Ladders*—for adolescent girls in Assam, India. More recently, Liang et al. designed another tangible multiplayer game, "Menstrual Monster," to engage teenagers across genders in the discourse around menstrual health [165]. This game explores leveraging the modality of sound to arouse curiosity and facilitate participant reflections through "sounds of using menstrual products" (ibid).

Researchers have also explored embodied interaction to facilitate knowledge construction about menstruating bodies. For example, Woytuk et al. designed—Curious Cycles—a collection of objects and interactions to encourage touching bodily fluids like menstrual blood, saliva, and cervical mucus, towards knowledge construction about one's menstruating body while appreciating the changes in undergoes [48]. Similarly, Felice et al. leveraged soma design to speculate the future menopause technologies that promote "engaging the body in designing to resist the medicalization of menopause" [56].

Although these efforts are directed toward dismantling the taboo and bridging the prevalent information gap, there is a dearth of literature offering insights into the factors shaping the lack of conversation on the subject, which contributes to the information gap. Mustafa et al. unpack the impact of religious beliefs on literacy about a menstruating body and how these beliefs shape a menstruator's perception of and relation with their body [187]. Lin et al. have studied how a minimal menstrual education background among the population from regions with prevalent sexual conservatism shapes their menstrual tracking and data-sharing practices. Presenting a case from

the Global South, I contribute to these conversations by highlighting the factors and prominent stakeholders in our study context that contribute to and propagate silence on the subject.

2.3.3 Material and Civic Menstrual Infrastructures

Researchers have also explored the intersection of safe menstrual hygiene practices and supporting public infrastructures, extending conversations around the challenges of combating stigma associated with menstrual hygiene and "management" [27, 95, 174]. The HCI community has explored re-designing sanitary pads as an avenue to facilitate body literacy and body positivity. For example, McDonald et al. explored 3D fabrication technology to design cost-effective sanitary pads that can be customized to ensure inclusivity and reduce the burden on the environment [174]. Mukherjee et al. designed a textile-based smart sanitary napkin sensor to monitor menstrual blood loss volume, which can be used as an early marker for multiple gynecological diseases [185].

Researchers have used speculative design to envision a future with intelligent menstrual infrastructures, including smart sanitary products and smart washroom facilities. Søndergaard and Hansen created PeriodShare, a design fiction where they propose a smart menstrual cup that passively senses, quantifies, and shares menstrual data on a user's social networks [246]. Fox et al. have designed a catalog of future menstrual infrastructures, including smart cups and smart toilet seats, to envision a future with ubiquitous menstrual tracking and data sharing [93]. These speculative designs function as tools for exploring the social, ethical, cultural, and political implications of menstrual technologies.

Some studies have leveraged the affordances of sensing technologies to better support menstrual experiences in shared spaces like public washrooms and offices. Fox and colleagues have undertaken a detailed investigation of public infrastructure to support menstrual mobilities [96, 91]. They leveraged the internet-of-things (IoT) to upgrade basic sanitary vending machines available in public restrooms to empower menstruators with relevant information supporting their transit during the menstrual cycle (ibid). New et al. explored designing office devices and interfaces accommodating the thermal needs and comfort of working women experiencing menopause [191].

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Ng et al. studied the development of a menstrual cup–Formoonsa Cup–in Taiwan and the role of platform technologies in the development and legalization process [195]. Presenting the case of the Formoonsa Cup, the authors unpacked the potential of design to challenge and eventually push unjust social boundaries and bring social change. Through this thesis, I extend these conversations around technology-mediated safe and period-positive spaces by studying the design of toilet locator apps to support menstrual mobilities.

2.3.4 Menstrual Tracking and Intimate Data Management

The HCI community in recent years has seen an increase in the number of studies on menstrual health with a specific focus on exploring various aspects of menstrual tracking. In 2017, Epstein et al. presented an extensive analysis of user engagement with tracking applications across the United States [82]. Since then, researchers have looked at different transitions and tracking needs for the menstrual journey, i.e., menstrual tracking (e.g., [82, 84]), fertility tracking (e.g., [61, 59, 126]), and menopausal tracking (e.g., [281, 125]). The literature highlights various assumptions and biases in the design of menstrual tracking apps, including non-inclusion of sexual and gender minorities, the conflation of menstrual tracking and fertility planning, and non-consideration of women's life transitions—young adulthood, pregnancy, and menopause [82, 92, 84]. Eschler et al. further highlight the limited menstrual literacy support for early menstruators and perimenopausal users [84]. To mitigate these assumptions, it becomes imperative to expand these apps to support menstrual sensemaking practices of users [94, 92, 61]. Researchers also call for critical reflection around collecting and sharing intimate data through digital technologies. Søndergaard and Hansen used the speculative design of a smart menstrual cup to call for critical reflection on the tech-based commercialization of intimacy through quantification and sharing of menstrual data [246]. Fox et al. further posit the possibility of future menstrual tracking technologies leading to new forms of intimate surveillance by systems of power (e.g., family sensing and workplace sensing) [93].

The prevalent tracking technologies designed to support different transitions of the menstrual journey have garnered criticism for perpetuating a dualist understanding of the self, or that the

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mind and body are separable [128]. Recent years have seen critical scholars raising voices against the Cartesian dualism—approach of mind-body dualism, which promotes 'medicalization' of a natural process like menstruation and menopause [125, 127]. For example, scholars have emphasized taking a *period-positive* approach where menstruation is not viewed as a 'problem' [47] or a health symptom that needs to be 'fixed' [125, 128]. Aligning with the third wave of HCI (embracing "experience and meaning-making") [41], critical scholars have proposed a shift in viewing menstrual tracking by prioritizing phenomenological and embodied inquiry [125, 127, 128, 48]. Answering this call, Homewood and colleagues have explored phenomenological approaches to design menstrual and fertility tracking devices using *ambiguity* and non-traditional data visualizations (with colorful ambient light [128] and saliva crystals [126]) to support user's sensemaking practices. However, they observed epistemological tensions while applying their phenomenological commitments into practice. The lack of quantified input and output led to users deeming the designed trackers "inaccurate or obsolete" compared to prevalent trackers that reflect Cartesian dualism. This work calls for a balanced approach to design the use and presentation of scientific knowledge about the body that it "does not have to replicate its Cartesian dualist roots" [128].

Researchers have studied tracking apps for different stages of the menstrual journey independently and through the personal informatics lens. As discussed, this approach focuses on the *quantified self* [164] and views menstrual tracking apps as a tool for knowing one's body (e.g., [125, 82]). Fox et al. posit, "menstruation can be understood as an assemblage—of one's own bodily experiences, the tools one takes up to make sense of them, the actions one might be prompted to partake in as a result of tool use, wider social norms and expectations, and the standards the developers project and reinforce through the protocol of the app" [94]. Thus, a personal informatics approach does not alone account for the role and potential impact of the user's social ecology [45], including the stakeholders who otherwise play a pivotal role in menstrual journey, e.g., parents, partners, siblings, and peers [280, 62]. In recent attempts, researchers have explored designing menstrual and fertility trackers for the *shared space* to initiate conversations on the subject [90, 123, 126]. However, these attempts primarily focus on the menstruator with optional to negligible

involvement of others.

Our research views a menstruating body as evolving and experiencing different transitions throughout the menstrual journey from menarche until menopause. I extend the ongoing discourse by taking a *long* view [155] for studying menstrual tracking practices of menstruators at different points along their menstrual journeys in an urban Indian context (see [280, 278, 279]). Based on engagements with menstruators, I also identify key relationships which play a critical role in shaping an individual's menstrual tracking practices throughout their menstrual journey.

Chapter 3
Silence: The Language of Menstrual Literacy
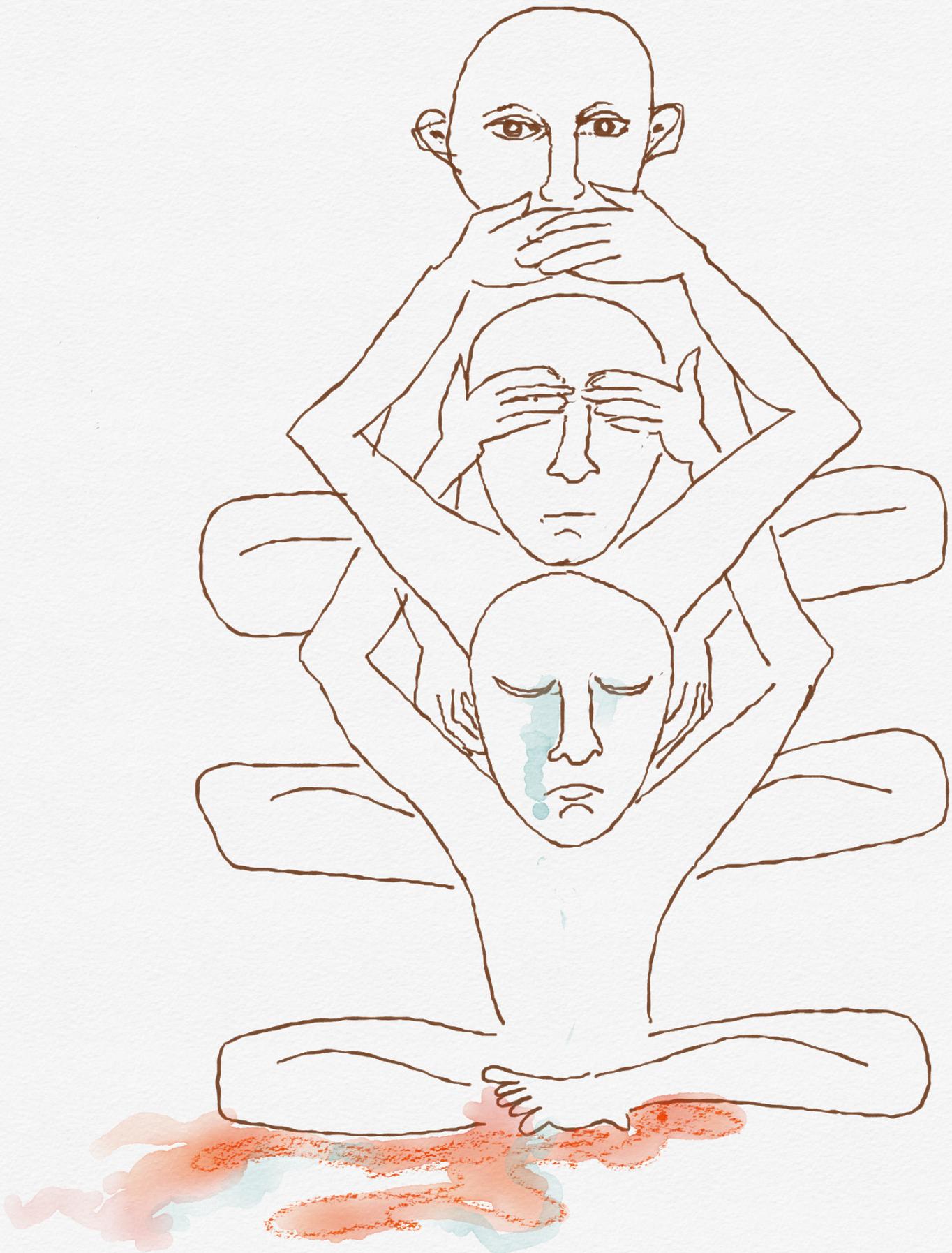
Inspiration: Gandhi's Three Monkeys by Pratigya Beniwal

CHAPTER 3

SILENCE: THE LANGUAGE OF MENSTRUAL LITERACY

Growing up in Delhi, I have had my experiences with cultural taboos and limiting social norms, which prevent open communication on menstrual health and wellbeing from school to home settings. In 2017, the upcoming release of an Indian movie—PadMan—brought the conversations about menstruation to the forefront across the nation [122]. The movie is based on the life of Arunachalam Muruganantham, the man who made sanitary napkins affordable for women. Following this, Social media saw a rise in campaigns challenging the social construction of menstruation and promoting open conversations on the subject. The same year, the Indian Ministry of Health and Family Welfare launched the SAATHIYA mobile application to support education about bodily changes during adolescence [46]. Surrounded by these developments, I started thinking about the potential impact of digitization of menstrual health education (MHE) in India. I began by researching literature and government reports on menstrual health education in India. An extensive amount of reports (e.g., [67, 292]), articles (e.g., [234, 216]), and studies (e.g., [286, 34, 66]) emphasize the dire need for timely education and sensitization of menstrual health to circumvent tabooed treatment of the subject. However, I observed a dearth of work discussing menstrual health education dissemination practices in Indian settings. Identifying design opportunities and potential for technology-mediated dissemination of menstrual literacy entailed understanding *how* adolescents [1] seek and receive menstrual literacy from school to home.

In this chapter, I present results from a qualitative inquiry of current approaches used to educate adolescents about menstruation. I performed a content analysis of the education and training materials in use. I also examined the perspectives of different stakeholders (young adults, parents, teachers, social workers, and health professionals) by conducting an online survey, interviews, and focus groups. I collected data using a combination of research methods—a survey of 391 adults, 52

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[1]WHO define adolescents as 10 to 19 years age group and youth as 15-24 year age group [294].

interviews, and 2 focus groups—to understand how adolescents (in urban India) are introduced to topics of menstrual health education, how they must stitch together fragments of knowledge amid strong social stigmas, and what they feel would have made a positive difference in their initial encounters with menstruation. The findings highlight the heavily gendered nature of this context that determines both provision of and access to relevant information. I emphasize that it is not only the nature—accuracy or accessibility—of the curriculum that matters, although that is the first step. There are critical decisions to be made regarding who must introduce the relevant information, to whom, at what ages, and in what contexts. By identifying potential answers to these questions, I attempt to identify sociotechnical implications for the design of initiatives that might leverage existing behaviors and practices.

Through the findings presented in this chapter, I contribute to the growing body of work in HCI at the intersection of menstrual literacy, awareness, and sensitization (see Chapter 2, section 2.3.2). In what follows, I begin by summarizing related research in HCI on culturally responsive design for communicating taboo topics and working across genders. I then describe the methods I used to understand existing approaches and challenges in addressing MHE. To identify sociotechnical implications for the design of MHE initiatives, we choose to employ Bardzell's feminist HCI framework [30]. Our focus remains on taking an ecological approach to address the challenges of MHE, identifying ways for technology to be leveraged towards creating safe environments for adolescents to learn, across genders, along with peers, utilizing and/or augment already available content. Our larger goal is for this education to be consumed and shared not only to inform those who menstruate but to sensitize non-menstruating sections of society, and to protect against marginalization and discomfort on account of widely prevalent cultural taboos.

3.1 Working with Cultural and Gender Boundaries

To highlight how the findings of this study contribute to HCI literature, I now situate this study in the landscape view of the literature at the time we conducted this work. This section summarizes the research that took a culturally responsive approach to design and the challenges of working

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across genders, followed by a description of the feminist HCI framework [30] as I engage it to analyze the findings.

3.1.1   Culturally Responsive Design

HCI researchers and designers acknowledge the importance of factoring in cultural and local contexts, such as in the way Gulf Arab Muslims interpret and practice the concept of privacy, which is "beyond concerns for safety" and more about "the careful navigation of social media activity so as to preserve respect and modesty" [1]. Another study exemplifies the role of culture on the adoption of *Protibadi*, a digital platform for women to share their sexual harassment experiences in public places [4]. In this study, Ahmed et al. observed that despite the professed need for such an intervention, the culture of shame surrounding sexual harassment in Bangladesh led to comparatively low adoption. The HCI community is working to address communication on similarly sensitive issues, taking into consideration local cultures to combat and work around long-standing stigmas present within communities. For example, instead of aiming to dismantle taboos, Sorcar et al. leveraged local cultural customs to provide comprehensive HIV education to youth in India [248]. They customized materials to accommodate local languages, accents, and appearances, creating a familiar and comfortable environment for the user. They designed TeachAIDS, a software application consisting of a culturally acceptable educational curriculum, which they tested extensively with their target audience to ensure that there was no discomfort in engaging with the materials. Another study from India explored how collaboration and seeking support can generate avenues for conversing about sensitive topics in the hope of decreasing stigma around these conversations by designing a tablet-based game, an adaptation of *Snakes and Ladders* where girls are required to seek support from their community and peers around MHE to succeed [141].

Almeida et al. suggest that, in designing for intimate care and other sensitive topics related to women's health, designers must focus on channeling the experiences and emotions of women [9]. In one such study, the researchers designed an augmented system, Labella [11], that supports body literacy by encouraging women to explore their bodies just as they would have done using a mirror.

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Tran et al. developed a game for engaging parents and children (4-9 years old) on the taboos around menstruation [274]. This game takes the learner through each phase of menstruation by using a prototype of the uterus supported with audio and visual cues. In other recent studies from the Global North, researchers are trying to counter societal taboos related to women's reproductive health by embedding menstrual tracking information into their daily lives using ambient lights [123] and smart mirrors [90]. Given that menstrual health practices (*e.g.*, tracking) may vary across cultures [82], we aim to extend the culturally responsive approaches above to addressing MHE in the Indian context.

3.1.2 HCI across Genders

Despite supporting evidence that there is interest across genders for using interventions designed for and around women's health (e.g., [82, 278]), most research on women's health in HCI views women as the sole stakeholders. Bardzell references Foucault's theory of identity to talk about subjectification [29], explaining that in any situation, individuals are subjected to the practices of the institutions we are part of, as well as our response to that subjectification. There are multiple HCI studies highlighting the use of "stereotypically feminine attributes" in applications designed for managing women's health (e.g., [224, 82]). Epstein et al. point out how the use of gendered icons, colors, and text in menstrual tracking applications generates a notion of being excluded among sexual and gender minorities [82]. Another example is *Menstrupedia's* comic on MHE designed specifically for an Indian audience [179]. The comic uses the backdrop of a middle-class Indian family to showcase the journey of three young adolescent girls as they discover menstruation and MHM practices. With missing male characters, possibly an attempt to be culturally responsive, the comic falls back to treating menstruation as a gender-specific subject [278]. A UNICEF team took note of the negative social experience that adolescent girls faced around menstruation in schools in Indonesia and created an educational comic targeting both girls and boys [151]. Held one way, it gives girls information about periods and how to deal with them; turned upside down, it is a guide for boys on positive ways to interact with their peers who may be experiencing menarche.

Research argues that historically "women's bodies have been conceptualized in relation to a male standard," adding that the discomfort male adults experience due to the topic stems from the fact that they themselves do not experience the phenomenon [89]. Peranovic and Bentley report that although everyone knows that a woman's reproductive capacity necessarily involves menstruation, it may still be perceived as an alien phenomenon by men [223]. Designers have designed a prototype of a Menstruating Machine (MM), which simulates the experience of menstruation [253]. Though MM creates empathy towards people who menstruate, it does not discuss other related aspects like reproduction [27]. There appears to be a dearth of resources that tackle how women's health is addressed across genders. Men express a desire to contribute but may be held back due lack of comfort, often because they have received little education on such topics in their younger years. This seems to be a general consensus among men in many parts of the world, not only in the Global South [223]. Our research also finds that gender impacts MHE practices in India, in addition to proposing opportunities for engaging the non-menstruating gender perspective.

3.1.3 Feminist HCI

Bardzell's introduction of the feminist HCI framework—with its principles of pluralism, participation, ecology, embodiment, advocacy, and self-disclosure—allows HCI research to examine power imbalances, and how these might impact the realms of technology design, adoption, and use [30]. For example, HCI scholarship has employed this framework to shed light on technology interventions such as panic buttons for women's safety [146], mobile media use for maternal health [154], online forums that discuss street harassment [4], among others. We view MHE as an area that has been susceptible to power imbalances, given the differential dissemination of information to male and female adolescents across schools and homes. Thus we chose to engage the feminist HCI framework in our inquiry of MHE in urban India—first to highlight how existing practices uncovered by our study engender missed opportunities for addressing MHE, and then to understand how feminist HCI principles might assist in shaping future interventions. Among these principles, pluralism and participation work together to appropriately inform interventions that recognize and

address different needs across a target user base [30]. The principle of ecology encourages us to think about how technology might be designed to align with the environment in which it is being used [30]. Embodiment allows us to bring bodies into the mix, recognizing both commonalities and differences across such bodies, with gender being one mode of differentiation, while the principle of advocacy focuses on ensuring that technology is progressive and attempts to bring about political emancipation [30]. Finally, the quality of self-disclosure suggests that technology make visible the ways in which it constructs its users, and with what assumptions. We decided to engage with this framework in this study as a guiding lens for deriving sociotechnical implications from our research findings.

3.2   Methodology

The study, approved by the IIIT-Delhi's Institutional Review Boards (IRB), took place in Delhi from May 2017 to August 2017. The goal was to understand how adolescent health topics with a focus on menstruation and menstrual health practices were introduced at homes and in schools. To do this, I used a combination of methods to collect data from materials currently used, parents (mothers and fathers), teachers, accredited social health activists (ASHAs), social workers, and young adults (male and female). I conducted an in-depth survey with male and female respondents; their responses are labeled SM# and SF# respectively. I also conducted semistructured interviews with a set of participants in each stakeholder group; these are labeled IM# and IF# for young male and female adults, IPF# and IPM# for fathers and mothers, IT# for teachers, IH# for health workers, and IS# for social workers. Currently, Indian society by and large assumes and behaves according to gender binaries. Thus, to engage in discourse with participants, I admittedly fell back on their language, which excludes people. I acknowledge that not all the people who menstruate identify as woman/girl, and not all the people who identify as woman/girl experience menstruation. All of the data was analyzed in conjunction and duly corroborated (particularly across surveys and interviews). The data from multiple stakeholders allowed for appropriate triangulation.

3.2.1 Content Analysis

I analyzed the materials used in schools as part of the standard curricula for eighth grade—where the topic of menstruation is introduced—and tenth grade, where it is revisited. I also analyzed materials provided to health workers under different state-supported schemes. I looked at the content prepared by the UNFPA [100] in Hindi for consumption by different state agencies within India. While I also analyzed the curricula devised by recent non-profit initiatives (e.g., Menstrupedia [179], Sachhisaheli [236], Vikalp Design [287], and TARSHI [260]), in this work, we decided to focus on the content used by schools and government organizations that have a mandate to reach adolescents across India. I examined the extent to which these materials imparted MHE—the facets they touched upon (or not), whether they discussed the challenges that parents and teachers had perceived, products to manage hygiene, and more. I conducted semantical content analysis [150] with a focus on word frequency [108, 107] to analyze the materials. The text was open coded before being organized into five broad codes: *"evasion," "physiology," "myths & taboos," "management & hygiene,"* and *"visible body changes."*

3.2.2 Survey

I designed an in-depth survey to understand how adults (also including parents and teachers) across genders receive and disseminate MHE. The survey was created and administered online in English using the Survey Monkey [2] platform. It included 49 questions, with 19 targeting female participants in particular, 14 targeting male participants, 4 targeting parents, and 12 focused on demographics. Some questions were multiple choice, such as questions about the participants' sources of knowledge about menstruation, the suitable age for imparting MHE, etc. Others were more open-ended, such as questions about any restrictions imposed on activities during this period. We sought responses from individuals of Indian origin, residing in India, who were 18 years of age or older, regardless of their gender.

To recruit survey participants, we disseminated the call for participation by sharing it across the

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[2]https://www.surveymonkey.com/

	Adults (250)	**Parents (92)**
Gender	Female (156), Male (94)	Mother (77), Father (15)
Age	Min 18, Max 45, Median 24	Min 26, Max 69, Median 39
Religion	Hindu (164), Muslim (9), Sikh (8), Christian (3), Other (11), Atheist (24), No particular religion (31)	Hindu (66), Muslim (3), Sikh (5), Christian (1), Other (3), Atheist (6), No particular religion (8)
Income (per annum)	Low: <$5K (46), Middle: $5K-$26K (134), High: >$26K (48), No response (22)	Low: <$5K (11), Middle: $5K-$26K (39), High: >$26K (40), No response (2)

Table 3.1: Our online survey received 342 complete responses from 109 participants who identified as males and 233 participants who identified as females. Both, male and female respondents were given different sets of questions, with additional questions posed to parents.

email, WhatsApp, LinkedIn, and Facebook networks of all team members. A note at the beginning of the survey explained the objective of our study and sought informed consent via a button click—*"*By clicking the 'Next' button, you will be giving consent for participation in the study."* All survey participants granted their consent by proceeding to participate in the survey. The survey was designed to collect anonymized responses, i.e., it did not collect any identifying information such as respondent's name, email address, or IP address. However, toward the end of the survey, we decided to include a question to inquire whether the respondent was willing to engage in an additional interview, which could be conducted remotely or in person. If the respondents opted to share their contact information, their survey responses ceased to be anonymous. In these instances, I maintained a separate record of the contact details for interested participants while preserving the anonymity of their responses during data analysis.

The survey received 506 visits, with complete participation from 391 visitors. Due to the sensitive nature of the topic, it is challenging to determine whether the absence of certain data points is associated with the specific values of those data points based solely on the data I have observed. This characteristic aligns with the "Not Missing at Random" (NMAR) pattern [241]. Thus, during analysis, I eliminated 49 (12.5%) incomplete responses using listwise deletion [241, 158] as they followed the NMAR pattern. This left us with 342 complete responses (see Table 1).

For open-ended questions, I coded responses from different stakeholders and conducted the-

matic analysis [43]. Examples of codes included *"misinformation," "no prior information,"* and *"religious practices and beliefs."* I analyzed the remaining questions by calculating percentages and cross-tabulation [150] to view gender-specific percentages for certain questions and how one's experience affects the response. Examples included cross-tabulation of *"When did you first learn about menstruation?"* and *"What was your reaction when you had your first period?"*

3.2.3 Interviews and Focus Groups

I conducted 52 semi-structured interviews and two focus groups (with teachers and social workers); a summary is presented in Table 2. Participants were recruited using a combination of snowball and purposive sampling [169], particularly useful when researchers have limited access into the community of participants. To seek participants, we primarily relied on those who expressed interest through the survey. I also asked these participants if they could suggest someone they knew who might be interested in participating in our study. When necessary, I leveraged the social and professional networks of our team members. I aimed for a balanced sample, ensuring diversity of gender, ages, and cultural backgrounds. I made sure to obtain informed consent from all participants.

The goal of interviews was to understand the diverse perspectives of different stakeholders including fathers, mothers, teachers, health workers, and (male and female) adults. To understand how participants related to the topic of MHE, I started interviews by asking participants what came to mind first when they heard the word *"menstruation"* or *"periods."* Questions I asked focused on unpacking the factors that contributed to the complexity of this topic—for example, *"How is the conversation around menstruation affected by the gender of the people involved in the discussion?"* and *"Is it the relationship or the gender that affects the comfort level in bringing this topic to discussion?"*

All interviews were conducted on phone or in person, and in Hindi or English—depending on the participants' comfort levels. Interviews were transcribed and translated to English, when necessary, for further analysis. I subjected the data to iterative, inductive analysis [43]. I started

	Adults (23)	Parents (11)
Gender	Female (12), Male (11)	Mother (5), Father (6)
Age	Min 19, Max 30, Median 26	Min 33, Max 69, Median 45
Religion	Hindu (3), Muslim (1), Sikh (2), Other (3), No particular religion (2)	Hindu (9), Sikh (2)
Income (per annum)	Low: <$5K (2), Middle: $5K-$26K (17), High: >$26K (3), No response (1)	Low: <$5K (3), Middle: $5K- $26K (4), High: >$26K (3), No response (1)
	Teachers (9)	**Accredited Social Health Activist (ASHAs) (9)**
Gender	Female (8), Male (1)	Female (9)
Experience	<10 yrs (1), 10-20 yrs (2), >20 yrs (6)	<5 yrs (1), 5-10 yrs (6), >10 yrs (2)
	Focus Group 1	**Focus Group 2**
Participants	Science Teachers (8)	Social Workers (10)
Gender	Female (8)	Female (5), Male (5)
Site	Government Girls' School	Non Govt. Organization (NGO) [49]

Table 3.2: I conducted 52 semi-structured (20–30 minutes) interviews with various stakeholders. Additionally, I conducted two focus groups of 30–50 minutes with teachers and social workers.

by reading through our interview transcripts and coded the data line by line. Based on the patterns that emerged through this coding, I formulated clusters such as *"talking about* "periods" *in class"* or *"stigma in family."* I organized frequent brainstorming sessions throughout the data analysis phase with my advisors, Dr. Pushpendra Singh and Dr. Neha Kumar. Additionally, I collaborated with Shruti, a master's student in Human-Computer Interaction at Georgia Tech who was exploring the HCI literature on gendered health and wellbeing. During these brainstorming sessions, we discussed the transcript text and codes, facilitating the development of overarching themes as suggested by Saldaña [237]. These themes ultimately provided the structure for the findings section presented in this chapter.

3.2.4   Study Context

India is a large, culturally diverse country, with a population of above 1.3 billion people belonging to different linguistic, socio-economic, and religious backgrounds. Although our survey targeted a diverse set of respondents, we acknowledge that the language, technology mediums, and out-

reach protocols used afford a limited perspective. For instance, email and social media are not as inclusive as we would like. However, the choice of using an online survey provided us with an opportunity to reach out to a larger audience with the opportunity to participate (share their stories and experiences) within their safe space. The taboo associated with menstruation, as also observed by me during interviews, could have limited our reach especially to the non-menstruating sex. English formed a suitable language choice as for more than 86 million people English is their second language, followed by 39 million people who use English as their third language [135]. Further, our intimate experience with the context shaped our anticipation of people being more comfortable and familiar with English vocabulary for sensitive bodily functions given the associated taboo (as validated later in our findings). Also, a recent study suggests that avid smartphone users in India "frequently engage in English communication proactively and enthusiastically, despite their lack of English fluency" [147]. Our primary target audience was India's middle class population, which is expected to form 41% of the national population by 2025 [83]. We are thus unlikely to learn about perspectives from people less conversant in English, and/or less likely to go online.

Minors were not part of our study either. This was primarily because getting schools' permissions for including them was impossible due to the sensitive nature of the topic of menstruation; schools and parents are resistant to talking about menstruation and menstrual health in general, and were strongly opposed to our engagement with their students/children on these topics. Our best approximation for adolescents, thus, were young adults who had only recently experienced adolescence. We do believe that even in their mid-twenties, they would have a fairly accurate recollection of their introduction to MHE. Furthermore, we verified that school textbooks have not changed their treatment of MHE since 2007 [109].

We received a large number of varied responses immediately after I rolled out the survey. While on the one hand, participants reached out to support our efforts and ask us to share the analysis with them, others were surprised as to why we chose this topic, and some were baffled as to how technology could help. In many instances, people initially showed their willingness to participate but shied away once they were informed about the nature of the survey. This trend was apparent

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also in the survey responses: we received 49 incomplete responses, of which 27% respondents left the demographic sections empty, and 41% of participants left the survey in the section where they were asked to share the experience of their first period (the demographic sections came at the end of the survey to minimally impact the participants' performance [153, 257]).

Even in interviews and focus groups, when the first author, who is a woman, approached a couple for an interview, men always stood up and left the room to grant privacy to the women. When these men were explicitly asked to stay back, they would ask why their responses would be relevant. A few of them also expressed their discomfort in talking about the topic. Our attempts to connect with various reputed private schools were also in vain because most of them did not respond to our emails. Despite the above challenges we encountered in conducting this research at every step, we did end up with a rich—albeit slightly biased—collection of data.

3.2.5 Reflexivity

I acknowledge that collectively, our team members' identities shape the collection, presentation, and discussion of the data presented in this chapter. I am a cisgender woman born, raised, and schooled in Delhi, responsible for all the fieldwork and data collection. Witnessing my mother, a biology teacher for grades 6-10, navigate challenges in discussing menstruation due to societal stigma, and learning about menstruation from my peers has shaped my perspective. The rest of the team, comprising two cis-women and one cis-man, were also born, raised, and received schooling in different parts of India and had limited experiences with menstrual health education in their formative years. Data analysis was primarily led by me in conjunction with frequent brainstorming sessions with all the team members.

Our initial brainstorming sessions for conceptualizing the study were driven by our experiences and revealed that the state of menstrual education in professional and non-professional settings has stayed the same over the last decade. Though the advancement of technology has made information more accessible, a natural body phenomenon still receives taboo treatment. Our collective background in conducting HCI research to support health and education in underserved communities

motivated us to explore opportunities for technology to facilitate communication on this subject.

Witnessing women being marginalized repeatedly and on various counts due to a lack of informed-ness or social stigma around menstruation and our shared commitment toward facilitating open and respectful communication around this topic has influenced our data analysis and presentation. This study represents the beginning of a longer research engagement in addressing taboo topics around women's health using technology-based learning.

3.3   Findings

The findings are organized into three sections. First, I discuss how MHE currently reaches adolescents, focusing on the *delivery*. I then unpack the challenges that impact *receptivity* to MHE, such as causes for social stigma. The last section lays out the suggestions that emerged in the data, as participants keenly expressed approaches that could be used in *response*.

3.3.1   Current Means of Introduction & Challenges

The findings from this mixed-methods inquiry demonstrate that adolescents encounter information as well as myths about menstruation and menstrual health in various contexts and through various initiatives. Below, I describe how this information is delivered by schools, at home, through peers, and on account of government initiatives.

Classrooms

The Central Board of Secondary Education (CBSE) decides the curriculum to be used by a majority of schools in Delhi, including all the schools represented in this study. My analysis of CBSE textbooks revealed that the topic of menstruation is introduced in the eighth grade (to 13 year-olds) in a chapter titled *"Reaching the Age of Adolescence"* that attempts to explain bodily changes that occur during adolescence. In this chapter, the menstruation process is described—from menarche to menopause—in one paragraph of 241 words. Topics such as personal hygiene, myths, taboos, and adolescent pregnancy are covered in 2-3 lines without any detail. The book uses increase in

height during adolescence as the main example to highlight the bodily changes that occur during puberty. In fact, the word *"menstruation"* occurs 8 times through the chapter, while the word *"height"* occurs 24 times. In tenth grade, when students are typically 15 years old, the topic is revisited in a chapter titled *"How do Organisms Reproduce?"* This chapter explains the physiology of menstruation in 97 words, excluding any information on its management and hygiene aspects. Both chapters present diagrams of the male and female reproductive system. No visual representations of menstruation are offered.

Despite the above coverage of menstruation in the curriculum, approximately 46% of the survey participants mentioned that they were not taught about it. This finding aligned with our interviews, in which multiple participants mentioned that these chapters were skipped altogether. According to one male interview respondent:

> "In our education system this chapter (reproduction) is usually dodged out. Teachers used to say you have to read it yourself and prepare it by yourself. They tell you in abstract manner. This chapter was not discussed, not fluently, not even clearly." (IM9)

This appeared to be the case with teachers across genders; female teachers were not necessarily more comfortable, it was told: *"she kind of skipped it, she was not comfortable. She taught it for only 10-15 mins and then skipped it"* (IM6). In addition, even though this syllabus was meant to be imparted across genders, only 19% of our survey participants from co-educational institutions mentioned that it was covered in a common classroom session. Interview and survey findings both indicated that the behavior of boys was *"giggly"* or *"weird"*, while the girls *"felt shy"* in asking questions. As a female interview participant (IW8) mentioned, *"girls were listening, and as usual boys, I don't know, there was kind of making fun of or they were enjoying...I was feeling little shy even after having a query I did not ask them to my teacher"* (sic). This *"non-serious"* behavior from the non-menstruating sex is frequently the reason why separate sessions are organized for boys and girls, or why the lesson is skipped entirely. As a male interview participant (IM2) shared, *"I got to know that in the class adjacent to us the chapter was skipped completely because the boys were just making too much fun."* It was noted, however, that the feeling of shyness persists among

girls even in girls-only sessions. While sharing her experience of conducting girls-only sessions, a health worker (IH2) said, *"they do not ask questions openly, girls feel shy because of the topic being discussed. We are not able to discuss in depth as girls feel shy."*

Beyond the sensitivity of the topic, the language and the vocabulary used can also pose a problem. Sharing their experience, teachers mentioned that Hindi words used for the given subject sounded *"embarrassing,"* leaving them no choice but to use English words in Hindi sentences:

> "Especially one problem which I have seen is the language issue. In Hindi, even NCERT books have used such terminology which people are not comfortable with. . . half of the time the moment we utter those words the class goes somewhere else." (IT3)

In sum, not only are the educational materials not adequate for imparting MHE to adolescent students, it is challenging for teachers to overcome the stigma around such conversations in the classroom. Female students continue to feel shy, while the male students' display of "non-serious" behavior makes others uneasy. Navigating between Hindi and English is also a challenge; communication is hard in both.

Workshops

Various Non Governmental Organizations (NGOs) (e.g., Naz Foundation [276] and Sacchi Saheli [236]) and companies producing menstrual products (e.g., Whisper) regularly conduct workshops at schools. However, these are organized in *ad hoc* fashion and their format varies from one context to another, depending on the location of the school, among other factors. Even when these workshops are conducted, they are typically only for girls, as our interviews and survey conveyed. More than 50% participants of those who mentioned that they were taught about menstrual health said that it was through a workshop organized for girls only, 13% mentioned that separate sessions were organized for girls and boys, and only 5% stated that the session was open to everyone. Interviews with teachers also reflected this pattern. For example, IT1 shared: *"when Whisper visits the campus, we call girls and their parents also. So the session is conducted together for both parents and students in a common hall. No we don't call fathers, we only call the mothers."* Most

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such workshop initiatives are limited to urban areas, while the government initiatives—through health workers—focus on reaching rural areas. The gender divide is even more prominent in rural areas; almost all health workers I interviewed indicated that they address only girls during their monthly meetings and school visits, *"we visit anganwari for meetings, we only teach girls, and we do not give any information to boys"* (IH7).

Government Initiatives

Outside of the formal education system, the state has launched two outreach schemes for adolescents: Kishori Shakti Yojana (KSY) [214] and SAATHIYA [46], which I described in the Related Work (see Chapter 2). As we learned, however, there are challenges in delivering such content. The KSY scheme primarily targets girls only government schools, which are typically attended by those from less-privileged backgrounds. A good number of these are in rural/semi-urban areas, where frontline health workers are the main vehicles of delivery. Currently, India employs more than 950,000 frontline health workers, known as Accredited Social Health Activists (ASHAs) [200]. ASHAs are involved in a variety of public health schemes across India (ibid). These workers are already considered over-burdened and under-trained [22, 81, 172]. Irregular training results in poor counseling/communication skills as well as limited mastery over the content they are expected to deliver. This inadequate training is a well-recognized problem and several solutions have been suggested by the research community to address this (e.g., [297]). In my interactions with health workers, they mentioned that while they are told about the task in detail—to discuss adolescent changes—they are not given any additional support or training on how to deliver this information. Moreover, no other teaching aids are made available to them apart from the content:

> "We had this scheme for adolescents where one girl and one boy was selected and they received training from the doctors. Then they were asked to sit with their peer maybe at home or any place comfortable and spread awareness among them. But they did not do it after coming back to home as they felt shy. Girls did conduct sessions but boys did not pursue it." (IH8)

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The SAATHIYA app proposed by Indian government [46] has its own challenges. It is currently only available for the Android platform and the content is only in Hindi, which excludes non-Hindi speaking populations, approximately 60% of all Indians [206]. It was observed that people prefer to use English words for sensitive body parts and menstruation to avoid embarrassment, which might affect the adoption of the application.

At a higher level, it was found that three different ministries—Human Resource Development, Health & Family Welfare, Woman and Child—are involved in creating content for MHE. However, there is little evidence of collaboration among them.

Family

We reached out to parents to understand their approaches to explaining menstrual health and hygiene to their male and female offspring. A majority of fathers (4/6 survey responses) on being asked whether they would explain (or have explained) menstruation to their daughters, answered that it was their wife's responsibility. Survey results showed that for 131 (55.98%) female respondents, their mothers/sisters were the primary sources of MHE, out of which 71 (54.19%) were informed before menarche whereas 60 (45.80%) received information only upon experiencing their first period. Fathers/brothers were the source of information for only 2% of male and female respondents, making them the least popular choice. The following quote by a father reflects the unspoken rule practiced by a large number of Indian families: *"It is a mother's job to educate her daughter about this topic"* (SM43).

The survey results highlighted that mothers rarely used aids such as books or videos; they relied on open conversations and verbal explanations when giving information about menstruation, its management, and related hygiene practices. This mode of oral transfer also ensures that the knowledge passed on to adolescents is what their mothers experienced, which may not necessarily be the most up to date scientific knowledge. This transfer of knowledge also explains the transfer of taboos from one generation to another.

When it came to informing sons, most parents used the shield of culture and ubiquitous access

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to information to defend the lack of initiative on their part. One of the mothers shared:

> "So even till now India's culture is not that advanced where we take initiative and talk
> about such topics openly… we have internet, and kids themselves explore it, there is
> no eager need to talk about these things" (sic). (IPF2)

The popular primary sources of information for our male respondents were male friends (23.85%), books (18.35%), teachers (13.76%), TV commercials (9.17%) and the internet (7.34%). Unlike their female counterparts, they found their sources of information outside their homes. Here, a shift in attitudes across generations was observed. Only 5 of 109 (4.5%) male respondents mentioned mothers as their primary/first sources of information for themselves, indicative of attitudes and practices from the time when they were adolescents. However, 42 of 77 (55%) mothers (31-56 years old) have either already discussed or were willing to discuss MHE with their sons. This data highlights the transition that Indian society is undergoing, where younger mothers are willing to take the first step in imparting MHE to their male and female offspring. There were also a number of parents who were unwilling to initiate discussion with their child of the opposite sex, but were willing to answer questions when approached. For example, one of the fathers I interviewed expressed, *"No, I have not taken any sort of such initiative… with time the thinking is changing so if my daughter approaches me then yes I would talk to her"* (IPF4). In sum, although certain parents may be more forthcoming than others, when it comes to imparting MHE to their children (sons or daughters), there was an overall willingness to assist in the process. This indicates potential that health interventions might explore, by involving parents in the process of MHE while also respecting their boundaries for comfort.

Peers and Media

> *"India is still a very conservative society, people don't really talk about it, especially
> your family/parents are never going to talk about it especially to guys, but with friends,
> with the internet and some older friends you get to know about it" —Participant (IM2)*
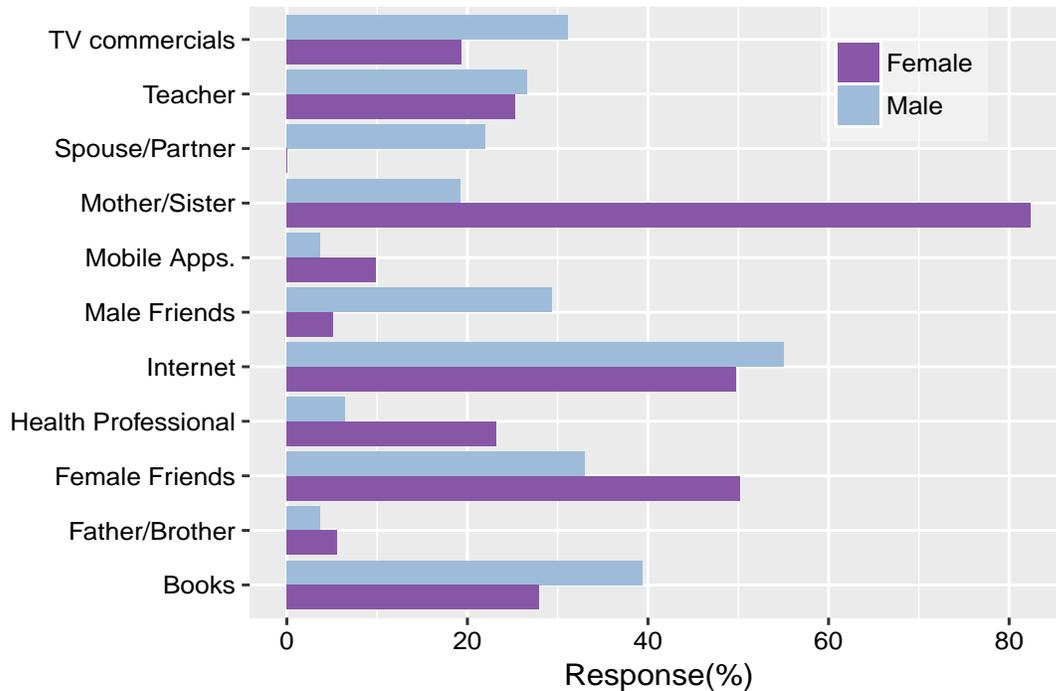
Figure 3.1: Survey data: Prevalent sources of information across the genders. It can be seen that male respondents depend on media (internet & books) and peers for information, whereas female respondents show primary rely on their mothers followed by peers and the Internet.

In a situation where menstruation is barely talked about and if so, only in hushed voices, it is the peers and the media who present the role of confidant for curious adolescents. Our male participants indicated a reliance on friends and media for their knowledge, making them vulnerable to half-baked information (see Fig. 1). One male interviewee reflected on the potential impact a peer can have in such situations:

> "But peers will give you knowledge when they have knowledge. They can play role on both the sides, if they have half knowledge they can corrupt your knowledge. . . and the source also matters. For example, if my peer tells me to go and Google it, at Google only I can show you 10 references which are in favor of it and then references which are against it. So what is the credibility?" (IM10)

It was observed that female participants felt more or equally comfortable in discussing menstruation with their female friends as with their mothers/sisters/daughters. Also, for 48 (21%)

female respondents, their female friends were their primary source of information: *"I was told about this by my friends only . . . schools were not imparting this knowledge, neither the parents were telling"* (IW9). While more female participants felt comfortable in discussing menstruation with their male friends, the reverse was not necessarily true. In the survey, 103 (44%) female participants mentioned being comfortable with friends across genders. However, only 36 (33%) males mentioned a female friend among their information sources. As a male interview participant shared, *"maybe I will wait for her (my girlfriend) to talk about it with me . . . what would she think of me if I talk about it?"* (IM6).

3.3.2   Stigma Prevents Communication, Provokes Guesswork

> *"We went to competition and the judge who was actually female gave comment, why do you hit such sensitive topic [menstrual health] that too in a street play which is a public thing, this is not something to discuss in public"* —Participant (IM11)

As the above quote from a male interviewee indicates, menstruation and related topics are considered "sensitive" and the stigma surrounding them prevents information from being shared and understood. A large percentage of female respondents (100/233) mentioned using secret words to refer to menstruation: *"I keep my volume down while talking about my periods. May be that's why periods are also called being 'down' :P"* (SW4). Some of the common terms that female participants used are "down", "aunty", "chums", "that time of the month", and "date." Male respondents indicated that they, too, were more familiar with these terms than with scientific nomenclature: *"I first got to know it by the name of periods only. I didn't know the word menstruation at all. . . I knew it by periods because of these ads from whisper and other sanitary napkins"* (IM2).

Approximately one-third of our female respondents shared that, within their families, they were not told about menstruation until menarche. This was also reflected in the survey where (61%) female respondents conveyed that confusion was the dominant emotion they experienced, as compared to those who had prior knowledge (19%). Survey responses by approximately 32% female respondents also revealed how misinformed they were when they had their first period:

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"I was in school wearing a white uniform... so I thought it must stick somthing on my skirt from my bench like red colour chatani (sauce) or poster color." (SW150)

"I thought I was sick from some big terminal disease!" (SW91)

"The thought was Am I pregnant and a baby had died inside me that is why i m bleeding... That was too scary..??" (sic) (SW208)

The stigma associated with menstruation has more serious consequences when it comes to school settings. In schools, where the mandate is to teach all students, regardless of gender, the stigma often leads to gender segregation and delivering content primarily to female adolescents: *"the teacher asked all the guys to move out because she wanted to discuss something with the girls"* (IW9). The teachers also shared how they tended to avoid the discussion depending on the class' response: *"so we generally decide to skip over that information and try to make it more scientific or leave it all together depending upon whomsoever and how much people are comfortable"* (IT3). In rural areas where this stigma is typically more prevalent, the health workers expressed stronger emotions: *"when we conduct meetings in school, there we invite girls studying in class 8-10. It's girls only session. We cannot teach this topic to girls in front of boys"* (IH9).

Discussion of menstruation with young kids is also considered taboo. It is introduced to students in eighth grade, although 57% of our participants indicated that they had hit menarche before eighth grade. Naturally, this is problematic, because a sizable percentage of female adolescents are uninformed when they hit menarche: *"I think generally girls start their periods with in 6th class, I got my period when I was in 7th class, so if I would knew about it before hand then the first one and a half day which were torturous for me as I felt that I am having some kind of severe problem could have been avoided"* (IW6). This was also evident in our survey responses as 34% of our female respondents had no prior knowledge about menstruation at the time of menarche, which caused them "confusion" (61%), "fear" (43%), "shock" (27%), "stress" (24%), and "sadness" (18%).

Though many of our respondents recognized that they were ill-informed, they were also in a state of acceptance around how things were. Cultural practices were acknowledged (e.g. menstruators are not supposed to enter the kitchen or go to the temple), but not fully understood. Participants

also did not express curiosity about these issues. The limited exposure that is received does not sufficiently explain the various facets of menstrual health. For example, only 34% female respondents were familiar with all available menstrual hygiene products, such as disposable/reusable pads, tampons, and menstrual cups. Prior research on menstrual health tracking behavior also cautions that its findings may not extend to audiences outside of the US [82]. Indeed, I observed differences in how our participants tracked menstrual health; only 30% track their periods regularly—using mobile apps or paper—while others either rely on their memory or do not track.

Female participants described the activities they tended to avoid during their periods. Some activities involving physical strain were avoided solely to reduce the pain felt due to the period, while other activities, like avoiding certain foods as well as places of worship, were imposed on them by others. Some respondents appeared to have adopted cultural restrictions without thinking, since that is all they had ever known. When males were asked if they were aware of these restrictions on menstruator's mobilities, a large number of our male respondents replied in the negative.

3.3.3 Proposed Mechanisms for Introduction: Stakeholders' Perspective

Our diverse participants had recommendations to offer with regards to how MHE could and should be imparted. I summarize the responses we received to the questions regarding who must be informed, by whom, when, and how.

Who must be informed?

I gathered multiple inputs, particularly from parents, on how information should be imparted to adolescents. Almost all respondents agreed that it was crucial to provide MHE to all genders. While some voiced a clear preference for the menstruating individuals to receive this education, others felt that the information given to the menstruating and non-menstruating individuals should differ, with explicit focus on menstrual hygiene and management for adolescent females, and an additional focus on sensitizing adolescent males. In the focus group I conducted with social workers, everyone concurred: *"there should be an addition like gender sensitization should be a part*

for males" (sic) (IN4). Participants considered it valuable for the male population to understand menstruation and its associated effects on the female population. Approximately 65% of male respondents, including fathers, agreed to the importance of awareness among males about the topic:

> "Surprising how our society has evolved and something natural has been kept so much hidden from half the population. . . [a lot of] men until their marriage do not know about it, which is really sad. So I think this education is really essential." (IM11)

> "We live in a co-ed society, men and women are dependent on each other. So if half the population of the planet doesn't know about the major part of the other half then it is kind of ignorant, I mean how would it work? Like, if men don't even understand what their other half go through every month of their life, half their life, so that won't work. I think men should have proper knowledge about this topic." (IM7)

The data shows that majority of our female respondents (90%), including mothers, felt strongly about the importance for men to understand issues around menstruation and menstrual health. This was also reflected in a quote by a female interviewee:

> "Actually I was in school and around in class 9th I had my first period. So I got a stain on my school uniform. . . I observed few boys laughing and making fun of that thing. So that was very embarrassing for me. I believe that if they would have been well educated about this, then they would have not reacted in this way." (IW8)

A recurring sentiment regarding familiarizing sons with the subject was to sensitize them to the experience that their mothers, sisters, and wives go through.

Who should inform?

Our survey results showed that mothers considered themselves the most appropriate and fathers/brothers as the most inappropriate to introduce and teach the concept of menstruation to female adolescents. One of the fathers expressed, *"we discuss, I and my wife discuss about it (explaining menstruation). . . she is of the view that she should talk about this to our daughter"* (IPF3). On being asked

about the most appropriate educator for male adolescents, the majority of men, including fathers, preferred health professionals (67%), followed by teachers (50%), and then mothers (27%). Female participants voted mothers (70%) to be the most appropriate person to introduce the phenomenon to adolescent females, followed by health professionals (46%), and teachers (38%). This conveys the preferred approach of preparing prepubescent females to face puberty where a mother serves as the primary source of MHE, followed by the more formal education system. It also conveys the minimalistic role that fathers are expected to play.

When should they be informed?

The average age for females to experience menarche is 15-16 years in rural India, while females in urban India experience it as early as 8 years of age [209]. However, the CBSE syllabus covers the topic of menstruation in eighth grade for the first time, when most students are 13 years old. In the survey, 188 (81%) female respondents had experienced menarche by the time they were taught about it in school. The teachers in the focus group also acknowledged the existing gap by agreeing with IT15 when she said, *"in today's scenario, where kids hit puberty at an early age, by class 8 they are already aware about it but in class 5-6, there is no awareness so it is important to inform them at that time."* Almost all female respondents concurred that it was important to impart MHE to adolescent females before menarche, while male respondents voted sixth-eighth grade (51%) and ninth-tenth grade (30%) as the top two age groups for educating adolescent males.

How should they be informed?

More than half of our female and male respondents (56% female and 61% male) believed that MHE should be included in the syllabus in a common classroom session. A female interview participant (IW11) said, *"current syllabus that is there, it does not have anything about menstrual health education, it only has the content about the science about it."* It should be noted here that, although they agreed on missing or limited aspects of the current syllabus, both parents and other adults preferred that MHE be a part of the students' routine education: *"it would be better if it's*

in the syllabus only. . . they (students) already know it but by doing so they will accept it more willingly, that too at early age, if it would be a part of their syllabus" (IW6). This indicates their preference for a more systematic approach over the current approach of organizing workshops or special sessions, which are independent initiatives by schools.

As discussed above, gender affects classroom pedagogy during the teaching of sensitive topics. For a majority of male participants, the instructor's gender did not make a difference. However, while sharing their experiences, teachers acknowledged that female students felt more comfortable in females-only sessions that were conducted by female instructors: *"so they were in fact quite inquisitive and since there were the select groups only girls and only boys so they were more free compared to what I have seen in my classes. . . usually it is the boys who are more inquisitive—they come up with a lot of questions and girls are usually quieter. But in those sessions, even girls could come up with certain questions"* (IT3).

3.4 Discussion

Having understood current approaches and attitudes to imparting and receiving MHE in India, I now turn to sociotechnical implications for designing interventions that target improved MHE. Recent HCI research has affirmed that technology has particular affordances that make it suitable for communicating and teaching sensitive topics [110, 248]. To propose implications for technology design, I engage deeply with our findings and Bardzell's feminist HCI framework [30].

3.4.1 Fostering Participation

The information on menstrual health which forms a part of the school curriculum is readily available and widely accessible. But, the school curricula are typically designed using a top-down, one-size-fits-all approach, not necessarily involving the participation of different kinds of teachers in curriculum design. I also note that—in their extended learning section—the school texts provide links to health websites from other countries, which can be quite distant from the cultural contexts of Indian adolescents.

In addition to school curricula, several governmental and non-governmental initiatives have designed materials for imparting MHE. As the content analysis demonstrated, however, these materials are frequently limited, and both teachers and students (across genders) find themselves at a loss for comfort when they engage with them. The feminist HCI framework helps us consider how we as designers might foster *participation* [30] in the design of MHE initiatives, so that 'users' (learners and educators) are more at ease and willing to engage. This requires a multi-faceted approach where we can consider the crafting of the message (for the learners), as well as the choice of the medium (for the educators to adopt). Not only is it crucial for the *learners* to feel comfortable receiving MHE, but it is also important for *educators* (who could be parents, teachers, or near-peers) to be willing and comfortable to engage in imparting MHE. Also, technology-based MHE must factor in whether the (software and hardware) medium, too, would be easy and comfortable to use for both learners and educators.

3.4.2   Engaging Stakeholders

If MHE is to be encountered in different learning contexts (schools, homes, workshops, etc.)—as our participants conveyed an explicit need for—then the participatory methods adopted must aim to engage learners and educators as stakeholders from each of these contexts, keeping in mind the different kinds of information they must give and receive. Additionally, there are no directives or tools available for educators at home (parents or older siblings) to use. Although several mainstream practitioners (e.g. [260, 179, 100]) have produced relevant content, efforts to distribute this content are neither well organized nor well understood. The feminist HCI principle of participation [30] encourages user involvement in the design process. We additionally stress the importance of expanding this set of users to include an *ecology* [30] of diverse stakeholders and designing materials with their involvement. The principle of ecology focuses on identifying and creating awareness about all stakeholders—who they are, how they interact with each other, and the systems/artifacts they engage with—during the process of technology design. Different stakeholders bring different perspectives, but as the findings highlight, each of these perspectives is critical to

understand, address, and get on board, if we are to prevent communication around the subject from being strained. This aligns with Eccles et al.'s [78] suggestion that parents and teachers can play a critical role in supporting healthy adolescent development if they "work together."

I observed, among our participants, the persistent notion that MHE was a topic for women and was best delivered *by them* and *to them*: *"Its a girl's thing and should be only told to them. This should not be revealed to others (men) in our case"* (SW43). I observed the sentiment to be prevalent also in formal education settings (both classroom and workshops), where instructors preferred to conduct females-only sessions even when the curriculum was intended for all genders. On one hand, these sessions can create safe learning spaces for adolescent females and shield them from the embarrassment they might feel (and frequently do, as I found) in the presence of adolescent males. On the other hand, however, such a model of learning falls short of taking an ecological approach. It perpetuates the isolation of the non-menstruating individuals from educational discourses on menstrual health. Non-menstruating individuals may not be the target population for MHE, but they are invariably connected, and often intimately, to individuals who do menstruate. Not involving them in MHE initiatives can inhibit communication and interaction on menstruation and perpetuate taboos, also worsening marginalization on account of such taboos.

Additionally, different ministries operating under the government of India (e.g., Human Resource Development, Health and Family Welfare, Women and Child Development) as well as various NGOs [179, 260, 236, 287] have launched a number of initiatives to address the lack of awareness on menstruation and related practices. However, there is little evidence of collaboration across these organizations and their initiatives. In the interest of achieving ecological balance from a feminist HCI perspective, there is a need to bring these initiatives into alignment, so that different stakeholders working towards synergistic goals might join forces in solidarity to address the needs for menstrual health education [30].

3.4.3   Embracing a Range of Attitudes

Due to widespread lack of awareness and open communication on the topic, there exists no single, explicit understanding on how MHE might be best imparted and what details must be given about it at what ages/stages. This requires the use of participatory methods with different stakeholders (and different stakes) in the ecology, as discussed above. An additional consideration needs to be the focus of MHE; while school curricula attend mostly to physiological details, I found the focus at home to be on behaviors that must be practiced during menstruation. Bardzell's feminist HCI quality of *pluralism* [30] negates the idea of a universal solution and focuses on inclusivity of diverse voices and needs of various stakeholders when designing potential solutions. As designers aligned with feminist HCI principles, it is critical that we advance towards a balanced, pluralistic solution to enhance interactions around MHE, and embrace participation with diverse perspectives in terms of gender, relationships, comfort levels, cultural values, and religion. This is especially true for spaces that are as culturally loaded as MHE is, as indicated by our data.

Much of the data I collected pointed to different myths associated with menstruation, and the stigma female participants have experienced at different stages of their lives, right from hitting menarche to bringing up informed sons and daughters. For example, I observed that in certain Indian contexts, women are not supposed to enter the kitchen or a place of worship during their menses. In general, I found that there were many restrictive social and cultural norms shaping behaviors during menstruation, depending on how conservative the family was. These attitudes were wide-ranging and occasionally even conflicting. For example, a few states of India celebrate menarche [240, 33], as it symbolizes that a girl has reached marriageable age. Also, there exists a section of society who associate "menstruation as a period of rest" [33]. However, several participants explicitly asserted that menstruation was not *"something great to talk about"* or *"celebrated."* Initiatives designed to impart MHE must first garner awareness about these wide-ranging myths, and consider how far design might be equipped to address them. There is also naturally a tension around which religious or cultural views to embrace, and which ones to reject. If a family feels strongly in favor of limiting women's mobilities during their menstrual cycles, for instance,

then designing educational materials that reject this stance may not be the most prudent or effective approach. At the same time, it is also important to foster awareness across different levels of openness. To design for incorporating the quality of pluralism [30], we must recognize the different kinds of differences across users.

3.4.4 Promoting Safe Spaces

Practices that are passed on need to be engaged with critically and questioned, and this questioning could be encouraged through effective, targeted design. This is where the quality of *advocacy* can play a critical role [30]. Advocacy is only possible, however, when safe spaces can be designed and developed (with or without technology) for open communication to take place between those present. Here, the designers' opinions might be quite different from predominant views in society among various stakeholders around MHE. However, even among these stakeholders there are many different views regarding the level of political emancipation that must take place (e.g., as observed, all female participants strongly advocated for the inclusion of males in the discourses of MHE but at the same time acknowledged the need for difference in the depth of the topic and the appropreate age to deliver MHE). These need to be communicated through open dialog, for which safe spaces must be created.

Our findings indicate that open peer-to-peer communication on the subject of menstruation does take place intra-group, or within the menstruating/non-menstruating groups. However, there is lack of inter-group peer-to-peer interaction on the subject. To the best of our knowledge, all existing technology-based initiatives [141, 235, 179] are designed for a common user base—the menstruating individuals (particularly adolescent females). Our data conveys that while (young and old) women do need a particular kind of education so they are better equipped to deal with their experience, those who do not menstruate also need to be engaged. There is a need for approaches that aim to deliver content in a manner that not only imparts conceptual information but also improves gender sensitization around the issue, across genders. The challenge here is to find a balance in advocacy such that MHE adoption is not impacted. To design for advocacy, we pro-

pose that existing approaches—such as the comics introduced by UNICEF in Indonesia [151], or aforementioned games that are designed to counter misconceptions and create awareness among menstruating individuals, be extended to devise pathways for non-menstruating individuals to participate and be able to learn about menstruation and related topics.

3.4.5   Enabling Self-Disclosure

I now touch upon the quality of *self-disclosure* [30]. A significant challenge that surfaced repeatedly was that the delivery of existing MHE curricula took place at certain points in adolescents' lives, taking into consideration their ages, but not where their individual physical and personal growth stood. An adolescent learner of MHE has either experienced menarche, will experience it in the future, or will never experience it. As discussed in prior sections, the content providers (schools, teachers, and mothers) are responsible for deciding *when, what,* and *how* to introduce the subject *to whom*. Our data demonstrates that the decision is either influenced by an event (onset of menarche) or psychological development (age or puberty, e.g. class 8th), irrespective of life experiences of adolescents that might shape their attitude towards the subject [88]. The adolescents themselves, regardless of gender, may not be ready to engage with MHE materials. On the flip side, the education might come too little, too late. Ideally, we need an adaptive learning environment to respond differently to the aforementioned cases by considering the user's behavioral experiences, including their thoughts, emotions, and values. The solution should not typecast the user, rather users should be given an opportunity to define themselves for the solution. As a result, we suggest designers incorporate customizability in their approaches to make them a comfortable and inclusive experience that is adaptive to users' identities.

Technology design has the advantage of meeting users where they are at, and where they are coming from, also factoring in how much they are willing to learn at a given time [221, 143, 273]. This applies also to the educators (parents or teachers); some might be more comfortable engaging, some might be less. For designing a technology-based adaptive teaching tool, we need to understand *(1)* what needs to be adapted, and *(2)* what factors contribute to this adaptation. The age

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and the past and (potential) future experiences of menarche are fundamental factors influencing the adaptation. To answer the first question, designers may draw on the factors mentioned by Towle et al. [273], which include *(1)* interaction (one-to-one, one-to-many, or many-to-many), *(2)* role (user as a beginner or expert to facilitate support to and from different learners), *(3)* activity (customize the list of activities suitable for the user), and *(4)* environment (provision of different content, or the same content using different media). This opens up opportunities for design that works to provide support for one or multiple adaptive elements. For example, Menstrupedia [179] is a website designed to support the peer network through *"Ask me"* prompts, a blog to support one-to-many interaction, and a comic for imparting MHE to adolescents. Its design fails to consider, however, where the user is coming from to provide personalization as appropriate. By devising ways for both learners and educators to indicate their physical and psychological readiness could make a difference towards ensuring their receptivity to MHE materials.

3.4.6   Extending Engagement

Engaging with MHE materials in a curriculum is essential, our participants felt, but these materials mainly address cognitive awareness, rather than cultivating body-awareness among adolescents. As I observed, the curricula neither include any visualization of phases of menstrual cycle, nor talk about associated hygiene and management aspects. Further, when adolescents are introduced to the topic, they may or may not have hit menarche. These cases need to be dealt with differently, as they result in different body experiences and awareness. I found that many of the female participants were formally educated about menstruation/menstrual health post-menarche, which caused them to experience a complex set of emotions, ranging across confusion, shock, fear, stress, and sadness. Such experiences may cause psychological trauma, impacting one's self-image or negatively impacting one's sense of identity and self-awareness. This sentiment was echoed by several participants, who claimed that they felt "ashamed" as though they had committed a crime. McPhearson et al. [176] found that menstruators have a more negative body image if they have had a negative menarchial experience as compared to menstruators with positive menarchial experiences: *"yet it*

is possible that if a woman felt ashamed of her body at menarche, an event that marks a physical transition into womanhood, her shame and negative feelings about her body could remain years later". Additionally, the content currently delivered in schools takes a simplistic and conservative view of gender, assuming gender binaries and that all women will experience menarche, which may not be the case.

We must, as designers with a feminist mindset, make efforts to ensure that MHE is delivered to adolescents in a way that respects their awareness and associations with their bodies, so they are able to experience adolescence in a physically and psychologically safe environment. Consideration of the quality of *embodiment* [30] is important so that these adolescents can learn to engage with and feel comfortable in and with their bodies, not just learn about them in theory.

Chapter 4

Learning *from* and *with* Menstrupedia

Constructing
Menstrual Literacy
Isn't Linear

Inspiration: Let's Talk about it by Serena Hackett

CHAPTER 4

LEARNING FROM AND WITH MENSTRUPEDIA

In India, much like in several other countries, the societal taboos surrounding menstruation lead to inadequate dissemination of menstrual health education (MHE) in everyday settings. As elaborated in Chapter 3, the absence of open discussions regarding menstrual health and wellbeing places the responsibility on individuals, particularly during their adolescent years, to develop their understanding of menstruation. As evidenced in the the Chapter 3, adolescents and young adults predominantly turn to the internet as their primary source of information. This observation shaped my subsequent research objective, which aimed to gain a deeper insight into how users interact with an ICT-based platform dedicated to menstrual health and formulate recommendations for expanding the technology mediated adoption and delivery of MHE.

Many practitioners have been working independently at the grassroots to bridge the information gap regarding menstrual health and wellbeing by conducting menstrual health workshops, and awareness campaigns, creating educational content, and leveraging social media to achieve wide-scale dissemination of MHE. One such initiative is Menstrupedia [179]—a social enterprise that provides a friendly and informative guide on menstrual health through the use of multiple media— a website, comic, YouTube channel (which conveys updates on offerings), and Facebook page with over 39K followers and likes. The website offers a quick guide to menstruation, a blog, and a Q&A forum. Menstrupedia was designed to support young and old Indian women manage their menstrual health. In 2017, the platform claimed to have reached 250 schools, 60 NGOs, and 150,000 girls across India [179]. The Menstrupedia platform offered an opportunity to study user engagement with online spaces that target MHE in a society resistant to conversing and learning around such sensitive topics.

In this chapter, I present results from an instrumental case study [32] of Menstrupedia [179] conducted in the year 2017. I have examined the receptivity of Menstrupedia's users to its ini-

tiatives, identifying its affordances and shortcomings in its delivery of MHE to a growing online audience across geographic and socioeconomic boundaries. Here, I focused on the Menstrupedia website's users' engagement with its Q&A forum, as well as its quick guide and comic offerings. I performed a content analysis of the available educational information (Learn section) and information being exchanged (Q&A forum) on the website. In addition, I present findings from think-aloud comic reading sessions with young adults across genders to gauge the users' perceptions. Finally, I engage with the feminist HCI [30] lens to critically analyze Menstrupedia's affordances and shortcomings toward designing technology-based dissemination of menstrual literacy for the Indian context. Here, I elaborate on how the six feminist principles of pluralism, advocacy, ecology, self-disclosure, participation, and embodiment surface (or *might* surface) in the design of Menstrupedia. Through these findings, I connect with the growing body of work in HCI at the intersection of menstrual transitions and cultivating menstrual literacy (see Chapter 2). I also reflect on how feminist HCI framework might be useful for researching additional sensitive and taboo information exchange across diverse cultural contexts.

4.1 Sensitive Topics and Online Communities

Examination of the treatment of sensitive and taboo topics through technology use is a growing focus of the HCI community. For several years, online communities such as Menstrupedia have been an active focus of the computer-supported cooperative work (CSCW) scholarship. I summarize the portion of the research at the intersection of HCI and CSCW that had shown engagement with sensitive topics in these communities until this study was conducted. For example, Birnholtz et al. observed that university students leveraged the anonymity of Facebook Confession Boards (FCBs) to discuss and gain knowledge about taboo topics, including sex, illegal substances, mental health, and bodily functions [37]. These authors observed that participants solicited information about sexual behaviors, shared their sexual experiences and fantasies, questioned stigma associated with sexuality, and more while revealing "potentially stigmatized identities." Similarly, Andalibi et al. [13] have studied information-sharing practices on sexual abuse on Reddit. They found that

individuals use "throwaway" accounts to ensure anonymity while seeking online support on the subject. Related work by Semaan et al. found Iraqi users to be slowly adopting ICT (e.g., online fora, blogs, and social networking sites) for engaging in discourses around various taboo topics otherwise considered "lewd" [242]. Authors observed that participants opted for ICT "where they had full control over the audience and their real world identity—that is, ICTs through which they could move in and out of anonymity." Carrasco et al. showed that LGBTQ+ individuals in the United States used online platforms as their safe spaces to seek support and companionship [50]. These authors found that queer populations manipulated various features offered by social platforms to achieve selective visibility, that is, selectively disclosing their identity to a specific group. Other studies [116, 38] have also demonstrated the use of social media platforms by LGBTQ+ communities for seeking support during (personal and social) transitions. Research shows that even for non-sexual taboo topics, such as mental health, people seek information and support on online platforms [131, 163, 16, 244]. Kumar et al.'s work demonstrated that providing an anonymous forum for discussions on HIV/AIDS significantly improved awareness on the topic among Fijian users [157]. Johnson studied how first-time mothers actively and passively participated in online communities to explore topics such as same-sex parenting, which would otherwise seem like taboo topics [142]. Extending this body of work on navigating taboos in online communities, we aim to understand engagement on and with Menstrupedia's platform.

4.2 Methodology

I conducted an instrumental case study [32] of the Menstrupedia platform [179] in New Delhi (India) from September 2017 to February 2018, targeting an enriched understanding of the affordances and constraints of an ICT-based platform seeking to widen adoption and delivery of MHE. I gathered data from the Menstrupedia website, conducted content analysis of the Menstrupedia comic, and organized comic-reading sessions with young adults. I present analysis of this data below, referring to the questions from the Q&A forum using *Q#*, and quotes from the interviews using *F#* and *M#* for female and male participants.

4.2.1 Menstrupedia Website

Menstrupedia's website (`https://www.menstrupedia.com/`) was launched in October 2012 with the aim of overcoming the stigma and myths surrounding menstruation by providing information in a friendly and accessible fashion [266]. It currently has four main segments: a quick guide, a comic section, a Q&A forum, and a blog. The website asks users to choose a screen-name and does not collect any demographic information except an undisclosed email address. On the website, we studied the Q&A forum and quick guide (the ASK and LEARN sections).
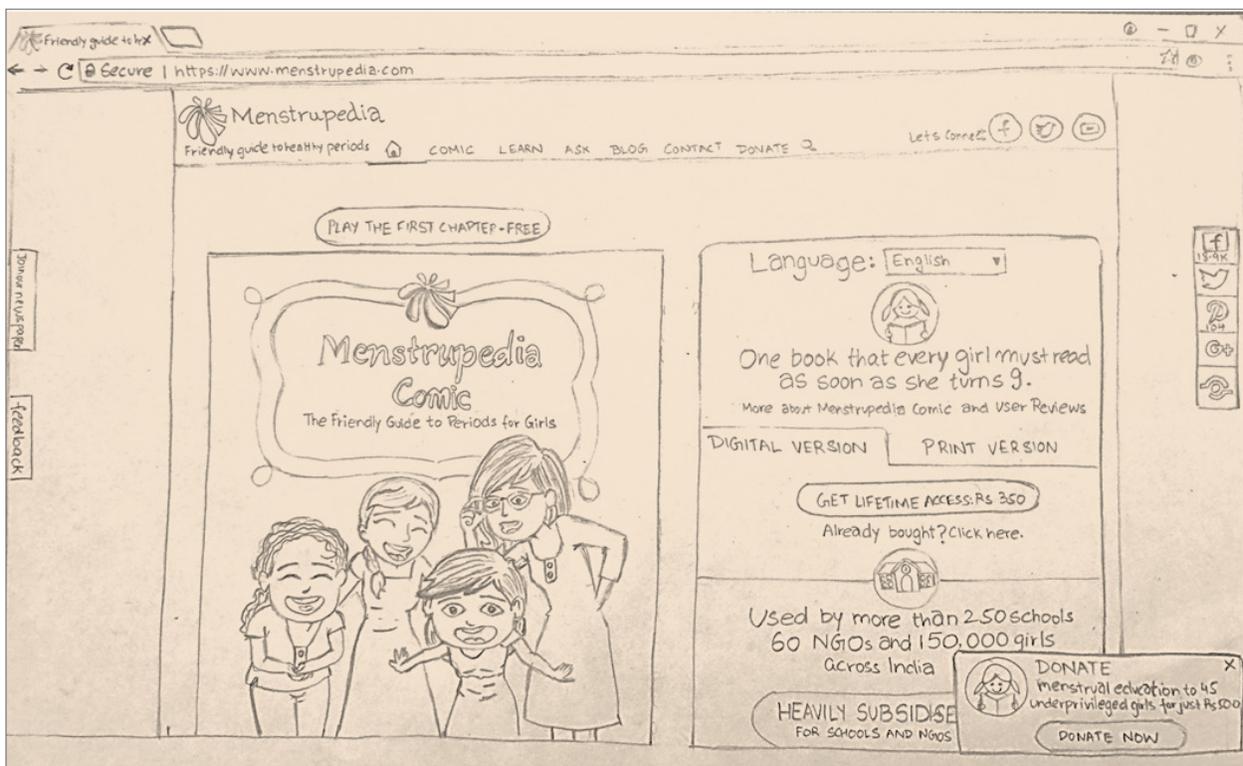
Figure 4.1: Sketch of Menstrupedia website. The website hosts a Q&A forum in its ASK section, a blog, and a quick informational guide in its LEARN section. The COMIC section presents details, history, and reviews of the comic.

Q&A Forum

The ASK section of the website allows a registered user (of any gender) to post queries or answer existing questions. Posts are public; anyone can view them without having to register. Clicking on

a question opens it up and increments its "views" count. For each question asked from the launch of the website until January 31, 2018, I collected the title, content, date of post, number of views, number of responses, author name, and tags. Since the post only discloses the screen-name of the author, I did not have access to authors' demographic information. This process yielded 226 questions, of which I removed 3 redundant questions that were asked under different titles. I used the remaining 223 questions as our data set, subjecting it to thematic analysis [43] in two phases, where I applied a two-level coding (question *topic* and question *type*) scheme.

In the first phase, I began by preparing a topic codebook (see Table 4.1) [237] by performing an inductive thematic analysis [43] of the data. Once the codebook was prepared, I invited Shaan, a Computer Science undergraduate at IIIT-Delhi and the student collaborator on this project, to independently code the curated dataset using the codebook. To resolve our coding disagreements, I organized brainstorming session with my advisors. In 9 of 223 cases, we were unable to arrive at a consensus, so we discarded those questions and further analyzed the remaining 214. In the second phase, questions under the 'Other' *topic* code (49 questions) were eliminated and the remaining data (165) was subjected to deductive thematic analysis (see Table 4.2) [43]. Our goal was to classify these questions on the basis of their nature. We adopted a two-level analysis. In the first level, we followed the coding scheme used by Harper et al. [114] with two codes: *Informational Questions* (with intent of getting information) and *Conversational Questions* (with intent of stimulating discussion). In the second level, the informational questions were coded via a tailored version of the scheme used by Morris et al. [184], with two categories: *recommendation/opinion* (subjective answer) and *fact-based knowledge* (objective answer). Similar to the first phase, our coding disagreements were addressed during team brainstorming sessions.

Quick Guide

I studied the content presented in the *quick guide* under the LEARN section of the website. This guide provides educational information in small paragraphs (with a median word count of 119 per topic, a minimum of 30, and a maximum of 848), supported by colorful graphics on puberty, men-

	Menstrual Health-Related Questions (165)		
Theme	Topics	*%*	Example
Irregularity	Irregularity of menses and flow	17.29%	*"I am a girl of 16 Its been 40 days since my last periods. What's the reason for it?" (Q75)*
Sex, menses, pregnancy	Delayed menses post sexual activity, linked to chances of pregnancy	16.82%	*"We had sex 4 days before her periods date and aftet ipill consumtion she did not have period for december. do you think we should worry about pregnancy." (Q91)*
Medical issues	Various diseases associated with menstrual health	12.62%	*"Continual white discharge through out the month before and after the periods, feeling so discomfort." (Q8)*
Hygiene & management	Hygiene practices and flow management products	11.21%	*"Is there protection that works best for extreme sports?" (Q118)*
Myths & taboos	Societal taboos and cultural practices	4.67%	*"Why is it not allowed to have head bath during 1st 2 days of menstruation?" (Q37)*
Controlling menses	Ways to prepone/postpone cycles per convenience	4.67%	*"What is the process to get periods before my periods time?" (Q21)*
Pills & menses	Various pills and their impact on menstrual cycles	3.74%	*"Does intake of Heavy Antibiotics affects Menstrual Cycle?" (Q11)*
Education	Awareness campaigns, appropriate age for introducing MHE, and more	3.27%	*"What is the appropriate age to educate young girls about periods?" (Q158)*
Basic physiology	Physiology underlying the phenomenon of menstruation	2.80%	*"What are the causes of delayed onset of menses in a 16 yr old girl?" (Q156)*
	Other Questions (49)		
Masturbation	Masturbation and its effects	28.57%	*"I usually mastrubate 2-3 times a week I have pimples on my face. Is this due to the above cause ?" (Q183)*
Male physiology	Specifically ejaculation, erection, and nocturnal dreams	26.53%	*"In almost 4 out of 5 days, my penis is erect when I wake up in the morning or whenever I wake up after sleep... what can I do??" (Q202)*
Pregnancy	Pregnancy and abortion	14.29%	*"What is the abortion pill (RU486, Mifepristone, Mifegyne)?" (Q209)*
Contraception	Various contraceptive methods	6.12%	*"What do I do if I miss an OC pill?" (Q208)*
Miscellaneous	All remaining questions	24.49%	*"This website shows more about female hygiene. what about male hygiene not explained here?" (Q207)*

Table 4.1: Of 223 questions analyzed, 165 were related to menstrual health and 49 were classified under 'other' (consensus was not reached for 9 questions). The data presented here highlights the information needs of (a segment of) the Indian population on sexual well-being and family life.

Type (%)	Subtype (%)	Example
Informational (82.42 %)	Recommendation/ opinion (52.94 %)	*"During periods, my stomach and hip pains a lot.I feel very tired. I feel like my head is rounding.Because of this i miss my school. What to do?" (Q14)*
	Fact-based (46.32 %)	*"I usually get abdominal cramps during the first two days of my periods! is it normal? why do we get it anyways?" (Q110)*
Conversational (17.58 %)		*"Why shouldn't a girl go to the temple during her periods?" (Q164)*

Table 4.2: Distribution of questions based on their type. Questions that were *informational* were subjected to second-level coding for a deeper understanding of information-seeking behavior. Most questions seeking a recommendation or opinion seemed to want medical advice.

struation, myths, and hygiene. To check if the content was comprehensive, the student collaborator and I performed deductive content analysis [80] independently by examining the facets covered and the extent to which they were discussed. We used a tailored version of the coding scheme presented in Table 4.1 with seven categories: *education*, *hygiene and management*, *myths and taboo*, *basic physiology*, *medical issues*, *irregularity*, and *menses & reproductive health*. Additionally, I also evaluated the content and supporting graphics using Bardzell's framework [30].

4.2.2 Menstrupedia Comic

The Menstrupedia comic was developed in association with the sanitary pad-producing company *Whisper*, over a period of 18 months (in 2013-2014), with the help of a successful crowd-funding campaign [180]. This comic has 88 pages organized into four chapters—*growing up* (on puberty-related changes in male and female bodies), *what are periods?* (on menstruation), *when is my next period?* (on menstrual tracking), and *taking care during periods* (on myths, hygiene, and management). Although the comic targets girls who are nine years and older, the website promotes it as being relevant for "younger or older girls and even boys." This comic is available in English, Hindi, and nine regional Indian languages. Except for the English version, which is available in print and as an e-book, all versions are only available in print. They are available for purchase on www.menstrupedia.com and www.amazon.in. At the time of writing, this comic claimed to have reached 250 schools, 60 NGOs, and 150,000 girls across India (see Fig. 4.1) [179].

	Controlled Environment (10)	Uncontrolled Environment (10)
Site	Cabin (Private Space)	Cafeteria (Public Space)
Gender	Female (5), Male (5)	Female (5), Male (5)
Age	Min 18, Max 20, Median 19	Min 18, Max 20, Median 19
Major	Design (10)	Computer science (3), Maths (1), Design (6)
Family Income (per annum)	Middle [$5K to $26K] (6), High >$26K (4)	Middle [$5K to $26K] (5), High >$26K (5)

Table 4.3: I conducted think-aloud comic reading sessions with 20 young adults (10 female and 10 male) in a public and a private setting, followed by a ten minute semi-structured interview. All the participants were first-year undergraduates. The data was collected in form of audio-recordings, field notes, and hand- sketches.

Content Analysis

I analyzed the graphic and textual content in the Hindi and English versions of the comic using the lens of feminist HCI [30]. To assess the content of the comic books, I employed the same methodology we applied when examining the Quick Guide. My undergraduate student collaborator and I each conducted separate deductive content analyses [80]. Here, we utilized the codebook we developed to analyze the Quick Guide.

Reading Sessions

I conducted comic reading sessions with 20 adults (see Table 4.3) to understand how young adults (male and female) might respond to Menstrupedia's approach to MHE. Here, I combined the use of the think-aloud protocol [52] with interviews between the book chapters, followed by a brief post-session interview. These sessions were conducted in public and private settings, to study the impact of the surroundings on the participants' reading of the comic.

At the start of every session, participants received an introduction to the think-aloud protocol. They were also provided with the option to choose between the Hindi or English versions of the comic. After each chapter, participants were asked three questions to capture what they liked, disliked, and if they had learned something new. On average, the reading session lasted for 30 minutes, and was followed by a 10-minute semi-structured interview. Towards the end of the

Figure 4.2: In the think-aloud comic reading session, the participants had a choice of reading the Hindi or English version of the comic. Additionally, after each chapter participant's were asked— *"What did you like?," "What did you dislike?,"* and *"Did you learn something new?"*

session, participants were asked to fill out a survey of nine questions, including seven demographic questions, a rating question regarding their preference of media for receiving MHE, and a checklist of emotions to capture their experience of engaging with the comic.

Following the purposive sampling approach [85], I recruited participants out of a class of first-year engineering undergraduates. I approached the class of students and solicited voluntary participation after explaining our study objective. All recruited participants provided us with written consent; I also informed them that they could leave at any time. I conducted interviews in Hindi and/or English, depending on the participants' comfort levels. These sessions were audio-recorded to be translated and transcribed in English for analysis. I also took hand-written notes during the interactions with the students, observing their body language as well. I read and coded interview transcripts line by line, and analyzed the data using inductive analysis [43].

4.2.3   Study Limitations

India is a large country with a greatly diverse population. We acknowledge that our study participants represented a small percentage of an expansive but relatively privileged middle class, when compared to the rest of the country. They spoke and understood English well, and were

well-versed with technological advancements. The findings presented here would likely be quite different if working with socioeconomically marginalized populations, in rural or urban India, where resources are even more constrained and challenging to access. While this is a limitation of this study, we also emphasize that even the best endowed groups in India struggle with lack of attention to menstrual literacy (and similarly taboo topics). By addressing their under-studied struggles first, we believe that we will find ourselves a step closer to addressing the struggles of more vulnerable populations.

4.2.4 Reflexivity

All researchers who worked on this study are of Indian origin, with extensive experience in conducting HCI research and engaging in fieldwork with diverse marginalized communities across various regions in India. As a cis-women of Indian origin, I led the study design, where I collected all the data. I acknowledge that my identity, cultural familiarity, and experience of constructing menstrual literacy in the study context with acute menstrual stigma influenced the data collection process. I approach this study with an emancipatory action research approach and from a feminist standpoint. The data analysis was primarily led by me, where I collaborated closely with Shaan, who also identifies as a cisgender woman born and raised in Delhi. We engaged in frequent brainstorming sessions throughout the data analysis with Neha and Pushpendra, senior HCI researchers identifying as cisgender female and male, respectively, with extensive research experience with gendered health and wellbeing in global health.

Prior to this study, neither of the team members engaged with the Menstrupedia team and/or their platform in any capacity. That said, it is essential to note that all of us, born and raised in different parts of India, have experienced constructing menstrual literacy, given the lack of menstrual health education in our study context. As an inter-generational research team, we note that our understanding of the approach to cultivating menstrual literacy and its vocabulary did not differ much. Thus, the interpretation of the data collected is likely biased by our strong desire to improve access to menstrual literacy in India and challenge the stigma associated with its provision.

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I urge the interpretation of the data presented in this chapter to be read as such.

4.3   Findings

I now present findings, first on user participation on the Menstrupedia website, before shifting focus to our participants' engagement with the Menstrupedia comic. Finally, I take a consolidated view of the information provided by both the Menstrupedia website and comic to analyze how they are similar and different. Throughout, I reflect on how the offerings of Menstrupedia (website and comic) align with Feminist HCI principles, or—in some cases—might align better.

4.3.1   Online Participation: Information Solicited and Revealed

Who were the users?

Menstrupedia allows only registered members to post questions, revealing the users' screen-names, profile pictures, and timestamps for posts, in addition to the actual post. Our data showed, however, that 96% did not use a profile picture, almost 5% used *"anonymous"* as their screen-name, and 61% used a pseudonym (as far as I could tell). The text in the questions did reveal facets of users' identities, however, such as age and gender, though self-reported data could be inaccurate. To the best of my assessment, 69% of the questions were posed by female participants and 15% by male participants. Additionally, 26% users explicitly mentioned their ages (the minimum was 14, maximum 52, and median was 22). For example, *"I am 23 years old i did not have my periods for 6 months. i do not know what to do next and i really need help. please guide me"* (Q96). Users also appeared to solicit information as intermediaries. Approximately 5% questions focused on the well-being of the user's daughter, mother, sister, friend, wife, or sexual partner. This important finding affirmed that, subjected to the accuracy of self-reported data, the Menstrupedia platform is not used by women alone and allows for an ***ecology*** of actors to participate [30]. For example, the quote below appears to be from a male user:

"Please let me know about PMS and how to deal with it? Being of the other gender we guys often tend to misunderstand our sister's or girlfriend's or wife's behavior at these times most importantly the mood-swings. Please let me know how to take care of our sister or girlfriend or wife when she is facing 'this' time.. the DO's and DON'Ts for us." (Q161)

That this Q&A forum was open for participation across ages and genders shows that it was ***pluralistic*** in its design [30]. As I later discuss, however, there was also scope for greater pluralism.

What did they ask?

The questions ranged across diverse topics (see Table 4.1). Of the 223 questions we analyzed, 165 were connected to menstrual health, while the remaining 49 fell broadly in the realm of sexual and reproductive health. Not only do we see a categorization of the MHE gaps present among Menstrupedia's current users, we also note additional areas in which these users were lacking information. Most of these questions were accompanied with multiple sentences that explained the context in depth before the question was posed. Sometimes, multiple questions that drew on different contexts sought similar answers, such as the two questions below. In both examples, the users appeared anxious to determine whether they might be pregnant:

"Hi! I didn't had my periods last month n went for unprotected sex with my partner several times within 4 days consuming 2 contraceptive I pills. . . Still I m missing my periods. Its been a month n a half now without periods. . . Is der a chance of getting pregnant???? Its really bothering me now pls help." (Q198)

"I am 32 years old. last month i had periods 2 times then i took treatment from Gynac for the same. This month I got my periods on 16th Feb. But there was no proper bleeding only 2-3 spots in a day. Me & my husband had unprotected sex on 12th Feb. Is there any chances of that i am pregnant? Please advise." (Q185)

The absence of other, easily accessible platforms made questions on Menstrupedia more wide-ranging. Participants were curious about menstruation-related topics, but also voiced a desire for all kinds of other information, such as regarding pregnancy and/or sexual health. This indicates a mismatched set of expectations between Menstrupedia and its users, and perhaps the lack of **participation** as Bardzell describes it [30]. More user research may be needed to determine whether this lack of alignment is costing Menstrupedia in terms of users looking for MHE.

And how?

We arrived at a categorization of—and examples for—the types of questions that were posed, drawing on Morris et al.'s approach in their study of Q&A on online communities [184]. Users sought—almost in equal measure—fact-based information (approx. 37%) as well as subjective opinions and recommendations (approx. 43%), and frequently asked open-ended questions to initiate discussion (approx. 18%). In Table 4.2, we see examples of these types. While Q14 asks for a recommendation for what to do when there is pain during periods, Q110 asks about why there are abdominal cramps at the start of the period, and Q164 has a more open-ended question around why a girl should not go to the temple during her periods. These highlight how users of Menstrupedia's platform sought different kinds of assistance and support—from peers as well as medical experts—and a larger **ecology** of actors [30].

4.3.2   The Menstrupedia Comic: Information Provided and Participants' Response

The comic features four female characters—Pinky (nine years old), her older sister Priya who is a doctor, and Pinky's two friends Jiya and Meera. The comic begins with Pinky's birthday party, during which Jiya experiences menarche. The story unfolds with Priya introducing and explaining puberty and menstruation to the three girls. The families featured evidently come from a middle-high income level. The three girls represent different stages of adolescence: Pinky—a pre-pubescent girl who is yet to be introduced to the topic of menstruation, Jiya—who has just experienced menarche and is confused, and Meera—an adolescent girl who is familiar with hav-

ing periods and seeks clarifications on associated myths [263]. Use of these different characters indicates a **pluralistic** approach towards female readers at different stages in their lives [30].

A Friendly Format

The dominant view among all participants was one of appreciation that the comic used real life scenarios to deliver critical information, as F10 shared:

> "I like how they came up with personal accounts so you know they [girls] can feel a little less embarrassed about everything. It is how that she [the older sister] talked about things, how she normalizes the entire experience…" (F10)

The characters featured in the comic were widely appreciated, and participants expressed comfort in engaging with instructional content that was delivered by a doctor figure (the older sister). Here I confirm the findings of Sorcar et al., who also found that students were comfortable learning about HIV/AIDS from a doctor featured in their animated curriculum [248]. This appeared to enhance our participants' perception of the comic as a legitimate source of information, invoking a sense of **advocacy** [30]. As one participant commented, *"…it was informative and the way they portrayed it using a doctor…it was very nice and particularly about being informed about such things at an earlier stage is always beneficial"* (M8).

More generally, participants liked the illustrations used to capture the reader's attention:

> "It is really cute and funny in places, quite funny. I like how there are a lot of diagrams and not like cartoony diagrams but like proper detailed diagrams. It is actually cute how they tell you to calculate, how your cycle is going to be. I like how they say [when] you should visit a doctor. I like how it is so detailed because there so many questions that you want to ask, you want to know and you are not really comfortable you know going to someone and being like okay my period blood is this color, is that normal? But if you read this [comic] you do come across this then. This is really cool like 'Mujhe kyun nahi dia jab main choti thi' (I wish I was given something like this when I was an adolescent)." (F2)

Figure 4.3: Sketches of discomforting visual representations. The line diagram of vagina appears on page 11 and the remaining illustrations depicting the steps for maintaining genital hygiene appear towards the end of the comic (page 80). Boys found all three visuals discomforting, while girls only expressed concern regarding the rightmost image.

There were specific aspects of the comic that were appreciated, such as the warnings regarding when to consult a doctor. As one male participant said, *"the good thing is the way they have given that warnings in a proper manner, which should be there so that your eyes are drawn towards that and it is not skipped over the whole conversation"* (M9).

Boundaries of Comfort

Participants found most visual representations and diagrams in the comic appropriate except the visuals presented in Fig. 4.3. Male participants found all three visuals *"a bit discomforting"*, while female participants found the line diagram of the vagina (the rightmost image) to be *"crude"* and expressed their preference for a subtler representation. This was not unexpected, and affirmed the lack of comfort around taboo topics, including graphics. More could be done, as I discuss later, to make audiences more at ease, but also gradually become more comfortable with this content, potentially through incorporating **embodiment** [30].

We also tried to gauge the participants' comfort levels by asking if they would be comfortable reading the comic *"while traveling in a crowded coach of Delhi Metro during peak hours?"* Approximately 70% of male participants and 40% of female participants indicated their discomfort in reading the comic in such crowded public spaces, because they felt they would be judged:

"Not in the metro because other people might see us and they might judge us but in the cafe or where someone is not directly seeing us then it may be fine when reading this. No I would not want to be seen because people just see us and judge like what is he doing reading because most people don't understand these things that's why." (M2)

We asked if covering the comic with a newspaper or giving it a different cover would solve the problem, but all participants said that it was not the cover but the illustrations and content that would make them uncomfortable:

"In India there is a lot of stereotype about all this stuff. Even when you go to buy sanitary napkins they give it to you in a black polythene. So yeah there is a lot of stereotype with this so I don't think I will be comfortable reading this in a public space. I don't think that [book's] cover is a problem as such I think the visuals inside it are... still no." (F5)

We also had our participants engage with the comic in public and private settings. However, I did not observe any difference in their body language—neither across settings nor genders. Almost all participants reported feeling relaxed throughout the session. A more ***participation***-oriented approach might benefit Menstrupedia by helping to identify these boundaries of comfort [30].

Instructional, for the Most Part

Reviews also indicated that the comic was a good and much needed initiative, affirming that it had instructional value. Around 80% (62/77) of user reviews praised Menstrupedia's efforts using expressions such as "great"(28/62), "good" (20/62), "informative" (16/62), and "amazing" (14/62). One review said:

"Even after menstruating for over a decade, there is a lot I learned from this comic. I even suggested it to my mother (a vice principal in a school) to keep a few copies in her library. She also loved it, and says that it has really helped the teachers educate adolescent girls about the goings-on in their bodies."

Although participants were in agreement that a comic—visual, illustrative, and narrative—was a compelling way of educating adolescents on the topic, some also raised concerns around the length of the comic, saying that 88 pages were too *"stretched"* and *"dragged"*, impacting their engagement with the comic. All female participants agreed that the last chapter was the most informative, and the third chapter was redundant (period tracking was introduced in chapter 2 and revisited in depth in chapter 3). During the post-session interviews, most female participants shared that they felt curious while reading the comic, whereas fewer boys reported curiosity. More iteration of the comic's design from a ***participation*** lens could further aid readability [30].

English, the Language of Science

The comic is available in English (in print and as an e-book), and in Hindi (and other languages), only in print, for purchase. The content analysis revealed that there was no difference in meaning or cultural expression between the two texts; they were direct translations of each other. The Hindi version had used several English words transliterated, such as "period" and "sanitary pad." Also, Hindi translations of less known scientific words (e.g., pituitary gland) were accompanied by their English translations in parentheses. Although I gave our participants the choice of engaging with the text in either language, they all opted for English. This bias towards English may convey lack of a *pluralistic* approach, but prior HCI research has also shown that middle class technology users across India lean towards English, even when they are more fluent in other available languages [147]. There are still, however, many different user groups that are not targeted, particularly users who may lack necessary literacies for engaging with the text. Innovating around other modalities, as approached by prior work on voice-based systems and text-free interfaces (e.g., [3, 177, 167]), could improve the reach of the Menstrupedia platform and make it more ***pluralistic*** [30].

Engaging the Non-Menstruating Sex

The analysis also highlighted missed opportunities, which might have been leveraged to advocate for behavioral change. Not only the lead characters but most supporting characters (including the

pet dog and patients in Pinky's clinic) were female, supporting the stereotype that the topic of menstruation was meant for "girls only":

> "There are too many females, I mean there is no father no brother they are just all girls having this conversation. So you know it's a typical [mind set] 'ye ladkiyo wali baat hai' (it's a girl thing)." (F2)

The only male characters used in the comic are Pinky's father, Jiya's father, and her younger brother, who have a visual presence but do not speak. All these male characters appear at critical points in the narrative—Jiya's father comes to pick her up when she experiences menarche, Pinky's father enters the house to find ripped pieces of a used pad scattered in the house by their pet dog, and Jiya's younger brother uses a sanitary napkin to absorb the ink spilled on his notebook. In each of these cases, we see characters of the non-menstruating sex refrain from participating in the ongoing dialog. Although the comic encourages seeking clarifications from parents, the visual representations (e.g., the girl is shown talking to her mother over the phone, while her father stands behind the mother) reinforce a preference for the female over the male parent.

Almost all participants (17/20) believed that including a male lead character would be a compelling way of presenting a male perspective on the topic of menstruation. The journey of the male character (brother/friend) could be used to sensitize male readers, also informing them of various ways in which they might provide support to the menstruating sex:

> "We can like show this comics from a boy's point of view, like how they behave or treat girls when they know that their fellow acquaintances have the thing." (F8)

Moreover, for readers identifying as male, the inclusion of a male character could help them relate to the ongoing discussion in the comic. One of the male participants expressed:

> "It might make a difference that there is a boy character and how he reacts to something which is not normally talked about to him, something which is very new to him so knowing his psychological changes might yes make a difference to people." (M10)

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The visuals in the comic leave room for greater exploration of the qualities of *ecology* and *advocacy* [30]; when we fail to include the non-menstruating sex in addressing taboos around MHE, we also restrict the avenues available for social change.

4.3.3   The Menstrupedia Platform: A Multi-Faceted Approach for Delivering MHE

Access to Menstrupedia

The Menstrupedia platform provides support for both online (website) and offline (comic) information delivery. According to a December 2017 report by the Internet and Mobile Association of India [137], there are 481 million internet users (40% of the population), and only 30% of them are female users. To address the needs of this large percentage of offline female users, the platform developed its comic, *"because awareness is needed everywhere"* (as Tuhin Paul, the co-founder of Menstrupedia, stated on the Q&A forum). The comic is available in English, Hindi, and nine regional Indian languages. However, the cost of the comic ($4.5 to $6) renders it unaffordable for many across rural India having monthly per capita consumer expenditure (MPCE) of approximately $22 [181]. Moreover, the books can only be ordered online, also limiting access.

Certainly, by design, Menstrupedia honors the quality of *pluralism* in that it has made the effort to produce its comics in several Indian languages, also aiming to target a potentially large offline audience. However, the content has merely been translated across languages without an accompanying change in cultural expression. In addition, the co-founder recognizes Menstrupedia's limited reach, and the need for its information to be more widely accessible, but the platform so far seems unable to respond to this need.

Disparities and Inadequacies of Content

We also studied how topics covered in the comic compared to the content presented on the website. The comic offers an in-depth explanation of menstrual tracking, using the example of a paper-based calendar, but it does not mention any digital means (e.g., mobile tracking applications) that are now available. As one participant mentioned:

"They can also tell us about the apps that are coming because this [marking on a calendar] is too much effort. You can tells us about the apps, there are so many apps coming up." (F4)

Additionally, the comic only covers sanitary napkins and cloth pads, leaving out other products, such as tampons and menstrual cups, although the website explains the use and disposal of all products. One of the participants shared:

"The thing is tampons aren't very common, so I think it is very necessary to talk about tampons because some people may prefer using them so like at least you should have the knowledge about them. You don't feel comfortable with them that is another thing but at least you should know that this kind of products also exists. So I feel that they should definitely include them [in comic]." (F10)

Information on infections or diseases related to menstrual health was inadequate on the website and in the comic. The comic discussed pre-menstrual syndrome (PMS), but the website did not provide any information on the same. There was also content that was omitted on both the comic and the website, as pointed out by participants. For example, the analysis of the Q&A forum indicated that 15% of the questions under the *medical issues* category were on Polycystic Ovarian Syndrome/Disease (PCOS/D). A recent survey has also shown that roughly 20% of Indian women suffer from PCOS [208]. Other medical conditions related to menstrual hygiene management include urinary track infection [97], cervical cancer [119], and toxic shock syndrome [243, 182]. This information gap was identified during reading sessions by all female participants. As one pointed out: *"Yeah so if I am recommending it to my age group then I definitely would want to add all these tampons stuff and the diseases stuff"* (F8). Here, again, we see potential for Menstrupedia to take a more ***participatory*** approach to cater to additional information needs of their users [30].

Digital vs. Material

I asked our participants to indicate their preferences regarding different delivery mechanisms. The majority preferred comics (see Fig. 4.4) for two main reasons. First, they expressed that the
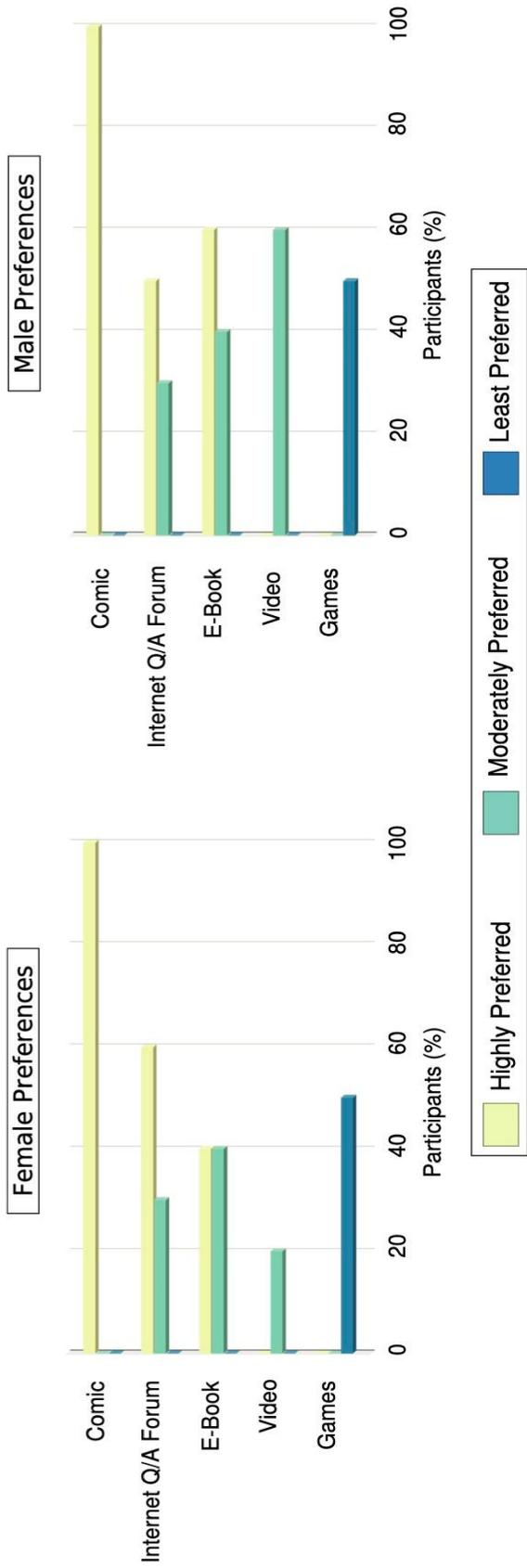
Figure 4.4: Distribution of participants' preferences regarding delivery mechanisms for MHE. All participants from our comic reading sessions were asked to rate these mechanisms on a scale of 1 to 9 (highly preferred to least preferred). I then classified these ratings into three categories: highly preferred (1-3), moderately preferred (4-6), and least preferred (7-9).

tangibility of a comic would bring them to reflect more on the topic, and stay committed. Second, the comic eliminated the possibility of getting distracted easily, which is what would happen—they said—on digital platforms. As M10 shared:

> "I rank this [comic at first preference] because you are more involved doing the activity like reading a comic book, seeing illustrations, you are more focus on to that, you are less tend to be distracted or vary actually from the topic." (M10)

Participants also saw value in the availability of internet fora for seeking answers to specific personalized queries:

> "When you have some questions you go and Google it and go read about it on the online platforms like Quora and stuff. So I think those are more helpful in such a case. So instead of reading the whole text you can get your answer through the particular thing [forum]." (F5)

We also see here different modes of engaging with MHE that may offer insights for designing different kinds of interactions. While comics offered the opportunity to learn in an engaged fashion, without distractions, the website offered quick look-ups when the user was in information-seeking mode. Allowing for different modes of engagement with MHE also conveys a ***pluralistic*** approach, as it targets user engagement across different learning mindsets [30].

4.4   Discussion

Menstrupedia is a platform that emerged to address the menstrual health education (MHE) needs of an Indian audience. This study examines the offerings of Menstrupedia, including its website and comic, for an enriched understanding of the challenges and opportunities in providing MHE to a growing middle class user group. I now present takeaways from the analysis, using Bardzell's feminist HCI lens [30] to propose design implications for imparting MHE via technology-based platforms. I also reflect on how this framework might be extended for use in research around sensitive and taboo information exchange across diverse cultural contexts.

4.4.1 Encouraging Active Participation

Menstrupedia's goal is to provide information on menstrual health and hygiene that is otherwise challenging to access for the Indian population, given limiting societal norms and taboos. By creating a Q&A forum, it provides an important avenue for ***participation*** where users can pose questions targeting MHE. Our data showed that this forum is not very widely used for posting questions—only 223 were posed over 5 years. However, the number of passive users appears to be much larger. Total number of views, till 30th Jan. 2018, were above 4 million (highest view: 740000 with median: 3100). Additionally, the topics covered by these questions highlighted that menstruation is not the only source of curiosity among the users, as also shown in Table 4.1, even though MHE is clearly the goal of the website. Depending on the users' age, gender, and other aspects of their backgrounds, the questions asked were also quite varied. Platforms for various kinds of sensitive information exchange might recognize and allow for this scoping challenge.

A one-size-fits-all use of the platform, which offers the same information to all its users, runs the risk of turning away users whose sensibilities may be hurt on account of explicit questions regarding engaging in sexual intercourse, for example, *"...what is tha difference between male and female masturbation i mean if male masturbate semen release from penis and what about females masturbate"* (sic)(Q173). How might the platform welcome a wider audience and set of stakeholders without offending sensibilities of a large conservative middle class population? Also, we may need to better understand the reasons why questions are viewed in large numbers but not many are posed, and consider ways of fostering more active participation, perhaps at lower stakes. For example, users could be given means to highlight lines of text or clap several times (such as on medium.com) or they could add question marks if they wished for greater detail. This can hold also for topics outside of menstruation.

4.4.2 Embracing Different Backgrounds

From the point of view of ***pluralism***, we saw that the Menstrupedia platform provided different ways of engaging with MHE—through the website's Q&A forum, the quick guide, the e-book, and

the comic. By offering the comic in different languages, it also targeted an audience with varied cultural backgrounds and literacies. Moreover, the comic addressed different ages of adolescence and stages of puberty with the three friends' characters. However, there might exist many more types of differences present among the target audience. Different families might have different attitudes towards open communication, cultural *dos and don'ts* during one's period, among other things. Although our participants came from reasonably homogeneous backgrounds, they also had varying responses to the topics covered in the comic. A platform that recognizes these deeply divergent backgrounds, and also allows every user to achieve a personalized interaction (given the intimate focus of MHE) might be more effective, our findings suggest. Accounting for ***self-disclosure***—the platform currently does not—might be one way of catering to varying audiences and varying questions. This might also respect the user's desire for a more intimate experience, which was a need communicated by our participants in their reaction to reading the comic in its material, rather than digital, form. The larger idea here is of respecting users and granting them the opportunity to clearly convey what information they are ready for and no more.

4.4.3 Taking a Holistic Approach

One key finding that came across throughout our data set was the need for taking an ***ecological*** approach. First, this showed up in the questions asked that were seeking medical advice and recommendations. It was also evident from the need users apparently had for open-ended discussions, where peers could potentially engage. And in questions asked by users who (reportedly) were asking for their friends and family. This also came across in the comic, which—as participants noted—failed to engage the non-menstruating gender. Questions around reading in the metro also highlighted this, since the fear of being judged by strangers on a train for reading a comic about menstruation was evident across participants. How might Menstrupedia use a more ecological approach to foster open and respectful information exchange across peers, medical experts, (male and female) family members, teachers, and even the society as a whole? For example, a UNICEF team in Indonesia designed a comic book which, when held in one way, informs girls about pe-

riods, and when turned upside down, converts into a guide for sensitizing boys on the subject [151]. Likewise, designers might innovate around improving communication between various actors in this ecology. It may be prudent to note, however, that not all ecological actors are equally invested. Prioritizing the more vulnerable populations is a worthy choice to make; even if male users are challenging to engage, we might still wish to engage the female ones. This insight is also generalizable across topics, although stakeholders may change. Leveraging the popularity of Bollywood actors, as Sorcar et al. do [248], can be one way of making an ecological approach more user-friendly as well.

A tension also emerged in this regard around the balance of responsibilities between humans and technology in this ecology. The importance of face-to-face interaction was stressed by several of our participants, despite acknowledging that Menstrupedia offered learning that was otherwise inaccessible to them. Although technologies can be designed to educate in various ways, such as by offering mixed reality experiences or through games [141, 274], a human must be in control to ensure that the right information is being accessed and consumed, as many participants expressed. This is also likely to be why our participants considered games the least preferred medium for MHE (see Fig. 4.4). Technology design must focus on supporting, leveraging, and extending human communication, as against replacing the need for it. This connects also to the larger debate in CSCW and HCI regarding how we might achieve an appropriate balance among these roles.

4.4.4   Engaging with the Body

Our interviews with young adults showed that Menstrupedia was perceived to have a friendly format; there was also general acceptability around the notion that Menstrupedia provided important information (e.g., vaginal discharge, different color of blood, dietary habits, PMS and more). Many of the visuals were engaging, but some others caused discomfort, particularly to male participants. This raises questions regarding how we might incorporate ***embodiment*** into our designs. It may be preferable to begin with visuals that are less explicit, with a potential advanced goal of having (male and female) adolescents physically engage with their bodies to better understand how these

are impacted by menstruation. Designers have also tried to generate empathy among male users in prior work (e.g., [253]). Here, it is important to recognize that the cultural context has a major role to play in the success of an intervention. No matter how progressive the designers might be, aligning with the needs of a conservative audience and setting appropriate thresholds is critical, whether for MHE or for other topics.

Labella innovated around the design of underwear to enable self-learning in a private space [11], and this may be one way to foster familiarity with different menstrual products. However, intimate surroundings are not always easily created—particularly in urban middle class India, and a strong fear of judgment might prevent users from engaging. This means we might need to consider design in ways that do not view privacy as a prerequisite. Sorcar's approach recommends how we might be more subtle in our designs [248]. This also makes design more pluralistic by showing respect towards the sensibilities *and constraints* of the user, even if these are projected onto him/her/them by the environment, such as in the case of the male participant who shared that his mother would be offended if she found him reading about menstruation in the metro, or the one who mentioned his preference for an e-book so that no one could tell what he was reading.

4.4.5   Fostering Advocacy

Our study also brings up pressing questions around ***advocacy***, particularly for us as designers. How much must design abide by societal norms to gain adoption and approval, and how far might it push these boundaries? This is a question also raised by Ibtasam et al.'s recent research on women's financial inclusion in Pakistan [133]. Feminist values change from the Global North to the Global South, as well as from region to region and city to city. There are no absolute answers, but we might recognize that change is slow, and we may need to take small, consistent steps toward it. Generating both short- and long-term goals can be helpful for designers and ensure that users are in the right place at the right time to engage with the right design for them, so to speak.

Above, I reflected on our findings through the lens of Bardzell's feminist HCI [30] framework to arrive at implications for designing MHE platforms in the future, also offering more general

takeaways for topics beyond menstruation that might be conversationally taboo. We reiterate that technologies can be particularly assistive in imparting education on such topics, but as this study of Menstrupedia shows—there are affordances as well as shortcomings that must be understood to make such efforts successful.

Chapter 5
Menstrual (Im)Mobilities

Anupriya Tuli, Shaan Chopra, Pushpendra Singh, and Neha Kumar. 2020. Menstrual (Im)Mobilities and Safe Spaces. In CHI Conference on Human Factors in Computing Systems (CHI '20). ACM, New York, NY, USA, 1-15. https://doi.org/10.1145/3313831.3376653

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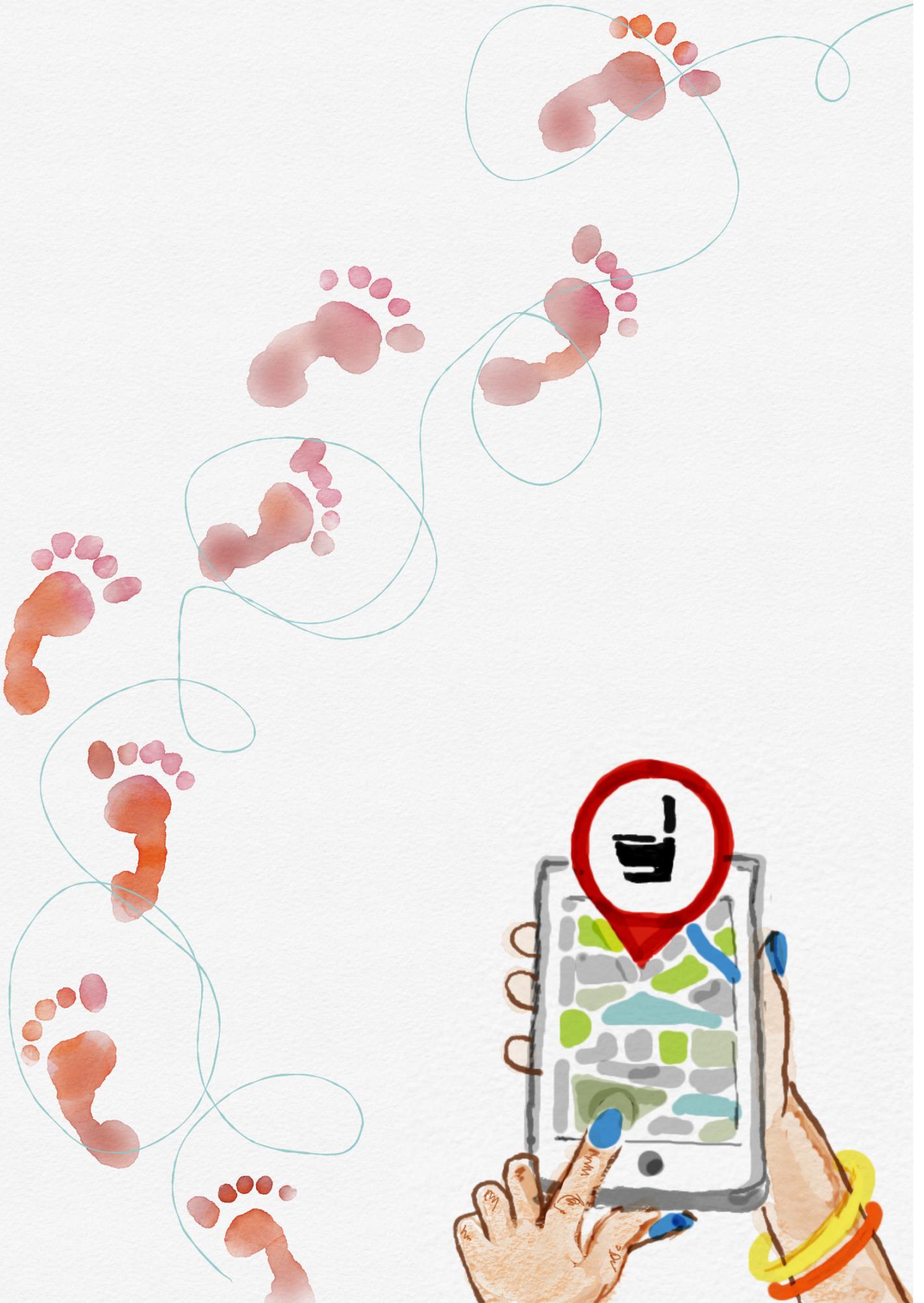
CHAPTER 5

MENSTRUAL (IM)MOBILITIES

Promoting appropriate menstrual hygiene practices is crucial for maintaining good menstrual health. However, within the home environment of adolescent menstruators in my study context, the emphasis is predominantly on learning and internalizing social behaviors related to maintaining menstrual secrecy rather than adopting healthy menstrual practices. As highlighted in Chapter 3, mothers and female guardians divert their efforts to emphasize the importance of discreet menstruation in shared spaces with non-menstruators to prevent the development of stigmatized identities.

In circumstances where maintaining menstrual secrecy is the priority, the importance of having access to menstrual products and a private, secure, and hygienic space for changing and cleaning extends beyond merely practicing menstrual hygiene; it facilitates an experience of menstruation without encountering feelings of shame, embarrassment, or compromising one's human dignity. This realization motivated me to delve into studying mobility from a menstrual lens. The goal was to understand what it means to navigate public spaces as a menstruator in an environment shaped by acute menstrual stigma and unfulfilled aspirations for safe spaces.

In 1980, Dolores Hayden—an urban planning historian—asked, "what would a non-sexist city be like?", asserting that a woman's place was no longer in her home [117]. Highlighting the sexist origins of many metropolises of today, Rao asserts that most cities were designed around men and their work, but it is time for urban design to include "the other half of the population" [231]. Extending this notion to support menstrual mobilities would entail easy access to menstrual-friendly civic and material infrastructure, specifically *functional* public toilets for menstruators navigating public spaces during periods. Fox brings the conversation around feminism and the design of public infrastructures to HCI with her research on public restroom infrastructures and the distribution of hygiene resources [91, 95]. Like Fox, I view menstruation as a site "of and for political action and technological intervention" [91].

In 2018, inspired by Fox and colleagues' work, I started thinking about what it would mean to translate their efforts of digitalization to support menstrual mobilities in my study context. In Delhi, India, gendered mobilities [285] have had only recently been made the object of scrutiny by the government [205]. Public infrastructure initiatives, including the introduction of more public toilets, aim to make the city more citizen-friendly and sustainable, duly aligning with campaigns such as *Digital India* [199] and *Swachh Bharat* [207], to "digitally empower" citizens and strengthen the urban design. In 2017, the Indian government also introduced *pink toilets* to address the needs of "women, adolescent girls, and children" [288], and launched the *Swachh Bharat Toilet Locator* [72] to show the location of nearby toilets, and *Swachhta@PetrolPump* [166] to collect collects feedback on toilets at gas stations across the city. In the same year, Google joined this endeavor by hiring Local Guides (local citizens) to geo-tag toilets, upload pictures, write reviews, and provide ratings on Google Maps [54, 58]; these maps currently represent 45,000 public toilets across the country [255], including the *pink toilets* in Delhi. The drive for pink toilets is well-intentioned; access to proper sanitation in India remains an untenable problem for women [53]. As these toilets (and their tracking mechanisms [54, 255]) become pervasive, I was keen on investigating of whether and to what extent they are poised to address a key need and source of stigma for a sizeable chunk of Delhi's population—of practicing menstrual hygiene [21, 40, 102, 280].

This chapter presents results from our research on attaining a deeper understanding of *menstrual (im)mobilities*, or the challenges and limitations that menstruating individuals face when they must contend with menstrual hygiene practices and its associated stigma in a state of transit. For this, I engaged with the culture of menstrual hygiene practices in Delhi. Using qualitative and design inquiry, I investigated current needs and practices of menstruating individuals, focusing on their menstrual hygiene practices in transit, and their experiences around the lack of toilets or other spaces they could use. I also examined their aspirations around safe spaces, or spaces where they felt that they could freely recognize, express, and address their menstrual hygiene needs. I then analyzed the insights gained using Brewer and Dourish's examination of *storied spaces*, targeting the *legibility*, *literacy*, and *legitimacy* of surrounding environments [44]. This lens fittingly and

generatively allows to illustrate how menstrual mobilities are currently negotiated, and how exist-ing mobile technology support falls short of meeting target users' needs. Taking a social justice stance through these insights, I extend conversations in the HCI community at the intersection of material and civic infrastructures and gender equity (see Chapter 2, section 2.3.3). I conclude by discussing how technology design might better support menstrual mobilities by offering a *third space* to support menstrual hygiene practices [36, 186].

5.1   Gendered Mobilities and Safe Spaces

Cresswell and Uteng define mobility by "not only geographical movement but also the potential for undertaking movements (motility) as it is lived and experienced—movement and motility plus meaning plus power" [285]. They add, "Each of these aspects of mobility—movement, meaning, practice and potential—has histories and geographies of gendered difference." Rao reflects that she felt safer in "Mumbai and New York than Delhi and DC", and that her "instinct was grounded in a long history of urban planning, and how most cities never accounted for women in their design", highlighting how mobilities and access have been and remain gendered [231]. Building on these writings, we decided to investigate how gendered mobilities are sought and negotiated in a localized yet pervasive scenario—that of practicing menstrual hygiene in conditions of transit. We chose to examine the case of Delhi in particular, amid a strong popular sentiment that finds the city seriously unsafe for women [289].

My conceptual understanding of mobilities is shaped by how we understand *space*. Dourish and colleagues [75, 115] have differentiated between, and drawn connections across, the concepts of *space*—as geographic location—and *place*—as lived or experienced environment. They as-sert, "we are located in *space* but we act in *place*" [115]. Along similar lines, Tuan defines place as "more than a location, while that *more* is related to the personal experiences of places" [277]. While designing technology-based interventions for mobility, Brewer and Dourish propose grounding their designs in the "experienced place" or users' cultural context as they argue: "mobile informa-tion technologies [...] are tools that serve to structure the spaces through which they move" [44].

We draw on Brewer and Dourish's examination of *storied spaces* [44] to explore the relationship between mobile information technologies and *safe spaces*. Prior HCI research has engaged with technology interventions such as panic buttons, online storytelling, and a breastfeeding-friendly tool that aim to address everyday mobility challenges [4, 70, 23, 146]. Definitions of safe spaces in HCI have been shaped by research in both online and offline environments. Scheuermann et al., among the first to document transgender individuals' experiences of technology-mediated safety and harm, elaborate: "while safe spaces emerged as a conceptual space of resistance to violence and freedom to organize, the term has become commonly used to denote safety from any emotional harm or othering" [239]. Their work and others' (e.g., [38]) highlights the importance of safe spaces for affording the mobility of information around a range of stigmatized topics, such as mental health [16, 37, 131, 244], HIV/AIDS [157], sexual abuse [13], and pregnancy loss [14, 15]. I extend this research by investigating *menstrual (im)mobilities*, studying the challenges individuals face in dealing with their periods on the go, and their aspirational safe spaces in this context. The notion of a *third space* [36, 186] also inspires me to consider ways in which we might foster liminal spaces for culturally situated knowledges and representation in our context (e.g., [258]).

5.2   Methodology

The IRB-approved research took place in Delhi's National Capital Region (Delhi-NCR), India, from February 2019 to July 2019. Here, the goal was to attain a deeper understanding of the challenges and limitations that face menstruating individuals when they experience periods in transit. To do this, I collected data using participatory design exercises (alongside interviews), and an online survey to corroborate our findings.

5.2.1   Participatory Design

I engaged in participatory design, aligning with Spinuzzi's recommendation of using participatory design as a methodology [251], to develop an in-depth understanding of participants' current practices around managing menstrual hygiene on the go, factors that shape these choices, and

	Activity 1 (10)	**Activity 2 (25)**	**Survey (139)**
Gender	Female (10)	Female (25)	Female (138), Genderqueer (1)
Age	Min 20, Max 36, Median 24	Min 20, Max 48, Median 27	18 to 35 (123), 35 to 50 (13), 50 & above (3)
Occupation	Student (6), Professional (4)	Student (15), Professional (6), Homemaker (4)	Student (84), Professional (48), Homemaker (6), No response (1)
Annual family income	Low: <$11K (2), Middle: $11K-$26K (3), >$26K (5)	Low: <$11K (8), Middle: $11K-$26K (8), >$26K (8), No response (1)	Low: <$11K (22), Middle: $11K-$26K (62), >$26K (41), No response (14)
Religion	Hindu (7), Sikh (1), No particular religion (2)	Hindu (17), Muslim (2), Sikh (1), Other (1), No particular religion (4)	Atheist (4), Hindu (100), Muslim (2), Sikh (5), Other (4), No response (5), No particular religion (19)
Daily transport	Own vehicle (1), Auto rickshaw (4), Buses (1), Metro (10), Ola/Uber (4)	Own vehicle (11), Auto rickshaw (5), Buses (4), Metro (15), Ola/Uber (16)	Own vehicle (44), Auto rickshaw (27), Buses (12), Metro (93), Ola/Uber (59)

Table 5.1: I conducted two participatory design activities with 35 women (labeled P#). Participants P1-P10 participated in Activity 1, and participants P11-P35 participated in Activity 2). I also conducted a short online survey (labeled S#) to corroborate the findings from the first two activities and accompanying interviews.

participants' aspirations of a public safe space while on their period. I conducted two activities with 35 participants (see Table 5.1). Each session graphicluded a participant and two researchers (Shaan, an undergraduate student collaborator from IIIT-Delhi and myself), I moderated the session while Shaan took notes. Sessions were at locations convenient to the participants. At the start of each session, I explained the study protocol to the participant, and obtained written consent. Participants were recruited through our team's social networks using purposive [271] and snowball sampling [111]. We disseminated the call for participation by sharing it across all team members' email, WhatsApp, LinkedIn, Twitter, and Facebook networks. All data was collected in both English and Hindi field notes, audio recordings, and photographs. Audio recordings were transcribed—and translated to English as necessary—for analysis.
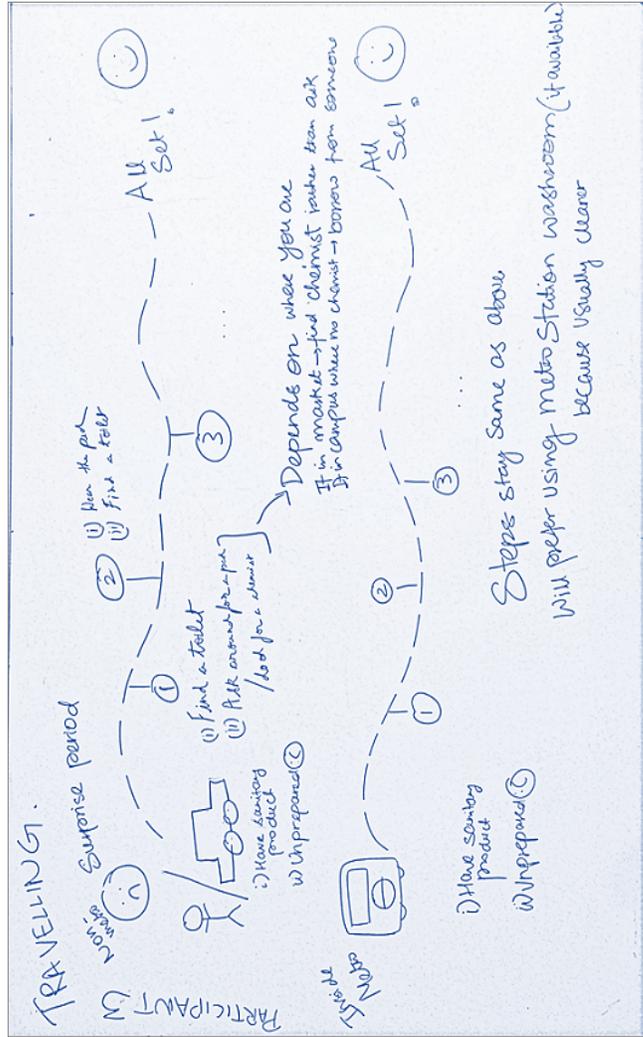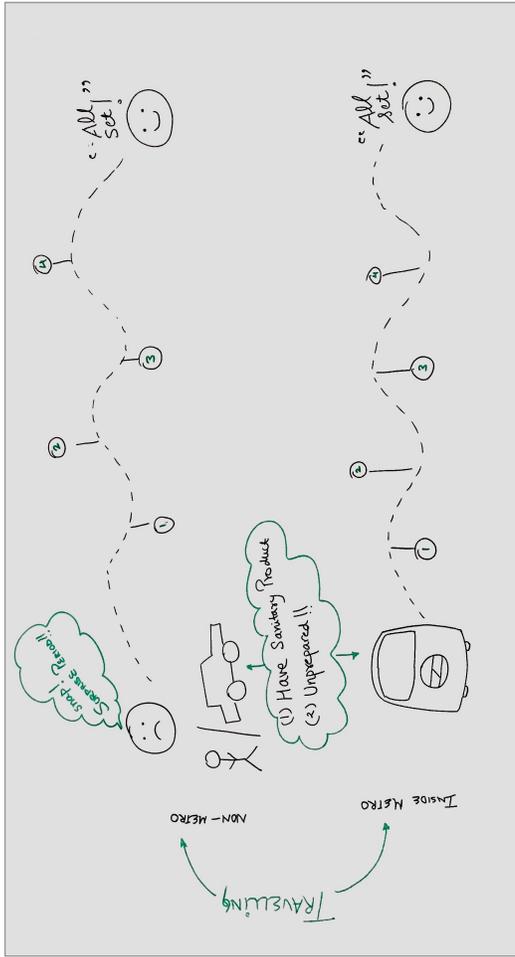
Figure 5.1: In Activity 1, the participants were asked to complete a bare-bones diagram (top left image) for four scenarios shown in top right image and were asked to use markers and sticky notes to illustrate *"the steps they would take in each situation."* Throughout the process, I queried them with varying contexts: *"What if the washroom is dirty?"*, *"What if you are short on time?"*, *"What if you are just 5 minutes away from your destination?"*

Activity 1: Identifying the Building Blocks of Safe Spaces

In the first activity, the focus was on identifying both tangible and intangible components that participants associated with safe spaces in the process of practicing menstrual hygiene. Individual sessions were conducted with 10 participants who identified as female and menstruating. I began the session by collecting information about participants' daily commuting practices and modes of transportation. I then asked them to share their experiences (if any) of dealing with surprise periods on the go. Next, I asked the participants to complete a bare-bones diagram of their *journey* from having a *surprise period* while travelling to being *all set!* (see Fig. 5.1). Here, the participants were presented with four scenarios and were asked to use markers and sticky notes to illustrate *"the steps they would take in each situation."* Throughout the process, the I, queried them with varying contexts: *"What if the washroom is dirty?", "What if you are short on time?", "What if you are just 5 minutes away from your destination?",* and more. Finally, I gauged the perceived usefulness of the information regarding the availability and access of "safe spaces for bleeding." For example, I asked, "If you have the information about the nearest washrooms, will it be helpful?", "Will knowing about the condition of washrooms like availability of soap, water, and more make a difference?", and "How will the information about the availability and status of a sanitary napkin-vending machine impact your decision?"

We, the student collaborator and myself performed open coding [237] to collate our findings from Activity 1 and consulted the data from national and international guidelines on designing menstruation-friendly public toilets [288, 293], to come up with 52 unique elements (building blocks) of safe spaces for our case. Examples of elements included *access to sanitary products*, *safe location*, *toiletries like water, soap, tissue paper, etc.*, *lady attendants*, etc. Finally, both of us collectively conducted affinity mapping [112] on this data to arrive at a consolidated understanding of aspirational safe spaces based on these identified themes: *privacy*, *safety*, *accessibility*, *availability*, *cater to menstrual hygiene requirements*, and *well-maintained*. The lessons learned from this activity, including the building blocks we identified, formed the basis of our next activity.
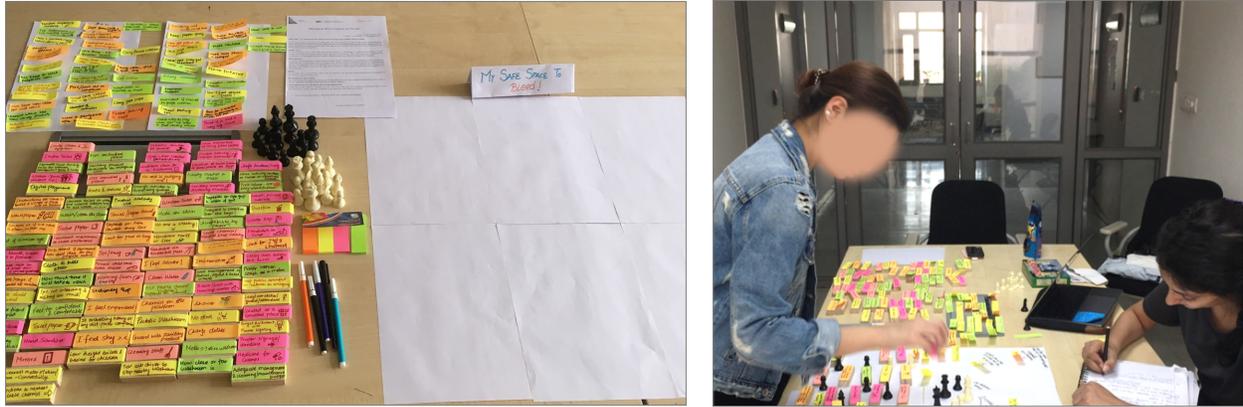
Figure 5.2: In Activity 2, participants were asked to visualize public safe spaces for a positive-period experience, through sketching and/or using the blocks visible above. Each block represented an element identified in Activity 1. Here, the white background represents the physical space where participants were asked to construct their safe space using existing blocks or by creating new elements (using empty blocks and post-it notes).

Activity 2: Constructing Safe Spaces

The second activity was designed as an open interactive session, conducted with 25 adult women, and lasted 30-40 minutes. Here each participant was asked to visualize their aspirational (public) safe space(s) for a positive-period experience, through sketching and/or using wooden building blocks (see Fig. 5.3). Each block represented an element identified in Activity 1. The white background represented the physical space where participants were asked to construct their safe space, using blocks or by creating new elements (using empty blocks and post-it notes). To understand the role that crowds played in the construction of these spaces, participants were asked to place chess pieces in their space. Black pieces represented male presence, while white represented all other company. Participants from Activity 1 did not participate in this activity; this was so I could validate findings from Activity 1 and allow for other perspectives to emerge until I had achieved data saturation. Each session included the participant and two researchers (the student collaborator and myself), where I moderated the session, while the student collaborator took notes. The sessions were conducted as per the participants' convenience.

Each session began with participants building their space(s) using the blocks. Once the partic-

Figure 5.3: In Activity 2, to understand the role of the crowd in shaping public safe spaces for a positive period experience, participants were asked to place chess pieces in their space. Black pieces represented male presence, while white represented other genders.

ipant had finished designing their space, the moderator explicitly asked the participant to position the black and white pieces in the context of their safe spaces. Finally, participants were asked to prioritize the elements in descending order of relevance. Throughout the session, I gave different scenarios and asked unstructured questions to probe the choices and placements of the elements in the space: *"What if you are running late for a meeting?"*, *"Imagine you are traveling in the women's coach versus the general coach (of the Metro)"*, and *"When caught by surprise by your period, do you prefer to be alone or in a group?"* Participants were also given various scenarios to further gauge their comfort around people across genders in their space. For example, *"Would you feel comfortable if you were traveling with male members of your family?"*. Towards the end, participants filled out a survey with eight questions about demographics, three about commuting practices, and one about their experience using mobile applications (such as Google Maps or a toilet locator application) when dealing with periods in transit.

I analyzed all the data collected—audio recordings, field notes, and photographs—using inductive thematic analysis [43], where I observed repeating themes from the first activity. Examples of codes included *experiential information, safety, time matters, aspirations, technology support, crowd effect, comfort of a companion, preparedness, temporary hacks, poor infrastructure, solidarity,* and *fear of stain.*

5.2.2   Online Survey

To understand how women dealt with menstruation while in transit, I co-designed and distributed a survey in collaboration with Haiyya Foundation [1]. Haiyya has extensive experience in working towards providing safe spaces for women in Delhi NCR to access sexual and reproductive health services. The survey included 13 questions, with 2 filter questions (capturing gender and age) and 6 on demographics. All but one questions were multiple-choice, and asked about participants' approach to period preparedness, that is, whether they carried a sanitary product with them, what happened when they did not, etc. The single open-ended question was aimed at offering respon-

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[1]https://www.haiyya.in/

dents the space to share their experiences while having to deal with periods on the go.

The survey was developed and administered in English using the SurveyMonkey platform. This survey formed a small component of a more extensive online survey conducted across India by team HAIYYA to understand aspired safe spaces to support menstruators' intimate health and wellbeing. The respondents were recruited by sharing the call for participation through email, WhatsApp, LinkedIn, Twitter, and Facebook networks accessible to team HAIYAA and our research team members. This survey sought responses from adult women menstruators located in India. A note at the beginning of the survey explained the objective of the study, also seeking written consent via button click—*"*By clicking 'Next', you will be giving your consent."* The survey was designed to collect anonymized responses, i.e., it did not collect any identifying information such as respondent's name, email address, or IP address. However, toward the end of the survey, we decided to include a question to inquire whether the respondent was willing to engage in an additional interview, which could be conducted remotely or in person. If the respondents opted to share their contact information, their survey responses ceased to be anonymous. In these instances, I maintained a separate record of the contact details for interested participants while preserving the anonymity of their responses during data analysis.

The survey received 361 hits over one month; of these, 106 participants only filled out the filter questions, 11 did not attempt the survey, leaving us with 244 responses, including 139 from Delhi NCR. Since Delhi NCR is the geographic focus, I only analyzed these 139 responses for the study. Here, I analyzed the open-ended questions using inductive thematic analysis [43]. Examples of codes included *preparedness, temporary hacks, poor infrastructure, solidarity,* and *fear of stain.* The remaining responses were analyzed by calculating percentages and cross-tabulation [150]. An example of cross-tabulation included comparing answers to *"Have you ever been in a situation wherein you had surprise periods while in transit?"* and *"How do you prepare for dealing with surprise periods in transit?"* The analysis of survey responses was mainly helpful in corroborating findings from the methods listed above.

5.2.3   Reflexivity

Recognizing the impact of a researcher's positionality on data collection, analysis, and presentation is crucial. Our research team, comprising four HCI researchers, shares a commitment to advancing menstrual health, hygiene, and more broadly, women's health, wellbeing, and empowerment. Of the team members, three identify as cisgender females, and one as a cisgender male. Each of us has lived in Delhi for over 10 years, providing us with intimate familiarity with the public infrastructure challenges this research delves into.

As a cis-woman, I conceived the study design and led the data collection, drawing on my lived experiences of navigating public spaces during menstrual days. The scenarios explored in participatory design sessions were heavily influenced by my 15+ years of observing and practicing menstrual hygiene during transit in Delhi. While conducting this research, I was training to become a menstrual educator at Sachhi Saheli [236], a non-profit organization focused on menstrual health, sexual and reproductive health rights, and women's empowerment. During this period, the Sachhi Saheli team drafted a proposal for installing intelligent sanitary product vending machines at Delhi's metro stations. My interactions with the team, especially regarding their proposal and its reception by government officials, influenced the questions and probes employed in this study.

For data analysis, I worked collaboratively with Shaan, also a cis-woman born and raised in Delhi. It is crucial to recognize that our understanding of prevalent period vocabulary and our shared experience growing up in a community lacking infrastructure supporting menstrual mobilities have influenced our approach to analyzing and presenting the data in this chapter. Throughout the data analysis process, the research team convened regularly to develop the arguments presented in this chapter. Our team's feminist and emancipatory action research mindset, aiming to explore how technology design, adoption, and use can prioritize the needs and interests of women and other underrepresented groups, has further shaped our data interpretation.

5.3 Findings

Menstruation is a highly stigmatized topic in urban India, as discussed in previous chapters. In particular, Chapter 3 highlights the deep-rooted stigma and its impact on the everyday lives of menstruating individuals. These challenges and their impact were also echoed by participants of this study, who shared that they felt *"anxious," "panicked," "horrible,"* and *"scared"* when caught by surprise on account of their menstrual period. Focusing on mobilities during menstruation, I detail below how our participants worked actively to avoid facing menstrual stigma in such scenarios, as well as the safe spaces they aspired for.

5.3.1 Dealing with Periods on the Go

Participants practiced preparedness as well as various *"temporary hacks"* to minimize the challenges faced on account of their periods while in transit. I describe below how they ensured preparedness, sought support from other women, and located/constructed safe spaces on the go.

Prioritizing Preparedness

Menstrual products are not typically available in public washrooms in India, although there have been a few initiatives in some educational institutions (e.g., [2, 210, 284]). Participants shared that they thus needed to remain equipped with sanitary products, hand sanitizers, tissues, wet wipes, and/or Pee Safe sanitizer sprays in their handbags if their period caught them by surprise.

> "I am generally prepared. So I have my handbags and every handbag has one or two products always. Finding a particular product also becomes imperative in certain demographics as such. I carry hand sanitizer with me all the time now." (P27)

Most interview participants and 60% of the survey respondents said that they were always equipped with sanitary pads, to avoid the hassle of having to procure them on the go; S57 shared, *"I get anxious if I don't have a pad, and if I can't buy a pad anywhere nearby then I go home."*

Almost a third of the survey respondents believed in being prepared particularly when they were expecting their periods. As expressed by P28, *"once I know that I [have] started ovulating, I wear pantyliner as it is more hygienic. Especially since the time I have begun traveling like college and work."* However, 12% of survey respondents said that they did not feel the need to prepare for practicing menstrual hygiene on the go—*"Surprise periods occur rarely. There is no need of being prepared every time"* (S3)—and preferred to *"arrange something on the go"* (S56).

When participants found themselves unprepared, they depended on *"temporary hacks"* such as tissues, toilet paper, handkerchiefs, or cotton to avoid getting stained, until they could get access to a sanitary product. The fear of a period stain surfaced repeatedly across our findings. For example, one survey respondent shared, *"I had nothing. Ultimately I used my hanky for, but that was horrible because I was going to washroom very frequently to check if I am stained or not"* (S38). When stained, participants' priority shifted to hiding or covering the stain using any available piece of clothing, like a scarf or jacket, as expressed by one interview participant (P29), *"So, if I have a coat or something to hide it then I am self-sufficient but if not then I need something to hide the stain. I don't know, maybe I will look and buy something from mall."*

Prioritizing preparedness was critical to avoid being subject to the stigma of being caught with a stain, and participants shared that this was constantly on their mind as a scenario to be avoided at all costs. They avoided relying on their extrinsic environments to the degree that they could, and had personalized workarounds ready if the worst were to happen.

Relying on Solidarity from Women in the Vicinity

Three-fourths of the survey respondents shared that, when they found themselves unprepared, they relied on solidarity from women around them. This sense of solidarity was expressed by a survey respondent (S11) thus: *"There is always this understanding between two women I suppose, when it comes to period."* Research participants commonly relied on women in their vicinity for borrowing sanitary products, as S35 shared: *"Women around will always offer help by offering their back-up products. I've done it for others and vice versa. Plenty of times."* Notably, approaching women

in public spaces (such as bookstore at the airport in S28's response) when one was out of sanitary products was not seen as unsafe or challenging, although this was less desirable when there was male presence.

While traveling in the Delhi Metro, the women's coach was viewed as a *"personal space"* and the *"go-to place"* for support in the given scenario: *"In general coach I visualize more of males. So if you are in ladies' coach and you ask for pad, there will be like 3 or 4 people more listening to you, so basically there is high probability of finding the pad/product. Yes, [women's coach] makes a difference! I will be more at ease in women's coach"* (P15).

Participants also turned to women nearby as they sought comfort and help towards hiding period stains: *"They [the women around me] will somehow be able to hide it [stain] and help me to go to place where I might find amenities. They can also cover it by standing in front of me"* (P31). One survey respondent (S7) also shared that when a girl in her class got her period, teachers helped out by *"covering her skirt."*

This solidarity extended beyond offering sanitary products and hiding period stains as well. In the words of one interview participant, a period stain was not the end of the world, but a potential call for empathy and/or concern.

> "If I see a woman with a stain I would be concerned like are you okay? Do you need medicine or hot water bag but not create a hoopla around it! I will not be 'Oh my god, it's a stain', that would be my last concern, it's just like any other blood stain. I would be concerned if the other person needs anything, as basic as chai or warm water, but not be concerned that they have stain." (P28)

Safe spaces for practicing menstrual hygiene then did not translate to a particular physical location, such as a handbag, washroom, or a coach in the Metro, as in the subsection above. They included many locations where one could expect to find the company of other women that one could derive solidarity from (even if there was not a one-to-one mapping between women and menstruating individuals). Protection from stigma was key.

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Locating (and Appropriating) Changing Rooms

Although safe spaces were not all about washrooms/changing rooms, they *were* in large part about them. Once participants had obtained access to a sanitary product, they needed to locate a place where they could change, at a minimum. As S27 expressed, *"the problem wasn't of the availability of sanitary products but the availability of toilets."* Government and industry initiatives have been taking active measures to provide information about public washrooms online [54, 72, 86, 255], but most participants did not seem to be aware of these efforts. All the participants admitted to using Google Maps whenever they traveled, even when they were familiar with their routes, but *"it never occurred"* to them to use these maps for locating public washrooms or to *"lookup for such [toilet locator] app"* online. Fewer than a handful of interviewees had used Google Maps to *indirectly* locate washrooms by looking up the nearest mall, marketplace, or petrol pumps, as they *"didn't know whether it could do that (lookup toilets) or not!"*

The exercise of locating safe spaces (such as public washrooms) for changing was shaped by women's mode of transportation. When using public transport, women preferred to locate washrooms manually or by asking around for directions, as shared by one participant:

> "I will prefer to walk out and manually hunt for washroom because there are lot of places which are not on Google map. For example, there would be a building but there would not be a washroom specifically marked on Google map. So I would instead look for them physically rather than searching on Google map." (P12)

For women who could afford it, travel by cab or personal vehicles offered them the "freedom" to reroute to specific locations (e.g., pharmacies, public washrooms, their homes) without worrying about being judged by crowds. This was especially the case if they had a period stain.

> "This gives a lot of freedom right! I can stop anywhere, buy anything. Also there are so many malls in the city. I think cab is really not an issue though. I will go to the nearest chemist and then search for toilet." (P32)

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Additionally, a private vehicle was viewed as a safe changing space, in the case that a washroom was inaccessible. An interview participant shared that she would *"just kick out the person for some time and you know change or put pad"* (P17). One survey respondent (S14) also shared:

> "I realised my periods started in the back of the car, with my friends sitting in front (1 female and 1 male). Even though I wasn't that comfortable with that male friend, I immediately told him to look for a chemist shop. Without me putting much emphasis on it they both understood and the guy started looking for one immediately. I gradually started building the urgency and why I need it. Luckily after like 10-15 minutes, we spotted a chemist. Then the issue was where [space] to put it (the pad) on. Chemist didn't have a space I could go and do that. Car? A sad alternative but possible if we get nowhere else." (S14)

From the participatory design exercises as well, it was clear that the definition of a safe space was conditional on the mode of transport participants were using, and the public infrastructures available nearby—of a mall, public washroom, or a pharmacy. The burden of reasoning through a given scenario to locate a safe space rested with our participants at all times that they were outside their homes and on their period.

Going the Extra Distance for "Love and Care"

Participants turned to what was familiar in their quest for safety, and opted for visiting friends or relatives nearby, rather than locating public washrooms, even when the latter might have technically taken less time.

> "If my home is 40 minutes away and this safe space is 30 minutes away, then I will prefer going home or probably my friend's home because at home or even if it's my friend's place, the people will be understanding and there is extra love and care we get! So basically, you are not being treated as just one another person in the mall. They understand you!" (P12)

Company and empathy mattered to participants, but if they could not find such a place nearby, participants preferred using public washrooms (at the Metro station, a restaurant, or a mall) where they had been before and could recall having a good experience, even when they were not the closest. P4 elaborated, *"If I really have to go to the washroom and I am in the Metro, then I get down at Rajiv Chowk and use the Starbucks washroom because I find that fairly clean."* Participants were open to using a washroom in a mall or restaurant if it had been recommended by other friends, relatives, or women nearby as clean and safe: *"It would be nice to know if people have used a place for such kind of purpose. So if I see that someone has used this place that will increase my trust for that place"* (P35). This trust that P35 mentioned was evidently challenging to build; participants were not in the habit of trusting public infrastructures to be tailored to their needs.

Developing a "Period Vocabulary", or Not

In locating safe spaces and/or friendly faces, participants seldom expressed themselves using terms or phrases that precisely communicated their situation. They had their own *period vocabulary,* which they used to signal their needs. For example, one participant (P35) consistently used the word *"things"* to refer to sanitary products: *"If the person is having the regular cycle and know that it is about time then people will be having the things [sanitary pads], at least I will be having the things."* Words like *"tension," "pressure," "discomfort,"* and *"emergency,"* were commonly used by participants to refer to the condition of having one's period. Further, for most participants, the term *"safe space"* immediately led them to thinking about washrooms.

Communicating about one's (or another's) period was also challenging for similar reasons. Participants stressed the importance of using the right language to indicate that they needed a sanitary product, or to inform someone else that they had a stain:

"Sometimes you don't know if you are stained. So if somebody notices my stain I expect them to tell me. So, that is a kind of experience I had, so I saw a girl with stain and I think she didn't know about it so I just went to her and informed her. That said, you should tell this decently!" (P34)

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Even when participants were okay talking freely about their own period, they were mindful of others' comfort levels—both around experiencing one's own period in public, or even seeing a stain on another. As P28 shared:

> "See, I don't care but at the same time I can sense if other people are uncomfortable. I am comfortable anywhere in any public space even if I have stained my dress and people can see my stain. But then you know I can sense that everyone is getting uncomfortable by looking at me, and they are all the more weird that why am I not uncomfortable and walking so freely." (P28)

Non-verbal communication around the stain also highlighted that even when there was a lack of precise vocabularies to describe the scenario participants found themselves in, the sense of alarm as well as solidarity that resulted from a stain were tacitly received and unanimously appreciated.

Securing Physical Safety First

Prior research has discussed challenges around women's safety in public spaces of Delhi [146]. Our participants also noted that concerns around physical safety were frequently present when thinking about identifying a safe space for changing, depending on the time of day.

> "So only in night, searching for a safe location will be on top of my head otherwise [in day time] I would not worry much about safety or having experience of a place before or feel insecure or have preference for lighted place. These things matter to me only at night!" (P12)

Although during the day crowds were a source of discomfort on account of the fear of being judged (such as for a period stain), they were seen as favorable at night by participants as it would make them *"feel more secure."* All participants stressed that having a companion (friend or relative), especially at night, would make them feel secure and at ease: *"See, if I don't have this safe space which I have just created, then having a companion creates a huge difference. If I am blessed with my safe space then I am completely fine on my own. You know this [constructed safe*

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space] is a very ideal state where I can walk to a guard and ask for help. This is too safe!" (P32). Participants knew to temper their expectations, given their knowledge of public spaces in Delhi.

When it was dark, physical safety was a bigger concern, but it was also a boon where stigma was concerned, as it was easier to hide stains and avoid attracting people's attention (P25): *"[At night] I will be needing all those things which I need in such situation, but the difference would be that tension in my mind will be less in night since there is darkness around, so maybe less number of people will be around who may concentrate on you, I think they will be less active which will help me in dealing with the thing in better way."*

Practicing menstrual hygiene on the go thus entailed a multi-faceted adventure; participants described in depth how they carried their safe spaces with them in their handbags (as far as possible), drew on the support of women in the vicinity, and struggled to identify safe spaces for changing. These steps were essential not only for securing physical comfort, but also for protection from being subjected to stigma—as evident from the importance given by participants to hiding stains, or identifying ways of speaking about menstruation in imprecise terms.

5.3.2 Aspirations for Menstrual Mobility and Safe Spaces

I now detail the findings from the participatory design exercises, where I asked participants to construct the aspirational safe spaces they could turn to when dealing with periods on the go. Using wooden blocks, chess pieces, post-it notes, and markers, participants were asked to convey what a safe space meant to them—whether it was a washroom or more, what kinds of information they needed, and what they expected from their environments.

First, a Functional Washroom

On being asked to build a safe space for practicing menstrual hygiene on the go, most of the participants started with building a washroom and used up most of their blocks and time in its construction. As discussed above, this connects back to women practising preparedness (P7): *"I am prepared enough. I carry my stuff with me. So the first step, if I am not wearing a pad, is finding*

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Figure 5.4: In Activity 2, participants were asked to visualize public safe spaces for a positive period experience, through sketching and/or using the blocks visible above. Here, the white background represents the physical space, and each block represented an element identified in Activity 1. Most participants placed blocks in a radial arrangement with the washroom and its facilities at the fulcrum of their space.

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a washroom.” Many participants mentioned that they would *“first check for false alarm”* (P31) or a stain in a washroom, then use *“toilet paper as temporary fix”* (P21).

The importance of the washroom was evident throughout the different structures of the safe spaces built by participants. Most participants placed blocks in a radial arrangement where the washroom and its facilities formed the fulcrum of their safe space, with surrounding blocks denoting pharmacies and other environmental needs (see Fig. 5.4). Participants also differentiated between public and private washrooms. While the former were often without basic amenities such as soap and water, the latter left participants feeling more assured:

> "In general, public washrooms' conditions are very bad. So clean water, hand-wash, toilet paper—these basic things—are very limited in our general public washrooms. So my basic expectation from public washroom is water and hand-wash. I am expected to carry my sanitary napkin because they will not have dispensing machines. So finding a decent washroom with soap and water is an ordeal. Also, I want to add [to my safe space] a lockable door to the toilet, which is also missing sometimes in public washrooms [. . .] So public places like markets where there is dearth of public washroom, and we look for cafes for using the washroom. Now the central government has made it that you can use any washroom in any restaurant. So now if the big cafes like Starbucks, CCDs, and all are little more considerate for women users, then it will be really nice safe place to use washrooms, which in any way we are looking for when we go for shopping." (P19)

Although a functional washroom was desired by most participants, that wasn't all they wanted. Cleanliness and hygiene were of high priority, followed by the availability of toilet paper, wash basin, running water, soap, garbage bin, lockable doors, mirror, etc.—either free of cost or at an affordable fee. Expectations around public washrooms were low, but most participants and 82% survey respondents preferred washrooms at Metro stations over other public toilets, since these were newly constructed, easily accessible, and relatively well-maintained.

While on the one hand, a washroom (with the above amenities) provided a safe space for

participants to tend to their menstrual needs, on the other, it also allowed them to avoid dealing with any menstrual stigma they might have faced had there been a separate demarcated room for addressing menstrual hygiene needs. As one participant (P24) acknowledged, *"I know there is a stigma around menstruation, but it would be just like using a washroom. People would not know the purpose, right?!"*

More than just a Washroom

Although participants used up most of their time in designing a washroom, they also voiced the desire for a changing space that was clean, hygienic, accessible, and private. Although this was generally a washroom, it could also be any closed and lockable space, such as a car or a private cubicle. As P23 said, *"I want a dedicated space like baby care rooms. I want them everywhere in addition to washrooms for menstruation, specifically dedicated for menstruation and changing sanitary product."* Participants also mentioned additional desires, such as access to food (and chocolates), herbal teas, energy drinks, and medicines for stomach cramps, an underwear-dispensing machine, a separate area for women's health products at the pharmacy, and even just comfortable cushioned chairs and hot-water bottles.

> "[I will need] medicine and energy drinks. When I have pain, I really feel like lying down. So maybe in girls coach [in Metro] they can create few special seats with cushions. It would be great to have an underwear dispensing machine or cheap and temporary bottom wear dispensing machines." (P32)

Participants' needs were centered around a washroom, but did extend to other amenities such as medicines, energy drinks, and more (see above). I also found that participants frequently seemed to think that they were aspiring for too much. One participant (P28) remarked, *"I would really want to know if there is tissue paper but then I guess it's very stupid!"* Another (P22) laughed and said, *"In the washroom I would like to know about running tap, but isn't this asking for too much?!"* Still another (P27) considered hot/lukewarm water a "luxury". As Kumar et al. discuss

in their work on leveraging aspirations towards design, *"aspirations are embedded in larger sociotechnical assemblages that are not entirely intrinsic to the individual in question"* [156]. In tempering their expectations, participants were continually ensuring that they were not unreasonable in their aspirations, given their experience with their environments, adding: *"because as you know generally washrooms here do not provide all these facilities."*

Locations of Safe Spaces, Online and Offline

Although participants were mostly uninformed of existing information channels, such as Google Maps and various toilet-locator applications, and prioritized experiential information, they did express a desire to have information regarding the nearest chemist and washrooms with a detailed list of available facilities:

> "No, I am not aware of such applications. I think, even now, when I know something like this is available, I might not install it. As I mostly commute through Metro and I usually know where these washrooms are! But yes, if I am travelling to a new place then maybe I will. So if an app provides me in-depth information and not just about where are the toilets, then I will install and use it." (P11)

Participants were keen to know where the nearest washroom was, which existing applications could inform them about:

> "In my case, I have this severe pain so I avoid stepping out of the house and even if I have to then I have to ensure that I am well prepared (carrying pad, food, and stuff). So if this [application] works out then I will not have to wait one or two days to go out! Yes, it will be amazing!" (P32)

However, participants also wanted to know if the washroom would be "safe" to use or not. Knowing that it was clean, hygienic, with running water, soap, etc. was the level of awareness they sought, adding that it would *"take a burden out"* and make them *"secure", "carefree", "less worried", "more prepared",* and *"end the crisis-ness of that moment."* One participant (P30) shared:

"Just like the things are on Google where you can actually see the places and everything that makes our life so easy, so similarly if we have that kind of information on our phone that how secure is this place, what are the amenities in the washroom, what kind of people are here and what time is it crowded or not crowded then that will be helpful." Another way of getting at this information was through reviews or ratings indicating the experiences of other women (to the extent that this information could be deciphered). Participants expressed a willingness to consider using a public washroom if there was information about its use. For example, information about the location of Metro washrooms was seen as desirable, since these were *"still relatively in better condition, and there is a staff which takes care of it, but the same can't be expected from a public toilet"* (P24).

Additional information that participants cared to have was whether public (or Metro) wash-rooms had women attendants or not. If so, this would add to their comfort levels. As S4 shared: *"So outside the public washroom usually, a guy sits over there charging you for it. So if there is a woman that will undoubtedly [bring a] change. It will be more comfortable"*. These attendants are typically male, and participants felt that if they were informed and empathetic, it could transform their experience of the washroom:

> "I want this one thing. I don't know how overly ambitious I am being, but yes, the
> male guards (attendants) of the Metro station washroom should not be immune to this
> nor should be unaware about the situation. I mean that it should be a very normal thing
> for them if a girl approaches for help. They should be informed." (P32)

A Period-Empathetic Environment

Participants revealed a continual awareness of who was around them (and their genders). They naturally preferred the company of a female friend or family member over being alone. When traveling alone, finding oneself surrounded by a crowd of women, even if they were strangers, was acceptable because they would "empathize and not judge", be "understanding", or "offer help" (perhaps in the form of a sanitary product). Amidst a predominantly male crowd, participants felt the fear of being judged, especially if they had a period stain.

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"It becomes a hoopla right, if they see a stain. I don't want anyone to judge me. I want everyone around to do their jobs and not stare if they see a stain. They should be concerned at the most but not judgmental." (P28)

With regards to male company, either family members or friends, participants shared mixed feelings. Many participants viewed them as part of their comfort zone, as shared by P25: *"It doesn't matter from which gender the person [companion] is because it will be my comfort zone as compared to everyone else in that situation or area around me."* This did not hold, however, when participants felt that their companions might have old-fashioned beliefs on the topic of menstruation. Age was seen as a factor here:

"I will ask for help from people around me irrespective of their gender. In fact I have done this couple of times where I have approached people specifically males for help and I have seen that people from my age group, not too old people, are actually very understanding about it. As far as I have met them, I can't speak for general case."(P30)

Underlying these attitudes was the aspiration for a safe space where individuals across gender and age could be seen as empathetic, not likely to judge or stare.

5.4 Discussion

As in Brewer and Dourish's *storied spaces*, I found that our participants' encounters with space were framed by cultural logics, "a series of collective understandings through which space and spaces take on different kinds of meaning" [44]. By studying participants' responses to their surroundings when practicing menstrual hygiene, and contrasting these with the Delhi government's (and other) attempts to introduce toilet-locator applications, I imagine how technology design might support new forms of "environmental knowing" [44]. Brewer and Dourish posit that "information technologies are deeply implicated in the operation and emergence of these logics, and the forms of collective encounters in space", and I unpack these implications below. To do so, I dwell on the constructs of *legibility, literacy,* and *legitimacy* introduced by the authors [44].

5.4.1 Legibility: Panoptic, Local, and Personal

Brewer and Dourish discuss *panoptic* and *local* legibilities. They define panoptic legibility as a "centralized form of legibility, in which a standardized scheme can be applied across multiple settings and locales in order to measure and compare them" [44]. "It is almost by definition", they say, "a view from nowhere" [44]. By contrast, local legibility is defined to be the view "from within" or "on the ground" [44]. These references are reminiscent also of Haraway's notion of partial and *situated knowledges* [113], reminding us that there are not only panoptic and local legibilities at work, but also *personal* legibilities. The view is different per individual, based on diverse navigational experiences. Just as the authors find that the elements of the everyday world such as individuals, places, activities, etc., are "not elements of the physical world to be uncovered and recognized, but elements of the social world", it is the elements of the everyday world our participants encounter that make up their social worlds [44].

The Delhi government offers online maps that can be used to locate public washrooms, but even when participants were aware of these resources, and had affordable access to them, they chose not to utilize them. Although mapping such information seemed intuitive, I realized that participants desired a more relevant map to inform their mobility across these spaces. There is a tension between *panoptic* and *local* legibilities here. Each participant had a different *personal* compass for navigating to their safe spaces as they dealt with their periods in transit. Some were okay with male companions, others preferred the solidarity of women's presence, perceptions of crowds differed, and the desirability of washrooms, cars, homes, etc. was different across participants. These factors shaped the extent and nature of participants' mobilities, highlighting that although the physical public infrastructure of toilets was key, these made up the panoptic view. The local and personal layers were often different, and yet the ones that mattered for use.

5.4.2 Literacy, and the Vocabularies of Menstruation

According to Brewer and Dourish, literacy entails representational practices, or practices through which representations are brought into existence, used, shared, and manipulated [44]. In our con-

text, these representations indicated the menstrual (im)mobilities of participants. Spaces acquired meaning once participants were able to annotate them appropriately to convey their preference, whether it was for a washroom in a public setting, a private vehicle, or the home of a relative. Digitization of these annotations could make maps more legible and meaningful for individuals, but are only possible when individuals indicate what they do or do not prefer in/as their safe spaces and why. A significant challenge here is of *vocabularies*. Because menstruation is a stigmatized topic, participants remained generally reticent, avoiding using terms that would make them or others feel uncomfortable. Thus, *period vocabularies* can help towards defining the scope of menstrual mobilities, but are generally imprecise and unlikely to convey sufficient detail; for example, pads or tampons were frequently referred to in vague terms as "things." The language of stains was generally not even talked about, but tacitly understood.

5.4.3 Legitimacy, Across Social Groups

Brewer and Dourish note that an environment can be viewed differently by different people from different vantage points, shaped by diverse backgrounds [44]. They also recognize that "these different epistemologies do not always sit comfortably side by side, but are frequently in tension with each other" [44]. The gendered context of practicing menstrual hygiene was expected and evident, and highlighted that many spaces—not only washrooms—were viewed by participants through the lens of whether they were safe spaces for menstrual hygiene practices, during their periods. This difference is seemingly recognized by the Delhi government, based on the design of *pink toilets* that make special allowances for women and adolescents in this regard. However, such existing infrastructures must convey a culturally situated understanding of safe spaces, at least from the perspectives of those intended to use these facilities. Participants clearly indicated not wanting to draw particular attention to their sanitation needs, but the *pink toilets* explicitly draw attention to their presence and purpose. Participants' safe spaces did not favor male presence, or if they did, then the male company was explicitly young and non-judging. Participants also wanted many women around whom they could derive solidarity (and sanitary products) from, like

in the women's coach in the Metro. These are indicators of the stigma that must be neutralized for menstrual mobilities to be preserved, for more spaces to be seen as safe, and for individuals' menstrual needs to be legitimized. This will ensure that individuals are able to *recognize, express,* and *address* their menstrual hygiene needs.

5.4.4   Towards a Third Space for Menstrual Mobilities

As per Brewer and Dourish, technology is a site where social and cultural categories are put into practice [44]. I now make design recommendations for a representational analogue of safe spaces to support and enhance menstrual mobilities.

It is first crucial to assure *legitimacy* from the vantage points of different social groups—those who menstruate but belong to different economic backgrounds, or are differently affected by stigma, as well as other individuals who are seen as judging or disapproving, but could potentially be more empathetic so as not to hurt the perceived safety of others' spaces. In Chapter 4, I observed that online information sources such as Menstrupedia are often used by friends and family who may not menstruate but are keen to provide support. Further, the use of mobile apps is heavily gendered across India [17], and targeting male audiences to solicit their engagement could widen reach for target users as well through intermediated access. Toilet locator apps could thus explicitly be designed to *(1)* reach such individuals, with a view to engage them in *period empathy*, and *(2)* possibly linking to Menstrupedia as appropriate. The content could also be designed to combat taboos by drawing inspiration from Menstrupedia's site, as discussed in Chapter 4.

As the use of washrooms (and other static and dynamic safe spaces constructed by participants) is gradually legitimized for menstrual hygiene needs, barriers to *literacy* would be reduced. The design of mobile apps could be culturally situated by drawing on the *period vocabularies* that I found our participants to use (or not use), also making allowances for non-verbal cues—such as appropriate emojis—that individuals could use to annotate spaces. These apps could additionally aim to *enhance* the vocabularies of those who are not currently comfortable using any. This could help with combating stigma as well.

Finally, the *legibility* of existing infrastructures can be augmented based on the insights gained through our research. Here, I prioritize *personal* legibility, so that women can easily access data meaningful to them, regarding spaces that they have historically considered safe—such as a friend's home, or a washroom in a bookshop they have visited. Annotations thus expressed could enhance *local* legibility via toilet locator applications, to incentivize and make it easier for users to communicate their reviews of spaces with others, expressing solidarity digitally not only in person. The *local* legibility must also fed into *panoptic* legibility, however, so that both state authorities and private establishments can be informed and held accountable for the state of their washrooms.

It is not the provision or operation of physical infrastructures that we are after, *i.e.,* additional public washrooms or pervasive pink toilets, but recommendations for technologies that facilitate mobilities across existing infrastructures. I view toilet locator apps thus as a potential *third space*, a "fertile environment" where individuals can bring diverse, culturally situated knowledges towards new insights and plans for action [36, 186], *i.e.,* where users can recognize, express, and address their menstrual hygiene needs safely. I focus therefore on the potential for the existing information infrastructure of toilet locator apps to address a larger set of scenarios than it is currently addressing. This is not only to make them achieve their goals of making washrooms easier to track around the city, but also to target a more holistic approach to supporting menstrual mobilities of (many of) their target users. Prior HCI research on systems in this vein, such as Protibadi and Hollaback! [4, 71], have emphasized the need to ensure that these systems are not appropriated to serve perilous purposes. This is also of critical importance in our context, given that Delhi is popularly held to be unsafe for women. However, combating this lack of safety, particularly when viewed through the lens of menstrual mobilities, is also the driving force of our research.

Chapter 6

Rethinking Menstrual Trackers

Inspiration: Period positive poster by Medha Kulkarni, Menstrupedia Blog

CHAPTER 6

RETHINKING MENSTRUAL TRACKERS

Recent years have observed a global push towards providing infrastructure to facilitate proper menstrual hygiene and 'management' to preserve fundamental human rights [40]. Basic infrastructure, including water, sanitation, and access to menstrual products, are viewed as fundamental for managing menstruation without shame, embarrassment, and loss of human dignity [40, 293, 283]. My previous research (see Chapter 5) highlights a lack of public infrastructure supporting menstrual mobilities in our study context, leaving the onus on menstruators to be period-prepared when in transit. It was noted that menstruators rely on menstrual tracking to an extent to *preserve menstrual dignity*, ensuring adequate preparation for an upcoming cycle. Interestingly, the findings from the first study (Chapter 3) revealed a limited engagement with digital menstrual trackers in our study context. In 2019, I started searching and exploring the available menstrual tracking apps. Building on the patterns observed across our studies, I wanted to understand *how* menstruators at different points along their menstrual journeys (from menarche to menopause) engage in menstrual tracking and *what* are the factors affecting these choices? *How* might these tracking practices evolve as they gradually transition from menarche to menopause, making different life choices (e.g., sexual activity, abstinence, marriage, childbearing, voluntary childlessness, hysterectomy, etc.)? *What* are their experiences with and aspirations of digital menstrual trackers?

The research presented in this chapter connects with the extensive HCI research on menstrual tracking at different points along the menstrual journey. Researchers have noted that menstrual tracking is typically adopted to understand one's body better [82], avoid stain stigma [279], or as natural birth control [62]. Fundamentally, these efforts aim to preserve menstrual dignity by 'controlling' menstruating bodies to conceal menstruation and menstrual stain [40]. Digital menstrual trackers being sociocultural products [171, 170, 60] propagate this construct of *menstrual dignity through privacy* by targeting the desire to "gain a sense of control of periods" [125] to market

themselves. The challenge with this approach is that it promotes 'treatment' and 'medicalization' of a natural bodily phenomenon "that needs to be fixed" [125, 128]. This prior HCI research calls for rethinking digital menstrual trackers, asking if we can design trackers as supportive tools for facilitating positive body association with one's body and creating body awareness of *others*, as opposed to tools selling and promoting control over the body through predictions [60].

In this chapter, our research revisits the purpose of menstrual trackers from being a tool to 'control the body' to a tool to build routines, promote healthy lifestyle choices, and importantly, attempt changing unjust social structures by promoting a shift towards period-positive ecologies. Following Kumar et al.'s recommendation [155], I take a *long view* for our investigation—across the menstrual journey (from menarche to menopause)—by engaging with menstruating women between the ages of 12 and 65. I analyze multiple surveys, a cultural probe investigation, remote interviews, in addition to reviewing mobile applications, employing the lens of Martha Nussbaum's central human capabilities [196, 197]. The use of this lens makes the struggles of experiencing life as a menstruating individual in a heavily stigmatized context visible, and makes visible the potential for digital menstrual trackers towards the crafting of period-positive futures. This research makes three contributions to HCI. First, taking a long view, I provide a deeper understanding of menstrual tracking practices in a highly stigmatized context, where menstrual tracking is not integrated into the lives of menstruating individuals. Second, I unpack the relationships across digital menstrual trackers, menstrual dignity, and Nussbaum's central capabilities critical for ensuring just societies. Third, building on the learnings from descriptive accounts, I discuss the potential of digital menstrual trackers as an avenue to promote and support central capabilities, followed by detailing sociotechnical recommendations for (re)designing menstrual trackers as a pathway towards period-positive ecologies.

6.1 The Trope of Menstrual "Management" and Dignity

In this section, I critique and establish the role of the human rights framing of menstrual dignity and digital menstrual trackers in propagating an unjust social construction of menstrual bodies.

Here, I connect with literature at the intersection of menstrual tracking, the body, and HCI before describing Martha Nussbaum's capabilities approach [196, 197], which I engage with to propose technology-mediated period-positive futures.

6.1.1 Menstrual Dignity, the Body, and HCI

"All persons, regardless of rank or social class, have an equal intrinsic worth or dignity. Human dignity is an innate worth or status that we did not earn and cannot forfeit."—Immanuel Kant (cited in [120])

The concept of dignity is central to Universal Declaration of Human Rights [188]. That said, people's understanding of the concept of dignity differs widely [140]. Historically, the term has been associated with different and/or opposite meanings [233, 140]. Different fields have associated dignity differently (e.g., dignity and spirituality, dignity and clinical studies, dignity and human rights, etc). Mccrudden posits, "the meaning of dignity is context specific" [173]. In this work I examine dignity at the intersection of menstruation and human rights—menstrual dignity.

According to a 2017 report on menstrual health management and human rights by WASH United, menstrual dignity means menstruators do not have to compromise (or be denied of) their basic human rights on the pretext of menstruation—a biological phenomenon [283]. The report posits a correlation between menstruation hygiene management (MHM) and right to health, education, and work. According to the human rights framing, poor MHM constraints menstruators from fully participating in society [40]. The lack of an enabling environment (across professional and everyday settings) for managing menstruation safely and with dignity leads into a barrier to gender equality [283]. The MHM advocates across the globe assert that without good 'hygiene and management' other human rights are in jeopardy [40]—"most importantly of the right to human dignity, but also the right to non-discrimination, equality, bodily integrity, health, privacy and the right to freedom from inhumane and degrading treatment" (cited in [106]). Thus, the international organizations, NGOs, and practitioners in the field actively work towards ensuring easy access to infrastructure (including toilets, water, soap, and sanitary products) to facilitate safe and dignified

management of menstruation to avoid shame, embarrassment, and the loss of human dignity [40].

Following Kant (see the epigraph above) [120], it can be argued that if dignity is innate then it cannot be compromised due to our biology (menstruation in this case). Although using a human rights framework has garnered much needed attention (discourses and funds) on a conversational taboo topic, Bobel critiques the social construct of menstrual dignity by asking "if menstruation is normal and healthy, why must it be managed to ensure dignity?" [40]. The author pushes back on *how* the framework is being used, where the human right devolves to the right to privacy that, if secured, enables one to pass as a non-menstruator (to escape stain stigma). The MHM's message to its core is "menstrual concealment is a human right" saliently promoting that "without products, it appears, dignity is out of reach" (ibid).

We can attribute the tension in the trope of dignity to operationalise a human rights framing to the concept of dignity being "complex, ambiguous, and multivalent" [183, 140]. Taking stock of multidisciplinary writings on dignity, Jacobson posits two distinct but easily conflating meanings of the concept—*human dignity* and *social dignity* [140]. The author (re)defines the Kantian conceptualization of dignity as human dignity which is innate, inalienable, cannot be destroyed, nor it is contingent, conditional, contextual, or comparative. Whereas social dignity is grounded in human dignity and one experiences, earns or bestowed through social interactions. Social dignity can further be characterised as *dignity of self* and *dignity-in-relation*. The dignity individual attaches to oneself often mirroring the "dignity they see (or fail to see) in the eyes of others" during social interactions is *dignity of identity* or dignity of self (ibid). The social dignity can also be viewed as dignity-in-relation to an individual (value/worth we reflect towards an individual through words or deeds), and time and place (the way dignity is embedded in spatio-temporal fabric) (ibid).

Using Jacobson's distinction [140] we can see that social construction of the menstrual dignity is reduced to preserving "human dignity through privacy". It is this framing of human dignity which Bobel [40] criticises by highlighting following flaws—(1) a unilateral approach of *privacy→ no evidence of menstruation→ no shame→ dignity preserved*; (2) menstruation is collapsed to include only the bleeding period (5–7 days) of the whole cycle; (3) fails to capture cultural di-

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versity (e.g., menarche is celebrated in south India [254]) by promoting western standard of embodied care, i.e., non-menstruating (male) embodiment; (4) fails to challenge the underlying root cause, i.e., the social construction of menstruation as taboo which leads to negative period experiences (embarrassment and discomfort); (5) views menstrual body as a site of reform which requires hyper-regulation/control/discipline and not the structures, ideologies, and social interactions. Bobel calls for building intellectual infrastructure rather than only focusing on providing civic infrastructure to manage menstruation safely and privately—"spending more time on education [i.e., body-positive menstrual literacy] and less time on cleaning up the body is a step in the right direction" [39, 40]. The onset of the Covid-19 pandemic led to further marginalization of menstruators [282], making a stronger case for working towards nurturing "an enabling sociocultural environment for those who menstruate" [20]. It has become imperative to discard the *human dignity* framing and embrace the *social dignity* trope when designing interventions for positive period experiences as explained by Bobel, "the intervention we need is transparency—forthright, matter-of-fact, inclusive, evidence-based, honest engagements with bodies in their unique, diverse, and dynamic social context" [40].

Recent years have seen HCI scholars exploring new ways of associating with "bodies in/with/ through technologies" embedded in social contexts [7, 249]. Researchers are actively practicing menstrual activism (e.g., [94, 195]) and leveraging embodied interactions (e.g., [25]) to understand, support, and build positive relationship with menstruating body to facilitate positive period experiences. For example, researchers have explored the concept of *intimate touch* to promote embodied interaction with the menstrual body and its bodily fluids [25]. Woytuk et al. leveraged the modality of *touch* to facilitate (re)construction of knowledge about the self by bringing close to one's menstrual body and nurturing an appreciation for the changing body [48]. Similarly, Menarche Bits is an open prototyping kit centred around soma design to engage young menstruators in designing embodied menstrual technologies to support them in "trusting their menstruating bodies" by focusing on the movements of the menstruating body [247].

Taking an activist stance, scholars have stressed on acknowledging and accounting for the mul-

tiplicity of the body, identities, action (e.g., menstrual sensemaking) when designing menstrual technologies [8, 94, 148]. Homewood posits reframing the menstrual cycle as a feminist and not androcentrically biased design problem with inclusion and choice of the individual at the core while acknowledging that there is no single clear feminist framing of the menstrual cycles as a design problem [124]. The author suggests, "it is equally as feminist for women to choose to conceal their menstrual cycles, aligning themselves to the second-wave ideology of transcending their biology, or for women to bleed freely in public and choose not to adhere to societal taboos through discussing and displaying their menstrual cycles with pride." However, current menstrual tracking technologies re-enact androcentric ideals, focusing on providing solutions to the same longstanding problem of the uncontrolled female body (ibid). For instance, digital menstrual trackers are sociocultural products that reflect and capitalize on the societal norm of preserving menstrual dignity by selling control over menstruating bodies [171, 170, 60, 125]. The current menstrual tracking apps lacks adequate menstrual literacy support [84] missing out on opportunity to (re)define a positive association with one's body [60] and create body awareness of *others*. For creating "greater awareness and respect" for menstruators and their agency to make decisions over their bodies and lives, menstrual health education is the key [87, 171]. Taking a stance against the social construction of menstrual dignity, I revisit the design of digital menstrual trackers as a pathway towards period-positive ecologies.

6.1.2   Nussbaum's Capabilities Approach

Martha Nussbaum's capabilities approach [196, 197] directs attention to struggles of experiencing life as a woman, promotes an adequate analysis of it, and makes pertinent recommendations for actions packaged as *central human capabilities*. Nussbaum posits a set of ten central requirements in the form of capabilities (freedoms or opportunities) as a social minimum for an individual to live a life that is worthy of human dignity, making it a fitting choice for our study. A society that falls short of guaranteeing central capabilities at appropriate threshold levels falls short of being a fully just society. The capabilities approach is structured to support multiple realizability, i.e.,

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they can be interpreted and concretely articulated as per the context of use [196]. The list of central human capabilities includes (1) **bodily health** and (2) **bodily integrity**, which for our study translates to menstrual and reproductive health, menstrual mobilities, and sexual and reproductive health rights (SRHR) [196]. Next are (3) **senses, imagination, and thought**, (4) **practical reason**, and (5) **emotions**, which are associated with menstrual literacy shaping liberty of conscience and expression without anxiety and fear of stigma. Then there are (6) **affiliation** and (7) **life** directly associated with having meaningful relationships, allies, and period-positive environments where a menstruator's life is not reduced to be worth living by creating stigmatized identities. The remaining are (8) **other species**, (9) **play**, and (10) **control over one's environment**. Nussbaum points out that the list comprises combined capabilities connected to one another in many complex ways. Realizing these capabilities entails asking what an individual is able to do and be, given the opportunities and liberties, while evaluating the available resources and how they support (or not) the individual to function truly humanly (ibid).

Although Nussbaum's central capabilities approach is criticized as a reductionist approach [250, 227], Kumar et al. demonstrate how it can serve as "a productive starting point for understanding women's wellbeing in the Global South because it goes beyond economics discourse and requires attention to women's specific contexts that might support or inhibit the capabilities" [155, 232]. Scholars have also engaged with Nussbaum's approach to (re)evaluate SDGs [190, 121], explored the relevance of the approach for designing technology for development purposes [149, 217, 218], applied the capabilities approach to healthcare contexts [159] and more recently to assess women's health in Global South contexts [155, 252]. I extend this body of work by drawing on central human capabilities to propose sociotechnical recommendations for designing digital menstrual trackers as capability-building tools to build period-positive ecologies. Our choice to engage with this approach aligns with Kumar et al.'s call to "shift focus from women's health to wellbeing" [155].

6.2   Methods

I conducted this research in Delhi, India, in collaboration with Sachhi Saheli—a non-profit organization (NGO) that has been working closely with the state government on providing menstrual health education for the past four years [236]. The study, approved by the IIIT-Delhi's Institutional Review Board, was conducted between February 2019 and August 2020. Taking the long view to health and wellbeing [155], I examined the menstrual tracking practices of women menstruators across ages (12–65 yrs.) and at different stages in their menstrual journeys (adolescence, adulthood, and menopausal years) using a combination of methods. Thus, for analysis, I distributed our participants into *adolescence* (up to 18 yrs.), *young adulthood* (18–39 yrs.), and *menopausal years* (40 yrs. and above) per the mean age at marriage [212], childbearing age groups [51, 132], and perimenopausal age in India [5].

I conducted a preliminary survey to develop a basic understanding of prevalent menstrual tracking practices in our study context. Corroborating insights from the survey and existing literature [278, 279] informed the overall study design. Next, I conducted detailed surveys with adolescents and adults at scale, and concurrently reviewed available menstrual tracking apps to curate a set of features/services being offered to support menstrual tracking. Insights from the surveys (e.g., need-based menstrual tracking practices and low engagement with digital menstrual trackers) and the taboo nature of the study topic shaped the need for further engaging with our participants via non-traditional methods. Aligning with Gaver and colleagues' [104, 105] recommendation for using cultural probes, I designed different cultural probe workshops for menstruators at different stages of the menstrual journey. However, with the onset of the COVID-19 pandemic, I could conduct only one of the planned workshops with adolescents. I revisited the study design and decided to conduct remote interviews given pandemic-enforced restrictions. Table 6.1 includes the demographic details of the participants across different methods. I now present the study methods and data analysis approaches in detail.

Method	Age (yrs.)	Annual family income (USD)	Smartphone	Menstrual journey stage
Preliminary survey (27)	Min 19, Max 45, Median 24	Low: <$11K (6), Middle: $11K–$26K (11), >$26K (7), No response (3)	Personal (27)	Young adulthood (25), Menopausal years (2)
Adult survey (210)	Min 18, Max 58, Median 25, No response 24	Low: <$11K (42), Middle: $11K–$26K (77), >$26K (54), No response (37)	Personal (210)	Young adulthood (25), Menopausal years (16)
Adolescent survey (220)	Min 12, Max 17, Median 14, No response 31	Low: <$11K (136), Middle: $11K–$26K (18), >$26K (1), No response (55)	Personal (53), Shared (157)	Adolescence (210)
Cultural probe (10)	Min 14, Max 17, Median 15	Not applicable as I recruited participants from a foster care NGO	No ownership (9), Shared (1)	Adolescence (10)
Remote interviews (16)	Min 21, Max 65, Median 37	Low: <$11K (4), Middle: $11K–$26K (5), >$26K (7)	Personal (16)	Young adulthood (12), Menopausal years (4)

Table 6.1: Demographic details of our participants across different methods. I recruited participants using a combination of convenience sampling, purposive sampling [85], and snowball sampling [111]. For each method, I began by explaining the study objective to our participants, followed by seeking written consent from the adult participants and guardians of the minors supplemented with written assent from the adolescent participants.

6.2.1 Preliminary Survey

I conducted a preliminary survey with 27 adult women menstruators to gauge and develop an initial understanding of menstrual tracking practices in our study context. I designed the survey by building on literature [82, 280, 278] and modifying it to suit the study objective and context. The survey included open-ended and closed-ended questions about menstrual tracking (perceived importance, practices, methods, and source of information), and technology-based health tracking. For example, *"Is keeping track of the menstrual cycle essential? If yes, when should one start tracking?"* *"What is the best and worst advice offered to you about practicing menstrual hygiene?"* The survey was administered on paper and collected anonymized responses in both Hindi and English during a *"period fest"* organized by our partner NGO [265]. I open coded the subjective responses [43, 237] and calculated percentages for the rest. The observed themes of *"myths and taboo,"* *"cultural practices,"* and *"irregularity"* align with the observations presented in Chapters 3–5.

Themes specific to menstrual tracking included: *"tracking mentally," "never felt the need,"* and *"did not find app useful."* 70.37% respondents mentally tracked their cycles, and only 37.04% reported using tracking apps, similar to the pattern reported in Chapter 3. However, 66.67% of participants acknowledged the importance of menstrual tracking, and 70.37% believed menstruators should track since the onset of menstruation. These initial insights shaped and informed the study design towards developing a deeper understanding of menstrual tracking practices of urban Indian menstruators.

6.2.2   Survey with Adolescent and Adult Menstruators

I conducted different set of surveys with adolescents and adult menstruators to understand their knowledge, experiences of, and practices around menstrual tracking. Both the surveys were iteratively co-designed with members of Sachhi Saheli including a gynecologist and menstrual educators. The surveys included questions gauging menstrual tracking practices, menstrual literacy, use of health technologies, demographics, and filter questions. The filter questions were aimed to capture the respondent's stage in their menstrual journey by capturing their experience (menarche/peri-menopause/menopause/none), age (current and of menarche), and gender. Some questions were multiple choice, such a: *"How do you predict your period?" "How did you come to use this method?" "You would feel comfortable in sharing your tracking information with who among the following?"* Others were more open-ended: *"Is there anything you particularly like/dislike about your method(s)? If so, what?" "Have you ever tried using mobile app for accessing period related information?" "What about tracking periods do you find burdensome?"* For open-ended questions, I open coded the responses and conducted thematic analysis of the same [43, 237]. Examples of codes included *"stain stigma," "discomfort," "irregularity,"* and *"lack of menstrual literacy."* The remaining questions were analyzed by calculating percentages and cross-tabulation [150] to view how respondent's experience affects the response. Example included cross-tabulation of *"Is sharing the menstrual tracking information with partner/parents/family members beneficial?"* with *"You are comfortable in sharing your tracking information with who among the following?"*

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The adult survey was developed in English and administered online using the SurveyMonkey platform, where I recruited participants by posting the call for participation through email, WhatsApp, and Facebook. The survey was designed to collect anonymized responses, i.e., it did not collect any identifying information such as respondent's name, email address, or IP address. However, toward the end of the survey, we decided to include a question to inquire whether the respondent was willing to engage in an additional interview, which could be conducted remotely or in person. If the respondents opted to share their contact information, their survey responses ceased to be anonymous. In these instances, I maintained a separate record of the contact details for interested participants while preserving the anonymity of their responses during data analysis. Our partner NGO helped me recruit adolescent participants as they have approval from Delhi Government to conduct surveys and workshops in government schools. The survey was developed in Hindi, administered in school and home settings in four different sites across North, South, and West Delhi. The responses were later digitized and translated into English for the analysis.

We received 301 adolescent survey responses and 281 adult survey responses. I eliminated responses of prepubescent participants and unit non-response with only the demographic details. Further, the topic's sensitive nature makes it challenging to determine whether the absence of certain data points is associated with the specific values of those data points based solely on the observed. This characteristic aligns with the "Not Missing at Random" (NMAR) pattern [241]. Thus, additionally I removed incomplete responses using listwise deletion [158] following the NMAR pattern. The cleaning process resulted in a dataset of 220 adolescent responses and 210 adult responses.

6.2.3   Cultural Probe Investigation

To understand how adolescent menstruators practice, visualize, and relate to menstrual tracking, I conducted a cultural probe investigation [104] through a workshop with ten adolescent girls (see Table 6.1). I recruited the participants from Udayan Care, an NGO supporting several family homes, which provide shelter to adolescent girls and are responsible for their education and
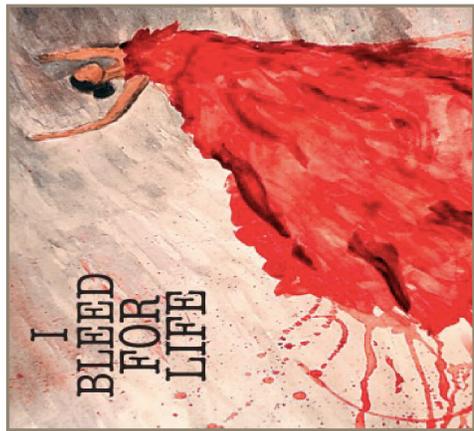
(a)   (b)   (c)   (d)
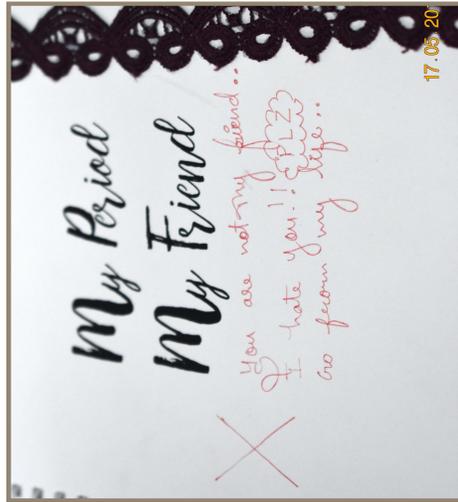
(e)   (f)   (g)

Figure 6.1: I designed a Period Journal (Fig. b) for cultural probe investigation with adolescent menstruators. Our participants' association with menstruation is evident in their Journals' decoration (camouflaging the statement—'my period, my friend'), including explicitly voicing their hostile feelings through text (Fig. c,d,e). Later I used the image [26] in Fig. (a) and Fig. (b) as probes during remote interviews with adults as ice-breakers and to offer a vocabulary to our participants given the topic of sensitive nature.

wellbeing [49]. I took ethical clearance from the NGO for the workshop, where I used a Period Journal as a cultural probe. I designed the Period Journal to include–stickers (sanitary products, flow, snacks, and smileys), monthly calendars, and blank pages. The front cover includes a tagline 'my period my friend' (see Fig. 6.1). The workshop spanned four phases over four hours, with a break of 10 minutes separating each phase. I began by administering the paper-based survey, which served as an icebreaker, followed by an open discussion based on their survey responses. I primarily gauged if they have attended any educational workshop on menstrual health, access to sanitary products, and period tracking practices. I introduced the Period Journal in the second phase and asked our participants to decorate it using art and craft materials. The focus of this exercise was to instill a sense of belongingness and gauge their response to the printed tagline. In the third phase, I asked the participants to mark their period days for the last two cycles in the Journal calendar using colors/scribbling/stickers. The objective was to gauge if and how our participants remembered their period dates. Finally, I asked them to predict and mark the date of their upcoming cycle. I wanted to understand if our participants were familiar with calculating menstrual cycles and, if not, familiarise them with the steps. I (re)visited the concept of the menstrual cycle and asked our participants to re-calculate and (if required) update their predicted cycle dates. I handed the Period Journal to our participants and revisited the NGO after two months. Using semi-structured interviews, I gauged engagement with the Journal. I used a mix of Hindi and English, depending on our participants' comfort and preference. I collected data in the form of field notes and photographs of their Journals, which were analyzed using inductive thematic analysis [43].

6.2.4 Remote Interviews

I conducted remote interviews with 16 mensruators following a narrative approach [79], where I aimed for a balanced sample across age groups and experiences (see Table 6.2). To seek participants, I primarily relied on those who expressed interest through the online survey. I also asked these participants if they could suggest someone they knew who might be interested in participating in the study. When necessary, I leveraged the social and professional networks of our team mem-

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Names	Age (yrs.)	Menopause stage	Menstrual condition	Sexually active?	Planning pregnancy?	Contraception	Using menstrual tracker?	Profession
Pihu	21	Not started	PCOD	No	No	NA	Used for a limited time	Student
Mahi	22	Not started	Not disclosed	No	No	NA	Used for a limited time	Student
Rafia	25	Not started	Heavy flow	No	No	NA	Yes	Student
Alia	28	Not started	Boderline PCOS	Yes	No	Condoms	No never felt any need	Social worker
Diya	29	Not started	Irregular cycle	Yes	No	iPill/condoms	Yes	Homemaker
Baani	30	Not started	Irregular cycle	Yes	No	Condoms	Yes	IT professional
Payal	30	Not started	Irregular cycle	Yes	No	Implant	No, but willing to try	Homemaker
Farah	34	Not started	Not disclosed	Yes	No	Pull-out method	No, but willing to try	Social worker
Juhi	37	Not started	Irregular cycle	Yes	Never	Condoms	Used for a limited time	Artist
Jasmin	38	Not started	Fibroids	No	No	NA	No never felt any need	IT professional
Priya	40	Not started	Not disclosed	Yes	No	Condoms	No, but willing to try	Health professional
Meenu	44	Peri-menopause	Not disclosed	Yes	No	Implant	Yes	Baker
Kiran	45	Not started	Not disclosed	Yes	No	Never used	No never felt any need	Homemaker
Reena	54	Peri-menopause	Not disclosed	Yes	No	NA	No never felt any need	Homemaker
Mala	61	Post-menopause	Hysterectomy	NA	NA	NA	It was unavailable	Designer
Sadhna	65	Post-menopause	Hysterectomy	NA	NA	NA	It was unavailable	Retired professor

Table 6.2: Detailed demographic information of interviewees, including self-described details about the menopausal stage and menstrual conditions. All names are pseudonyms.

bers. These interviews aimed to understand our participants' engagement with menstrual tracking by soliciting their lived experiences across different transitions of the menstrual journey. I started by asking, *"How has been your menstrual journey up till now?"* and followed up with clarifying questions further to gauge the role of menstrual tracking throughout their journey. For example, *"When did you first realize that it is essential to track one's cycle?" "Do you feel that tracking since the early years would have made any difference to you and your menstrual journey?" "What*

are your thoughts on the tagline in the shared images (Fig. 1 (a,b))?" I also engaged our participants in speculating suitable tracker(s) for their lived menstrual journey transitions. For example, I asked participants in their menopausal years to reflect on the design of a menstrual tracker first for their adolescent self, then how they would change it to make it suitable for their sexually active self, and finally, to assist them in their menopausal years. Given that we were discussing a sensitive taboo topic over remote interviews, I used a set of functional features available in prevalent menstrual and menopause tracking apps (see section 6.2.5 and Table 6.3) as a starting point for discussion while offering a vocabulary to our participants.

I conducted interviews in Hindi and/or English, remotely over audio/video calls, as per the participant's comfort and convenience. The interviews were audio-recorded and later transcribed in English for the analysis. I collected data in the form of notes and audio recordings. The audio data was transcribed in English and analyzed using inductive thematic analysis [43]. I read and open-coded each transcript line by line [237]. The sample codes included: *"physiological constraints," "taboo and stigma," "irregularity," "peer support," "period companions," "mental tracking," "compromise," etc*. The open codes resulted in 46 axial codes over multiple iterations, which guided the structure of the findings section. The sample axial codes include: *"discipline the body," "body as alarm," "periods are adjustment," "experiential information is valuable," "intimate data sharing," "teens and tracking," "aspired digital tracker,"* etc.

6.2.5 Review of Menstrual Tracking Applications

The objective of the app review was to build a dataset of functional features available in popular mobile apps around menstrual tracking. This dataset was later used in remote interviews for probing and facilitating speculation of the design of aspired digital menstrual trackers. I conducted a systematic review of mobile apps related to menstruation available on the Android play store on February 20, 2019, as the majority of the population are android smartphone users in our study context [145]. I used eight search keywords: *"menarche," "first period tracker," "period tracker," "period cycle," "period diary," "menstrual tracker," "menstrual cycle," and "menopause."* These

Application dataset	*Popular period tracking apps:* Period Tracker, Flow, and Clue
	Period tracking apps for teens: Teen Period Tracker, Oky Period Tracker, and Diva App
	Tracking apps for menopause: My Luna, Hot Flash Sisters, and Menopause Tracker
Extracted features	*Physiological modes:* Basic period tracking, planning pregnancy, and menopause tracking
	Tracking physiological changes: Flow, headache, mood, products, and more
	Annotations: Notes and personalized tags
	Reminders and cycle patterns: Data visualization
	Buddy mode: Sharing app with parents/partner/siblings/professional caregiver
	Export data: Share only specific data with specific person
	Learn section: Educational information through articles, daily tips, and more
	Expert and community support: Chat, forum, blogs, and more
	Account creation: Mandatory registration, onboarding, and data backup

Table 6.3: I identified the top three menstrual tracking apps in each category (top row) by calculating the cross-product of star rating and #user ratings for each app. I conducted a walkthrough of each of the nine apps to build our feature set.

keywords resulted in a total hit of 1964. I included free apps designed explicitly for menstrual, fertility, ovulation, and menopause tracking and developed in English/Hindi/Indian regional languages. I excluded the apps designed for pregnancy tracking, parenting, gestacional, or iPill tracking. I identified 318 unique apps after removing redundant hits across keywords and cleaning the data using the inclusion and exclusion criteria. Next, I curated an overall list of popular period tracking apps by including the apps with 1M+ downloads and 4+ ratings, resulting in 29/318 apps. Similarly, I curated a subset of popular period tracking apps for teens (9/318) and another for menopausal years (25/318) by reading the detailed description of each of the 318 apps. I identified the top three apps in each category by calculating the cross-product of star ratings and the number of ratings for each app. I then conducted a walkthrough [162] of all the nine apps (see Table 6.3) to extract 28 features. The sample features include *"symptom logging," "period logging," "reminders," "pattern visualization," "exporting data," "forums," "blogs," "contact experts," "reminders," "pregnancy mode," etc.* I then performed affinity mapping on these features to identify broad feature categories that I used as probes in remote interviews (see Table 6.3).

6.2.6 Data Triangulation

Throughout the data analysis phase, I organized frequent brainstorming sessions with my advisors and the Sachhi Saheli team. During these brainstorming sessions, we discussed the transcript text, codes, triangulation approach to develop overarching themes, and the structuring of the findings section, as Saldaña suggested [237]. I followed the triangulation-convergence model [63] to triangulate the learnings from multiple surveys and the menstrual tracking experiences of menstruators at different points of their menstrual journey collected and observed via interviews and cultural probe investigation. I collected and analyzed data from different methods separately before converging to the findings by comparing and contrasting the different results. The cultural probe investigation and remote interviews provided the data to study menstrual tracking practices taking the long view, i.e., throughout the menstrual journey (RQ1 and RQ2). I used the extracted features from the app review first to probe and later as a reference point to analyze our participants' experiences with and aspirations of digital menstrual trackers (RQ3). The responses from different surveys were mainly helpful in corroborating the findings across the methods (RQ1–RQ3). Our triangulation approach using datasets collected via various methods validated our findings.

6.2.7 Reflexivity

This research results from 2.5 years of intensive collaboration among a team of researchers and practitioners dedicated to menstrual wellbeing and women's empowerment. All team members identify as cisgender and are of Indian origin, bringing both emic and etic perspectives to the menstrual journey. It is crucial to acknowledge the impact of my background as an unmarried cis-woman of Indian origin in undertaking this study on menstrual tracking. I am also a trained menstrual educator and an HCI researcher with expertise in studying menstrual technologies, emphasizing a broader perspective on nurturing technology-mediated, just, and equitable futures.

For this study, I collaborated with Sachhi Saheli [236], a non-profit organization (NGO) dedicated to menstrual health, sexual and reproductive health rights, and women's empowerment. As part of this collaboration, I also underwent menstrual educator training and conducted numerous

education workshops with adolescents and adults across genders. Conducting workshops revealed a lack of familiarity with menstrual tracking across ages, shaping our research questions and data collection probes. Queries received during workshops influenced the design of data collection tools and guided data analysis.

The data collection for this study was personally a cathartic process. I share many of the narratives with my participants. Like my participants, I, too, have felt marginalized on the pretext of a bleeding body and share a complicated relationship with menstrual tracking to practice bodily autonomy while co-existing within the socio-cultural boundaries. The data interpretation presented in this chapter is thus likely to be biased by my strong desire to dismantle the social construction of the menstruating body as deficient and in need of 'control.'

Throughout the data analysis process, I frequently met with my NGO partners to discuss and seek feedback on the analysis. The NGO team involved in this study included Surbhi, a gynecologist and the president of the NGO, and Rikita, a psychologist. Both identify as cis-women and hold senior positions as menstrual educators. Additionally, I discussed the analysis with Neha and Pushpendra, who identify as cis-woman and cis-man, respectively, and are experienced HCI researchers with extensive work on women's health and wellbeing in the Global South.

Working with the NGO offered me various opportunities to represent them in policy development discussions at the national level. Attending and contributing to policy meetings further exposed me to different perspectives on the human rights framing of menstrual health and wellbeing. The longitudinal collaboration with the NGO was pivotal in leveraging learnings from the grassroots to refine my interpretation of the data. As an interdisciplinary team, we have collectively contributed to this research by drawing on our unique experiences in varied capacities while leveraging an emancipatory mindset.

6.3 Findings

I organize our findings into four sections below. First, I take a long view of menstrual tracking practices, i.e., from early adolescence to menopausal years. Taking this view of the menstrual

journey helped me to unpack evolving associations with menstrual tracking based on life choices, transitions, experiences, and access to menstrual literacy. I then discuss the innovative methods menstruators leverage to track and interpret their cycles. Next, I unpack the relationships that influence and shape their associations with their body and menstrual tracking practices throughout the menstrual journey. The last subsection presents aspirations of digital menstrual trackers that emerged in our data, as participants discussed their experiences with available digital trackers.

6.3.1 Tracking Through the Menstrual Journey

During the initial years of the menstrual journey, menstruators primarily associate their cycles with *"discomfort", "pain,"* and *"burden"*, attributing to the lack of menstrual literacy [280]. This association was also evident in our cultural probe investigation where adolescent participants could not relate with the tagline—'my period, my friend'—printed on the cover of the Period Journal and thus covered the statement partially or entirely using craft material (see Fig. 6.1). Only 2/10 participants used the Journal for logging their cycle, and the rest used it as their personal diary. On being probed, one of the participants described how she did not want to *"spoil"* her well-decorated diary by writing about periods as she finds them *"painful and discomforting."* I observed that the menstruators during adolescence view(ed) tracking as *"unimportant"* and *"did not take their periods seriously"* unless they are sexually active. For instance, only 10% of adolescent survey respondents reported tracking their cycles, whereas 21% said they often forget to track. One of the interviewee reflecting on menstrual tracking during adolescences elaborated,

> "I would have been apprehensive to do that [track] maybe because it feels like a task to have to do it, and I didn't feel it so important to do it so I would just avoid it. I think I never took them seriously enough. I think definitely when you get sexually active, that's when one starts taking it seriously." Pihu (21 yrs.)

While reflecting on their menstrual journey, more than half (59.52%) of our adult survey participants and all our adult interview participants concurred: *"ideally tracking should be done since*

menarche, because you should know your cycle. Ideally, that should always be the case" (Juhi, 37 yrs.). However, in practice, our participants did not pay much attention to their menstrual cycle:

> "There is always a rough idea, I am not particular about my dates. I think generally, we as Indian girls do not pay attention to if there is any irregularity. We are like 'ho rahi hnu na down' (I am getting my periods), that's it. We don't consider it as a big of an issue." Diya (29 yrs.)

Instead, menstruators adopt formal tracking if they have a specific reason—event and/or goal—including medical diagnosis, self-observed cycle irregularity, embarrassing experience, or once they are sexually active. Our data revealed that menstruators actively practice goal-driven menstrual tracking to either avoid or plan a pregnancy:

> "Except for pregnancy, I don't think there is any value [in tracking]. In the sense of pregnancy, I mean who wants to conceive and who does not want to conceive. That is the only reason, else I don't see any logic for it [tracking]. It is normal, it is going to happen, and your body will alarm you definitely." (Jasmin, 38 yrs.)

Self-diagnosed cycle irregularity is the second prominent motivator, with 30.95% of our adult survey respondents reported adopting tracking on observing cycle variation like Baani (30 yrs.)—*"so I keep track of my date using notes [app]. Oh, I, myself, started doing that because it was worrying me when they were irregular. So I just use to keep track like okay, let's see what is happening to me."* For a few menstruators who tracked to keep a tab on their reproductive health and overall wellbeing, any irregularity was as a sign to reevaluate routines and habits as quoted by Pihu (21 yrs.), *"[irregularity] is indicative that you are taking too much stress and not eating right. I do keep track now so that I keep telling myself to exercise more, you are taking too much stress, you need to calm down."* Here, tracking also helped in making an informed decision about when to visit a gynecologist and (re)schedule daily routines around the bleeding days—*"I just try to avoid workload during the first two days as I just feel like resting, and I want my hot water bottle. Therefore, if I have some work, then I try to finish it before my periods start. I resume my work on*

the third day properly. But first two days I prefer giving my complete body rest. So tracking really helps me" (Diya, 30 yrs.).

I observed that menstrual tracking has a deeper value and meaning associated with it beyond just tracking reproductive health. The participants' use of words like *"accepted," "adjusted," "part of life,"* and *"burden"* while reflecting on their menstrual journey indicated struggle to cope with menstrual physiology (bleeding and staining) and associated social consequences. Chapter 5 highlights how menstrual mobilities are heavily shaped and affected by the prevalence and severity of stain stigma in our study context [279]. I observed menstruators (and their mothers during adolescence) taking up and relying on menstrual tracking to navigate menstruating years responsibly by being *"prepared,"* to avoid embarrassing situations or *"accidents"*, thus propagating the status quo of 'disciplining' the menstrual body in hindsight:

> "She [mother] took it on herself to track it down, and she would say if Papa gets to know, then it's wrong. So I was always scared that if mom gets to know that I stained, she will scold me. She was so cautious that 'kisi ko pata na chal jaye' (nobody should get to know)" (Priya, 40 yrs.).

I observed our participants saliently using tracking as a tool to practice the fundamental right to body autonomy. Building on their experience, 16.67% of survey respondents in the menopausal phase compared to 3.05% in the young adulthood phase emphasized adopting tracking once sexually active. Given the cultural expectation in India around sex without marriage, marriage and childbearing, lack of sexual education, and not easy access (finance and stigmatization) to gynecologist, I observed menstruators use menstrual tracking as a natural birth control technique—*"I need tracking, not for conceiving, but yes, for avoiding the pregnancy"* (Jasmin, 38 yrs.). In some cases, fertility tracking empowered our participants to achieve stability in intimate relationships:

> "My sister-in-law wanted to conceive as soon as possible as this is her second marriage. So she was getting insecure within 3-4 months of marriage given the normal Indian mentality that 'bacha hojaega to ladki settle hojaegi ghar me' (with childbirth,

the girl will get settled in the in-laws house). I recommend her an app to track ovulation. So she tried this app, and it led to a successful pregnancy." (Meenu, 44 yrs.)

The above quote also shows that our participants were open to trying formal tracking and/or specific tracking methods recommended by someone they trusted. Among our adult survey respondents, 17.62% are following the tracking method recommended by mother, 16.67% by close friends/sister, and 4.29% by doctors. Cross-tabulation of survey responses revealed that mothers primarily promote mentally calculating the approximate dates without detailing the 'how'—the process of tracking and alternate mediums, whereas friends primarily recommend digital trackers.

I observed that the menstrual tracking pattern did not change much with transitioning into menopausal years. 33% of menopausal survey respondents mentioned forgetting to keep track of their cycle, and 16.67% said they did not feel the need to track their cycle at all. The ones who tracked their cycle continued with their tried and tested tracking methods (see section 6.3.3) and did not track any additional parameters (like hot flashes) other than the date of their periods, given the sporadic nature of periods during menopausal years. For example, Reena (54 yrs.) shared, *"all these things [physiological changes] stay in my memory. Since starting, I have kept it in my mind. The only thing I struggle to remember is the exact date. That is why I mark it on the calendar. Rest I feel that feeling hot is part of the routine."*

6.3.2 Prevalent Menstrual Tracking Methods

The most prevalent menstrual tracking approach is informal tracking, where 61.39% menstruators across ages reported relying on their body—memory and physiology—to track the cycle. It is a common practice to retrace the start date by some occasion/event, i.e., *"if something memorable happened during my periods"* (Rafia, 25 yrs.) and lookout for bodily cues (like acne, cramps, headache, heaviness, and more) signaling the upcoming cycle:

"With me I believe my body gives kind of hints that you are about to get your period. Different symptoms or hints every time, it's not fixed [...] Sometimes I get severe

mood swings a day or two before my periods, other times I experience pain in my leg,

or sometimes I get a headache" (Rafia, 25 yrs.)

However, only relying on the body for cues might lead to loss of health and beyond, as experienced by Priya, (40 yrs.),

"It is a problem, there's no [body] sign [...] I wish there was some cue. Because of

this problem, I even missed my pregnancy thrice. The first time, I did not know I'm

pregnant. It was like eight weeks had passed and I had not been taking any precautions

as I was traveling. And whenever I'm traveling, I skipped my period. I went to the

doctor only when I had miscarried. I had this pain in my stomach and went. She said,

you had a miscarriage, and I said I didn't know I'm pregnant because I was traveling.

Second time also I was traveling, I skipped my period, and I was pregnant. But again,

I learned about my pregnancy in the seventh week because I was skipping periods

while I was traveling, which is really common to me. Even third time again, I skipped

[periods] and, I had a miscarriage because I didn't get to know. So, I feel helpless."

Half of the interview participants and 95.23% adult survey respondents have tried formal menstrual tracking at some point in their journey. However, only 37.5% of interviewees reported regularly tracking their cycles, and 21.43% of survey participants acknowledge often forgetting to track their cycles. 77.61% of the adult survey respondents mentioned that they themselves figured out the tracking methods like period tracking apps (70.55%) and devised hacks including using digital calendars (19.63%), paper-based calendars (12.88%), and notes on a diary (5.52%) to track their cycle. These menstruators rely on online spaces to seek information around menstrual tracking methods (28.22%). Although our survey showed low reliance on paper-based methods, the choice of tracking medium (paper-based or digital) is driven by convenience, comfort, and negative experiences with tracking medium. For example, Rafia (25 yrs.) shared, *"I feel like it is too much work. First, find a calendar, find a pen and then mark a circle. That is not it. Then again, go back to the calendar, especially seeing and calculating my upcoming date. So I did not do that. Then I got to*

know about mobile apps, and I tried using a few." Further elaborating on her decision to switch away from mobile apps to a smartwatch based tracker, Rafia said,

> "It [mobile app] used to ask me many questions, including about my intercourse. So I didn't find them relevant enough for me. So I just stopped using it. Now when I look back I think it's a matter of convenience [...] all I have to do now is tap on my wrist [smart watch] and answer a few questions, and my job is done." Rafia (25 yrs.)

I observed that digital tracking is not confined to menstrual tracking apps. Some participants, including 9.05% of adult survey respondents, preferred using other apps like *"mark it in WhatsApp chat"* and Notes to log their period dates, *"so I used to, I like to keep track of my date using Notes. No, I never used to mention [the word] periods. I just used to write down the date, say 24 June, right, and the next time my periods start, I used to overwrite the previous date"* (Baani, 30 yrs.). For traditional paper-based tracking, marking on calendars (specifically kitchen calendars) and the personal diary are two popular approaches. For example, Alia (28 yrs.) shared, *"I still stick to my diary. I mean though we have apps, I am a pen and a paper person. I am more comfortable with my diary than an app."* It was interesting to observe that different participants used different visual codes to mark (primarily) the first day of their cycle. The choice of code ranged from putting a dot, cross, and the initials of the names. Probing revealed that all our participants felt that periods are personal and thus the code is meant for them, only to remind them:

> "So I would mark in my kitchen calendar, or my calendar diary. I would just, you know, put a dot or put a cross there. So that I remember, I did not want others to know. So I knew what a dot or a cross means. It is not like someone would see because I know it's my diary and nobody will open my diary. It was just for me." Priya (40 yrs.)

Different participants tracked the cycle parameter differently. Few participants logged (formally and/or informally) both the start and end date, whereas many were only interested in logging the start date—*"the main thing is to remember the start date. Suppose it was the 3rd of last month,*

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then I mentally calculate my next cycle plus or minus 3–4 days. So, this time it might come on 30th or 31st or maybe someday between 4th–6th" (Farah, 34 yrs.). The others took an even more casual approach by only remembering if they had a cycle in the previous month (or not), quoting the irregularity of their cycle. Pihu, shared her workaround hack for tracking her cycle given her diagnosis of PCOD/S.

> "I never kept a proper log date-wise. It was more around months like oh happened or this month not. When this recent cycle irregularity happened, I started doing it date-wise like this date it started, and this is the end date. The next time I noticed that it happened a week later from the first date, I take that as approximately as far as I can predict [...] I use a digital notepad to note the exact start and end dates." Pihu (21 yrs.)

Apart from the cycle date, our participants rarely tracked other parameters. In cases where they did, it was because they experienced severe physiological symptoms—*"in addition to dates, whether the cycle is regular, whether we experienced headaches, dizziness, or pain in the legs, we should note all these things if we face all such issues"* (Kiran, 45 yrs.).

6.3.3   Companions: Experiential Information and Care Support

> *"In your family, if you are unmarried or even married, there needs to be at least one person who knows about menstrual health and is responsible also so they can identify that if it [cycle] is abnormal and pushes to get it checked by the doctor. So, there should be one support system in the family, at least a supporting hand who is knowledgeable and cares for you." —Farah (34 yrs.)*

With the tabooed treatment and no open conversation on the subject [280], a few relationships are vested with the power of playing a pivotal role in shaping a menstruator's menstrual journey. This section presents these relationships and the extent to which they exercise their power (intentionally and/or unintentionally).
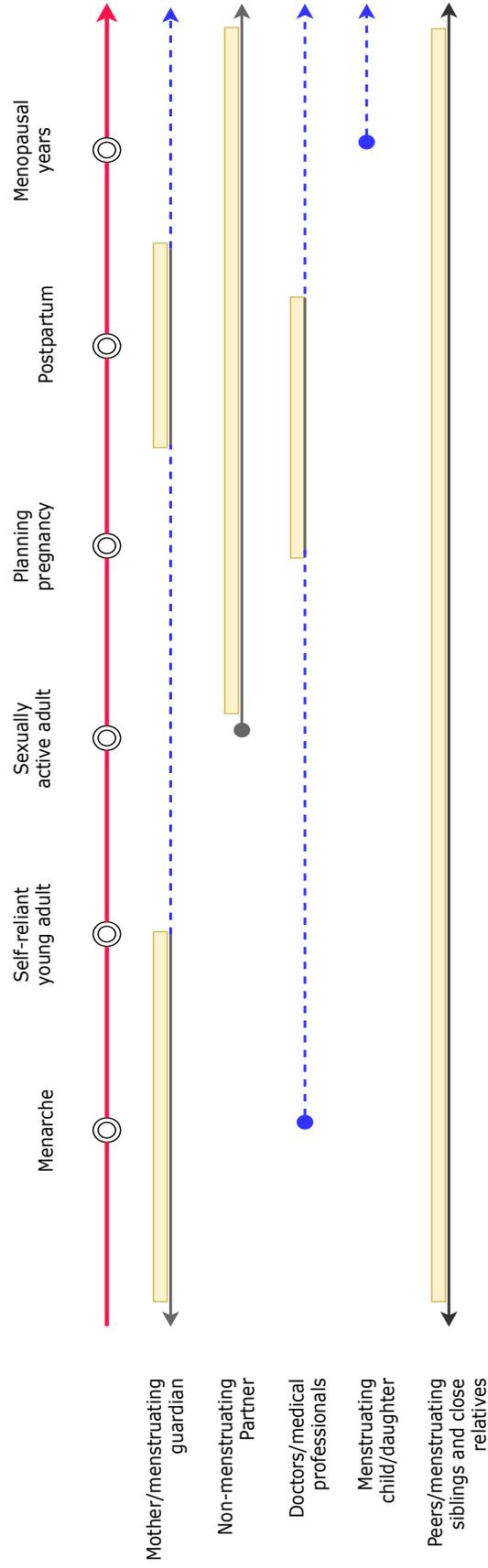
Figure 6.2: Menstruators engage with different stakeholders in their vicinity to seek need-based information and care support throughout their menstrual journey. Here, dashed lines represent passive need-based engagement, and the thick lines represent active engagement. The decision to involve *who*, *when*, and *to what extent* depends on multiple factors grounded in comfort and menstrual stigma.

Mother–The First Menstrual Companion

Since pre-pubescent years, preparing the child for menstruation is primarily seen as a mother's responsibility [280], including keeping a log of their adolescent's menstrual cycle as evident in the following quote by Diya (29 yrs.):

> "She [mother] used to take care of my initial days. She used to track it. I am sure she did something as she remembered my dates alongside her dates [...] in school days I missed my periods for one month. So I approached her to check if there was something wrong. She was the one who would have helped me with that, maybe by taking me to the doctor. So, I have shared everything regarding the period directly with her."

Menstruating guardians (predominantly the mother) are laden with the responsibility of playing an active caregiver for menstrual health and hygiene needs until the adolescent becomes self-reliant. For example, one of our participants shared how she was careless throughout her menstrual journey but was worried and concerned for her daughter, *"you know I was not keeping track or carrying a pad. In fact, I was more concerned when my daughter got her periods or years before [her menarche]" (Mala, 60 yrs.).* Even in our cultural probe investigation, I observed that it was the responsibility of the home supervisor (guardian) to track every child's cycle by recording the start and end date in a logbook.

With time the mother's role transitions from active to a passive caregiver, who is approached by menstruators in case of abnormality or *"issue"* with cycle and/or pregnancy. This transition is also visible in the survey data where the mother is the preferred companion for adolescents (73.18%) and young adult menstruators aged 18 to 29 years (76.83%) but is the third choice (43.47%) after the partner (71.73%) and female friends (45.65%) for menstruators aged 30 years and above. It serves as evidence that active menstrual companion(s) change through the menstrual journey, as reflected in the following survey response—*"after marriage, it is the partner only. Earlier it was mother or sister."* Sharing a mothers perspective, Mala (60 yrs.) said, *"so what happens is, if you see from the mother's perspective, slowly with time, the mothers are also maybe not keep such*

close tabs, because somewhere, subconsciously, you know that the child is now an adult."

A mother plays a crucial role in developing a formative association with the body and attitude towards menstruation because she defines boundaries for a young menstruator based on culture, family traditions, and her knowledge and experience. I observed instances of menstruators celebrating their bodies and menstruation when mothers impart timely menstrual health education while offering a safe space to question and understand the body and phenomenon. For example, Alia (28 yrs.) shared, *"my mother was the sole supporter and my only goto person when it comes to it [menstruation]. There was a time my cycle was late by 20 days. My mother was very open to going to a gynae, but many of my friends told me that their mothers are not okay with them going to a gynae at such a young age. I think my mother being so comfortable about it gave me much perspective that it is not a bad thing. Like it's a natural process, and we have to treat it like any other process. If you have an infection, you go to a doctor. So, if your cycle is not constant or having a bad cycle, it is okay to consult a gynae."* Whereas, in the other instances, menstruation is initially misunderstood, seen as a burden and adjustment, until menstruators constructed their version of menstrual literacy building on their experiential information and through various resources (both online and offline). It is this self-constructed menstrual literacy that empowered our menstruators to realize their agency in pushing and challenging the boundaries set for them by their mother:

> "Initially, I felt like something is wrong with me. I used to feel that I am different from the rest and nobody should know about it in class. The time when I was in 6, 7, 8 grades was worst. I felt awkward throughout the month and not just when I had periods. I felt awkward within my body, and nobody explained to me. I remember nobody was talking about it. My mother would just feel upset about me getting periods so early. She did not want to talk about it. She use to feel that whatever it is, it is wrong. I got to know later this is natural, there are other people also who start early, and this is fine. It is biological. Nothing I did like playing sports would have caused me to get periods early. But that time was difficult for me [...] So in adolescence, you are dependent on your parents. I was dependent on my mother. Even if I wanted to think differently, it

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was very hard. When I was independent and I looked at things differently, I developed my ways." (Priya, 40 yrs.)

I also observed the power of elderly menstruating companions in shaping and influencing the menstrual journey for menstruators across generations as further elaborated by Priya (40 yrs.):

"My mother hasn't changed. Recently my sister told me her daughter started early (menarche) and my mother was really upset again. My mother blames, you gave her this and that to eat and because of that it started early. And I am like what? You ruined my life like this, now at least don't say all this to her." (Priya, 40 yrs.)

Interestingly, menstruators across ages reported mothers primarily instruct about menstrual etiquette and use/disposal of menstrual products but rarely share their own menstrual experiences:

"When my mother was approaching menopause, she had issues with her uterus and got it removed. Even before that, she experienced many things, but she has never talked about all this stuff with me [...] Regarding her tracking experience, she has never shared anything with me. At times, I think that if someday me and my mother sit and talk, it will be good for me because then I will know what to expect when you approach menopause. Maybe I would be better prepared for it. Like precautions to be followed or when to see a doctor." (Rafia, 25 yrs.)

In rare cases when mothers did share their cycle details, they felt comfortable sharing these details only once their daughter is either married or of marriageable age, as expressed by Reena (54 yrs.), *"I have never discussed it [my cycle] with my daughter. I did not get a chance earlier as I did not find it right to talk about it when she studied [in school/college]. If a mother shares all this with her young daughter, it feels a bit shameful. Now she is married. I talk with her."*

Peers and Allies—The Only Constants

In our context, where menstruators receive negligible formal/informal menstrual health education [280], they seek confidants in their peers (e.g., friends and/or close relatives) and allies (e.g., doctor

or/and non-menstruating allies) as explained by Pihu (21 yrs.), *"but if I don't feel comfortable in telling her [mother] because I think she won't understand or maybe she would not have a good reaction then it would really make me very uncomfortable. You know when you can not have that security from your own home then you try and search for it outside, that is when you go online or ask your friends."* Menstruators actively and constantly rely on their social circle for 'urgent need-based' information support, sharing their concerns, and seek validation of their experiences, in offline or online settings, throughout their menstrual journey. I observed a sense of solidarity among menstruators when sharing and identifying approaches to address variation in the menstrual cycle and overall menstrual wellbeing. For instance, menstruators keep returning to their support groups, specifically to the ones with more experience as they preferred and valued experiential information over expert opinion, *"elders will advise us, and it is necessary to listen to them and follow their advice as they are more experienced and have lived more days menstruating. So following their advice might help us rather than visiting a doctor. I believe we should at least try what elders say, like if they recommend any medicine or any home remedy, we should at least try it for a month"* (Reena, 54 yrs.). It was also prominent in our adult survey responses, where respondents (68.57%) who perceived value in sharing period tracking information were more comfortable and preferred sharing it with female friends (68%) over the doctor (47.22%).

In addition to peer support, our narrative data presented a salient theme where non-menstruating allies played a pivotal role in empowering menstruators to overcome their conditioning of discomfort, shame, and stigma associated with menstruating bodies:

> "The first empowerment in my life was when I was in grade 11. I remember going to this small karate school with a male instructor and I could openly discuss my periods with him. He was a young man of 25-26 years of age. He would openly say it in the group of boys and girls that if any one is on their first day of periods you can rest, you can sit down. So from there I learnt that its okay, I can talk about it in front of 20 people, even if they are boys and girls that I am on my periods yet I am here so I will sit and not do exercise. This karate school probably make me accept the fact that

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having periods is nothing to be ashamed about." (Priya, 40 yrs.)

There were also instances where medical professionals played the role of an ally (see Alia's quote below) and were the first to introduce the concept and relevance of menstrual tracking, *"my doctor familiarized me with the fertile days and how to calculate them when I visited gynae in the initial year of my marriage"* (Payal, 30 yrs.). Our data revealed that although doctors played a crucial role in (re)shaping menstruators' attitude towards menstrual tracking, they did not recommend any particular tracking mechanism.

> "I am a 90s kid, and there were no apps that time. So I always used to mark my periods and note fluctuations [...] my friends thought I am a big fool wasting a lot of time... I used to get this a lot, 'mental hospital jao, kya karti ho ye, kyu track karti ho,' (go to a mental hospital, why do you do this?) [...] my gynae appreciated me. She said she hardly come across women who keep track of periods like this." (Alia, 28 yrs.)

Partners—Companions in Menstrual Wellbeing (or Not?)

With time, age, and life choices (e.g., sexually active and/or married), a partner[1] takes over the role of an active menstrual companion, a responsibility initially vested in a mother. For our survey respondents aged 30 years and above, partner (70.96%) replaced mother (48.38%) as the prominent relationship with whom they feel comfortable sharing their menstrual cycle details. Menstruators acknowledge their (non-menstruating) partners might not empathize with them entirely and primarily seek care-support and comfort from their partners throughout their journey:

> "I can share [tracking data] with both my mom and partner [...] a lady can understand what other ladies are going through. He [partner] is not going to understand up to this extent. So at max, he would see it as something that happens every month. In my case, I have observed that he acknowledges that something is happening to me so he will

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[1]All our participants are heterosexual, and their interactions with their partners do not include experiences with same-sex partners. This section refers to non-menstruating partners and their involvement in their partner's menstrual journey.

not impose anything. Partner become a little soft towards you during all those days, that is definitely a difference." (Diya, 29 yrs.)

However, involving a partner actively in one's menstrual journey depends on many factors, including if they are long term partners, living together, sexually active, and the partner's openness and attitude towards menstruation. One of our participants elaborated:

"I'm not married, and I am not living with anyone, so the guy I was seeing was like on and off basis. I mean, in any case, you always use a condom, so anyways, you don't give a shit to sharing these details (fertile days). I mean, that will be helpful when you start living with someone, or get married to someone, or planning a family, or deliberately avoiding starting a family." (Juhi, 37 yrs.)

A partner's active involvement in the menstrual journey includes collectively developing a period vocabulary. For example, Mahi (22 yrs.) shared she finds texting her partner the easiest if she is not with him at the moment, but if together, *"it's better to say it verbally or sometimes just a few nods work. I mean, I might not have said exactly verbally, but just nods or a different expression just sends the message that I started with my periods."* Additionally, non-menstruating partners develop their ways to track and identify their partner's cycle phases. Alia (28 yrs.) elaborated, *"I think he has a log in his head, so he never has to check [my diary]. He just quickly understands, which is a great thing. I get a lot of support from his side, and having a conversation about these things makes life easier because the other person understands where this is coming from. If you are having mood swings or anger, it is because of a real issue. It is a real thing. Nobody builds a castle in the air when they say they are PMSing or having mood swings."* The practice of partners collectively (albeit concurrently) tracking the menstrual cycle was acknowledged to be of value by all our interviewees *"because it is reproductive health"* (Pihu, 21 yrs.) and *"in case of unplanned pregnancy partners might end up blaming each other"* (Reena, 54 yrs.). Ironically, I also observed a pattern where menstruator did not track for themselves and rested the entire responsibility of contraception on their partner:

"My husband and I never really planned pregnancies ever. It was never a part of the plan. Both times I was caught unaware. So my husband was taking precautions and using condoms. So all this precaution was his, I mean job, it was never on me. Actually, I never took responsibility, although I knew that tracking should be done. He did take precautions." (Priya, 40 yrs.)

The conversations around menstrual tracking for family planning further unpacked prevalent power structures in intimate relationships. The non-menstruating partner is in a position of power to passively make choices that (re)define and impact their menstruating partner's overall menstrual journey. On being asked if tracking would have made a difference in family planning, one of our interviewee expressed,

"Ahh, different experience isn't dependent on us only. It equally depends on husband too. Even if we track but if he is unwilling to use precautions, I don't think tracking will be beneficial. It is different if you are tracking…your menstrual health. But if you are tracking for [avoiding] pregnancy, it is not all up to you…it also depends on the partner, whether he wants to do it or not." (Meenu, 44 yrs.)

On similar lines, Payal (30 yrs.) shared that menstrual tracking data will be of no value for her husband as, *"he would not pay any attention to it. As I know, if I tell him and share with him, he will listen to it, and he does, but otherwise, he himself will not be proactive or care to know about it. Even if I would not have been comfortable talking to him about this, even then, sharing data with him through an app or any medium would have been of no use."*

6.3.4 Digital Trackers: Experiences, Apprehensions, and Aspirations

Our participants perceived and acknowledged the value of digital trackers in relieving them of the burden of remembering dates while emphasizing—*"I am not saying one can't stick to the traditional way of charting or tracking your period, but you should always have a choice [of medium]"* (Alia, 28 yrs.). As reported by Epstein et al. [82], our participants also felt more connected with

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their bodies while engaging with data visualizations being offered in digital trackers, *"in the clue app, they give, full-cycle thing. In a diagram, your entire cycle is shown. So that is just fascinating and good information to know. I could see what is happening within my body through this"* (Juhi, 37 yrs.). However, a minimal number of our participants are using digital trackers, a pattern similar to the one reported in Chapter 3. Many of our participants have tried digital trackers at least once but did not continue. This section presents the participant's reported aspirations (or not) of a digital tracker, shaped by their apprehensions and experience with different tracking methods.

Avenue for Seeking and Constructing Menstrual Literacy

Our participants aspired for an assistant in the form of a menstrual tracker, with whom they could discuss their issues and seek advice. In general, something to update them with menstrual and reproductive literacy they never formally received, as expressed by one of our participants:

> "While planning and during pregnancy, I did not have much information. I would have benefited a lot from a tracking assistant at that time. I would have asked all my unanswered queries. Instead of spending time looking up books, I wish I had such an assistant [...] I can visualize myself receiving answers to all my doubts and questions I had since initial years through such an assistant. I would have discussed menstruation and pregnancy, like what should be practiced, avoided, and everything. I would have felt as if I have found a friend to discuss all this with. A friend, who would provide the information I never received." (Reena (54 yrs.)

The most sought-after is a safe space in form of a forum to leverage peer support, where menstruators could reach out to their peers and allies, validate their experiences, and ask queries which they would not have felt comfortable asking in person given the stigma and taboo around the subject— *"if there are doctors [on forums], it would be best. Often, we cannot talk openly with male doctors during visits. Everything was new for me during my first pregnancy, but I was still hesitant to ask questions. Even if I had questions, I never asked my doctor face to face. I believe such a forum*

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can be beneficial in these situations" (Meenu, 44 yrs.). However, I observed apprehensions around the information exchange through such forums. Our participants believed that the full potential of the peer support could only be achieved if an expert moderates it, *"I just feel it [forum] should be controlled as in nobody should pass wrong information as it can be very harmful concerning these things because it relates to health. So the educational discussion or conversation has to be monitored probably"* (Alia, 28 yrs.).

Given the sensitive nature of the subject and cultural boundaries, the prerequisite for moderation includes revisiting the question: how much is too much information? As Pihu (21 yrs.) described, *"there are different types of people. I know people who like knowing things, but I also know people who, if given too much information, would get too worried thinking about: Is this happening to me? So sometimes too much information hurts people."* The question becomes even more relevant when designing a tracker for adolescents, as Priya (40 yrs.) elaborated in the following quote. Speculating a menstrual tracker for adolescents while reflecting on her experience of initial menstrual years, she shared:

> "I would like the tracker to be simple and just about my periods. There can be information about sexual health because the risk-taking tendency is so high at that age. Remembering my time, if I was told that this is a safe time [to have sex] I would have wanted to see what happens if we do it during the unsafe time! Generally, until the age of 18–19, you always want to try out things that are termed as unsafe." (Priya, 40 yrs.)

With the evolving association with menstrual tracking and menstrual data sense-making throughout the menstrual journey, menstruators seek different information support during different journey transitions. Thus, the current approach to designing menstrual trackers—'one fit for all'—falls short of offering a personalized experience, as evident in the following quote:

> "It would be best if we can customize the tracker. I mean, there should be three options. First, married people who have a sexual partner can track for pregnancy if they want. Second, beginners who have not yet begun menstruating or are in the initial 1-2 years

of their periods can track and identify abnormal cycle patterns. Third, rest for people whose cycle pattern is stable, but they are not sexually active, so they can also use tracking as per their needs." (Farah, 34 yrs.)

Furthermore, different people like to track different parameters (like flow, clot, dietary intake, water intake, and more) in addition to dates, and some menstruators prefer to track only their dates. As reported in the survey and observed in our cultural probe, the latter was prevalent in adolescents. Even the adult menstruators suggested adolescent period trackers primarily only offering date tracking. These parameter tracking practices also offers us an opportunity to disseminate menstrual literacy by alerting about both—what is *normal* and *abnormal*, unlike the prevalent designs, which only focus on highlighting the not typical cycle pattern:

"It will be helpful if it alarms normal and abnormal. Like it should also tell you, these many hours have passed, please change your pad, and it has been 3-4 days, and if you still have heavy bleeding, it should indicate it as abnormal. I feel this would be brilliant." (Farah, 34 yrs.)

Self-controlled Intimate Data Sharing

Overall, our participants, including 68.57% of our adult survey respondents and many interviewees, saw value in sharing their data with close relationships while acknowledging it as a subjective choice. Different menstruators prefer to selectively share their intimate data with different individuals depending on multiple factors, including comfort, age, experience, and sexual activity. For instance, for survey respondents aged 18-29 years, the mother (76.83%) was the preferred choice followed by partner (74.39%), female friend (66.46%), sister (59.15%), and doctor (53.05%). Whereas, for respondents aged 30 years and above, the reported preference is a partner (71.73%), female friend (45.65%), followed by mother (43.47%). Conversations about menstrual trackers supporting intimate data sharing emphasized the need for designing to accommodate this subjectivity as expressed by Alia:

"Sharing cycle details is very subjective, so it would be handy for a person like me since I am very comfortable sharing my cycle details with my partner, sister, and mother [...] even people of my age might not be very comfortable with people logging into their personal info. There can definitely be a mode to switch on or off because it is subjective and differs from person to person in what we are comfortable sharing with whom." (Alia, 28 yrs.)

A few menstruators questioned altogether the need and value of sharing menstrual data through an app (or any other medium) when they can converse verbally as per their convenience—*"I can talk to my mother and sister verbally when I need to, so then why share by a formal thing?"* (Juhi, 37 yrs.). However, a 'buddy mode' to sync-share the menstrual cycle data with the doctor is perceived to be a valuable feature as it would offer a safe space to share details about the sexual activity which a menstruator, specifically adolescent/unmarried, otherwise would have avoided sharing all together given the associated stigma, as narrated by Pihu (21 yrs.),

"I would want a companion thing [sharing tracking data] with my doctor. I don't think they would be able to keep track of it, but it is easier to have data sync in that way so that they see the data there. But again, I would not want to share all of the data. So around the diagnosis [PCOD], I remember my boyfriend and I were always wondering should we have sex, should we not, and then I would always say no, as I was under the diagnosis. I have to go to the doctor, and I cannot say if it [sex] happened or not."

Menstruating data is powerful and would be a valuable heirloom for future generations as recommended by Lazar et al. [160], specifically in our context with limited to little menstrual literacy [280] as expressed by Kiran (45 yrs.), *"I will definitely share my cycle details with my daughter because it is hereditary. Our cycle pattern reflects our mother's or paternal aunt's (bua) cycle pattern. So, my period diary is similar to a kundali (horoscope) for my daughter. I will carefully note all the changes I will be observing in my cycle. I will also note if any particular home remedy or medicine worked for me. It will be helpful for my daughter to know what to*

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expect." Further, menstrual cycle data, if shared, can also be used to offer support, allyship, and solidarity as speculated by Mahi (22 yrs.), *"so my friend can come to my profile and see my status [upcoming cycle], but only my close friends [...] My friends know that during periods I get very disheartened and am not able to do work. So maybe next month she might be prepared, and she could remind me your this [periods] is coming, and we can have fun over these days."*

With power comes great responsibility. Our narrative data highlighted multiple instances where menstrual data could be used against the menstruators. For example, I observed discomfort and apprehensions among menstruators across ages in sharing the data about sexual activity, specifically with mothers. This discomfort was rooted in fear of stigmatized identity as expressed by Baani (30 yrs.), *"from the parents' perspective, it will be helpful to know if everything is all right with their daughter. But from a girl's perspective, she will be more uncomfortable because she might think her parents don't trust her and are keeping track of her cycles [...] imagine if I would have been involved in relationships and then it would have been tricky for me to you know share my cycle. It could be like, this thing [physical intimacy] has happened, and my periods might get delayed. So my parents might question me."* In another instance, one of the interviewees pointed at a possibility that menstrual data could restrict menstrual mobility on religious grounds. The recent movement around Sabarimala temple [267, 192] calls for careful collection and management of intimate data so it does not lead to further marginalization of menstruators as indicated by Jasmin (38 yrs.), *"I don't think anybody wants to know this [menstrual cycle data], until you are going to some religious thing in particular, you know, not clean or something like that, that kind of a thing."*

Data Logging and Privacy Concerns

Menstruators wished for a system that requires them to provide detailed information only once, followed by a bare minimum to negligible data input during each cycle. Logging detailed information every day for every cycle is considered much of an effort as expressed by Mala (60 yrs.), *"so every month, in every day of these five days, you put in flow, symptoms, moods, etc. I think that would be too much. I may have enthusiastically done it the first few times, but I don't think I*

would have done it after that. Especially if everything seems normal, you think it is such a waste of time to do this." One of the prominent reasons menstruators switched away from digital trackers (or trackers in general) was forgetting to continuously log data:

> "A couple of times, I felt like I needed to write and track, especially on an app. What is stopping me is the feeling that I might forget to track. This happened with me frequently. I may just forget to use the app [...] So I m not starting it again because I think I might not be able to continue tracking for too long." (Priya, 40 yrs.)

I observed that menstruaters who are using trackers (paper-based/digital) rely on them significantly to validate their physiological cues and mental calculations, *"so when I mentally note my period date using some event, then I use a calendar to cross-check the date in case I only remember the day and not the date"* (Payal, 30 yrs.). Given that trackers are being heavily utilized as confirmation tools, sporadically inputting data into a digital tracker in the long run results in inaccurate predictions causing stress:

> "I don't mind having a tracker which records the date but doesn't send me notifications. I think that is when you start getting distressed like, 'Oh my god, why I am late?' You start getting stressed and contemplating like what happened." (Juhi 37 yrs.)

Although inaccurate reminders led to feeling *"something is abnormal"*, 71.9% of our adult survey respondents agreed that receiving reminders about the upcoming cycle would be helpful. However, different menstruators reported different functional and privacy expectations from reminder notifications. For instance, around 22.22% of menopausal respondents explicitly denied any reminder service where one of them believed receiving reminders and notifications *"will be a violation of my privacy."* Whereas, few preferred notifications in the form of *"some encrypted message"* and others seek multiple reminders as they approach their cycle:

> "[Tracker] share a message that this week your period can start like tomorrow or the day after. So something that I don't need to see every day, but probably closer to the

date. Then again, if I am reminded once, I might forget. So if I get reminded a couple of times, even if I close my reminder, that would be nice." (Priya, 40 yrs.)

I observed that the need to preserve privacy was rooted in fear of creating stigmatized identity. Downloading an app especially for tracking menstruation reportedly felt like *"extra burden," "task," "time consuming,"* and a calculated risk which might lead to creating stigmatized identity given prepubescents and adolescents in our context still share mobile phones with their elder siblings and parents. In shared device scenarios, the attention-seeking look and feel of the trackers [82] makes menstruators uncomfortable in keeping such apps in their phones. Rafia (25 yrs.) shared, *"the apps I saw were mostly pink in color, flowers, basically very girly, and personally, I am not fond of such things. Second, I have nieces and nephews, too, who use my phone to play games. They might use that app, and then I have to explain what it does because they are very curious. But they are not of the age where I can explain all this to them. So such girly apps stand out and seek special attention, I do not think it is correct. I don't like it."* To avoid the risk of ending up in a vulnerable situation, our participants proposed moving these apps out of mobile phones and into something more convenient like smartwatches as proposed by Sadhna (65 yrs.), *"it will definitely help like if you have a watch on your wrist [to track periods]. If you perhaps have to look at the time, you will bring your mobile out of your purse and then see the time. Instead, a watch on your wrist is a much easier and quicker option. Similarly, if there is an app like that, it will help. It will help."* The fear of creating a stigmatized identity also shapes menstruators' concerns around leaving digital footprints of online engagement on the taboo topic, *"it feels less vulnerable to do it [posting queries] on an app anonymously because I feel like you can delete the app and forget about it forever, but it will always be there on the website. If you are a bit embarrassed to ask, I would prefer to do that on the app." (Pihu, 21 yrs.)* A similar trend was observed in Chapter 4, where the Menstrupedia forum showed prominent passive engagement (4M+ views) in contrast to active engagement (223 questions posted in 5 years).

6.4 Discussion

Nussbaum's political theory of capabilities approach [197] served as an ally to our participants as it made their struggles of navigating life as menstruators visible in a context with deep-rooted menstrual stigma. I observed that menstruators have to adjust and compromise on the pretext of their bleeding bodies to preserve the dignity of self as mirrored in the eyes of others during social interactions (see section 6.1.1). In this section, I begin by unpacking how menstruators are using menstrual tracking to experience liberation, calling attention to menstrual tracking as a site of intervention towards the empowerment of menstruators. For the analysis, I define *liberation* as the ability to achieve Nussbaum's central capabilities (specifically that of bodily integrity, bodily health, and control over one's environment) essential for leading a life in a dignified or worthy way [196, 197]. Leveraging the concept of central capabilities, I then discuss how digital menstrual trackers shall be (re)designed to serve as a pathway towards period-positive ecologies.

6.4.1 Menstrual Tracking: Carving a Path to Self-Liberation

Our investigation revealed that menstrual tracking serves as a means to experience liberation in a stigma-heavy settings. In our study context, menstruators are using it to partially and indirectly operationalize a few but prominent central capabilities (e.g., bodily integrity, bodily health, and control over one's environment) critical to ensure minimal social justice in a society. It is proactively being adopted as a workaround to practice the right to bodily autonomy, which otherwise is a distant reality given the prevalent cultural stigma (around menstruation, sex without marriage, and childbearing expectations) [136]. For instance, I observed that many menstruators (both married and unmarried) primarily consumed digital menstrual trackers as natural birth control. However, our participant-reported experiences revealed that the design of prevalent digital trackers falls short of catering to evolving information needs across a menstrual journey and does not account for their life choices like abstinence, voluntary childlessness, hysterectomy, and more (also observed by Eschler et al. [84] and Epstein et al. [82]). Instead, my analysis highlighted specific scenarios in

which the prevalent digital trackers might even be constraining for the menstruators. For example, our participants were apprehensive of installing menstrual tracking apps in their devices shared with and accessible to other stakeholders in their vicinity, worrying about creating stigmatized identity and restricted menstrual mobilities. I also observed that inaccurate predictions and type-casting of the menstrual cycle have made menstruators feel *"abnormal"* in their bodies in multiple instances, depriving them of their **bodily integrity**. My observations point attention to the potential of digital menstrual trackers to impact menstruators' capability of **life** profoundly, making it a suitable site for capability-building intervention to empower menstruators.

Our data shows how menstrual tracker as a capability-building tool call for designing trackers to support menstruators throughout their menstrual journey instead of the prevalent albeit narrow view of designing trackers to support a specific transition (menarche, fertility, and menopause) in isolation. Menstruation is not a one-time occurrence but an individual journey, and designing for this journey will entail designing for the subjectivity at multiple layers throughout the journey while accounting for messy and diverse associations with menstrual tracking. Further, I observed that an individual's association with menstrual tracking evolves with changing bodies and life choices across different transitions through the journey. Menstruators track per their convenience towards a goal using methods they find convenient. As observed, the goal expands beyond menstrual wellbeing, including experiencing enhanced liberation. Liberation being deeply subjective and tied to personal experiences (evident in our data), oneself (a menstruator in our case) is the best suitable designer of their liberation in a given circumstance (all through the menstrual journey) [139]. Aligning with the HCI community's call of promoting user agency, autonomy, and knowledge (e.g., [278, 270, 139, 8]) and Nussbaum's stance on giving positive freedom of agency to individuals to shape their lives by cultivating central capabilities [196, 197], I propose *designing for the self* approach to design menstrual trackers. I advocate that design should empower menstruators to (re)design their relationship with their menstrual trackers by *enabling them to first design and later tailor their tracker* throughout their menstrual journey according to where they are in their journey, experience with menstruation, and life choices. The recommendation of facil-

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itating *designing for the self* is a step toward supporting menstruators in exercising **control over their environment**.

To operationalize *designing for the self*, I recommend deriving inspiration from the literature at the intersection of crafting technology, do-it-yourself (DIY) toolkits, and open-source approaches (e.g., [11, 48, 247, 6, 9, 101]). These studies project non-traditional forms of interaction with bodies as the future of intimate technologies promoting self-care and intimate wellbeing [270]. I call for ideating menstrual trackers beyond a mobile application and as a multi-modal system engaging digital and non-digital cultural artifacts. Moving menstrual trackers out of smartphones enhances the affordance of using it as a probe to nurture a safe and personal space for the menstruator to explore the menstruating body and bodily fluids via embodied interactions (e.g., [11, 48, 25, 247]). Facilitating self-designing unpacks a new site for intervention—*the process of designing, assembling,* and *tailoring* itself. The act of self-designing can be structured to promote bodily awareness, "inviting women [menstruators] to become embodied knowers" enhancing opportunities to **sense, imagine, and think**, as exemplified by Almeida and colleagues [270, 11, 6, 9].

6.4.2 Digital Menstrual Trackers: A Pathway to Period-Positive Ecologies

With the central capabilities approach, Nussbaum envisions a human life where individuals are dignified free beings "who shape their lives in cooperation and reciprocity with others, rather than being passively shaped or pushed around the world in the manner of a 'flock' or 'heard' of animals" [196]. My analysis shows that menstruators, in our study context, live an inverse of the human life envisioned by Nussbaum. Our narrative data illuminates that menstruators develop a complex and antagonistic relationship with their bodies grounded in their experience and observation of society's negative attitude, reactions to, and expectations from the menstruating body. For example, our participants used adjectives like *"dirty," "abnormal," "awkward," "different from rest,"* and *"uncomfortable"* to explain how they felt about their bodies and bodily fluids (menstrual blood and discharge). Although our participants acknowledge menstruation as a natural bodily phenomenon, their frequent use of *"adjustment"* and *"compromise"* when reflecting on their experience of liv-

ing as a menstruator unpacks how the social construction of menstrual bodies makes them a site of struggle, including for individuals with menstrual literacy. Our thick and affective narrative revealed that digital menstrual trackers enable menstruators to conform to the socially constructed menstrual dignity by helping them be *"prepared to avoid accidents,"* i.e., avoid stain stigma [279], thus instilling a sense of control over their bodies. To nurture positive, just, and enabling environments for menstruators, Bobel emphasizes reallocating resources to build intellectual infrastructure (knowledge, skill, and abilities) [40]. Taking a stance against emancipation through 'control,' we call for rethinking menstrual trackers to craft opportunities for menstrual literacy for the menstruators and the *others*, contributing to capabilities of ***affiliation*** and ***practical reason*** towards crafting period-positive futures.

Currently, the FemTech interventions approach menstrual tracking as self-care and individual-centric [226, 82]. However, as evident from my analysis, it is a highly collaborative process shaped by multiple relationships at once. Figueiredo et al. [62] present a larger ecosystem of use (in western environments) in which fertility data is embedded and reflexively shaped by different stakeholders (family, partner, peers, health practitioners, and more). My analysis expands this understanding by unpacking close relationships influencing and shaping the menstrual journey (including their tracking practices) across generations, beginning with the pre-pubescent years and continuing till the final years of the menstrual journey (see Fig. 6.2). In many instances, these relationships themselves lack menstrual literacy [280]. However, our data shows they are obligated to be vested in advising practices and validating experiences that lead to formative (albeit negative) associations with menstruation and menstruating body, which, in the long run, might lead to deprivation of ***bodily health, bodily integrity,*** and ***life***. These observations are reminiscent of feminist HCI's quality of ecology [30], making menstrual tracking a suitable site to reflexively design for period-positive ecologies.

An ecological approach to design in our case would entail supporting an interdependent way of life that supports capabilities of ***affiliation*** and ***practical reason*** for all stakeholders. Different relationships play a pivotal role for different menstruators with varying degrees of involvement at

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different points of time in a menstrual journey and might keep rotating and replacing each other with every life transition (see Fig. 6.2). Moreover, the menstrual journey entails (re)negotiating social boundaries (set for menstruating bodies) and challenging power structures (in close relationships) towards a menstruator's liberation where liberation and its inverse meant different things to different menstruators. For example, many menstruators (and their mothers on their behalf) track to avoid stain stigma, others covertly rely on tracking as natural birth control, and few use tracking as a guide to schedule their work and engagements. Thus, taking an ecological approach would entail engaging with and accounting for ever-evolving and even conflicting diversity among stakeholders including varied and evolving menstrual literacy, diverse menstrual experiences, hygiene practices, associated myths, cultural and social norms, and more. A gender justice design space (like ours) with stakeholders having conflicting goals requires fair evaluation of which and whose freedoms are harmful to menstruators' wellbeing [196, 155]. In such scenarios, Nussbaum says, it is acceptable, even essential, to limit or sacrifice the freedoms of *others* (ibid).

Digital menstrual trackers offer multiple avenues for crafting period positive futures, ranging from the act of designing to the generated intimate data. For instance, the process of *designing for the self* (see section 6.4.1) can be structured as a co-designing activity while preserving the agency of the menstruator to include or exclude stakeholders(s) (menstrual companions including mother, daughter, peer, sibling, partner, etc.) in the vicinity as co-designers of their trackers. Prior works like Crimson Wave [90], Ambient Cycle[128], Ovum [126], MenstrualMaze [274], HelpPinky [141], and other DIY kits (e.g.,[11, 247, 48, 270, 6]) can serve as inspiration for designing and structuring the co-designing activity. In this case, *the design process* can facilitate conversation on the subject leading to ***meaningful relations and affiliations*** by serving as an ice-breaker, offering vocabulary, and an avenue for activism by facilitating positive body association with one's body and creating body awareness of *others*. Taking such an approach would translate to supporting multiple capabilities, including bodily integrity, affiliation, senses, imagination, and thought, and control over one's environment, which collectively contribute to ***bodily health***.

I observed that the most sought-after is a digital space to construct menstrual literacy. In Chap-

ter 4, we observed how such safe spaces also offer an avenue for menstruators and their allies to support **practical reasons**, and express their **emotions** around their menstrual experiences by building **affiliations**. However, our participants described their engagement with such spaces as predominantly passive and anonymous and being carried out with utmost caution to avoid creating a stigmatized identity. Given the prevalent menstrual stigma, our participants were aware and mindful that their digital footprints and menstrual data could constrain them (literally and metaphorically), unpacking a tension between menstruators' privacy and seeking care support. For instance, a chief of an Indian temple said, "there will be a day when a machine is invented to scan if it is the 'right time' [i.e., not menstruating] for a woman to enter the temple. When that machine is invented, we will talk about letting women inside" [192]. Thus, our participants desire to firmly control menstrual data sharing starting from the initial years of the menstrual journey—what data to share, with whom, and when. My analysis emphasizes the need to make careful considerations when designing the collection, management, storage, and sharing of intimate data in a stigma-heavy context like ours. The design of digital trackers should enhance menstruators' capacity to preserve their privacy by designing control over menstrual data sharing to ensure bodily integrity. It will entail redesigning for accountability and care at the policy level, also emphasized by Mehrnezhad and Teresa [178], in supplement to implementing privacy checks in the technology.

Scholars (e.g., [62, 279]) have pointed potential of intimate data in highlighting unjust social structures, making them a prospective tool for activism. However, the literature highlights the role of the FemTech industry in defining ways of 'how' the data is collected and stored instead of accomodating *multiplicity* of practices, subtly dictating a transactional relationship with the menstruating body [94]. The first step towards activism requires redesigning digital trackers facilitating the collection of intimate data such that they do not restrict **bodily integrity** by reaffirming 'concealment' of the menstruating bodies. Only then will the data collected through these tools serve for activism in a true sense.

Chapter 7

Towards Period-Positive Futures

Inspiration: 9 (best) Period Tracking Apps, Cosmopolitan (April 22, 2020)

CHAPTER 7

TOWARDS PERIOD-POSITIVE FUTURES

Menstruation is experienced every month by 1.8 billion people worldwide [130], where on average, a menstruator experiences 456 periods over 38 years of their life [261]. However, menstruation has historically been considered a conversational taboo in India, like in many other countries. In the last four chapters, I describe how menstrual taboos contribute to the marginalization of menstruators on the pretext of their bodies and how cis women engage with information communication technologies (ICTs) accessible to them to navigate life as a menstruator in urban Indian settings. I started by exploring how menstrual literacy is acquired both in offline settings and online spaces (Chapters 3 and 4), followed by unpacking the avenues for technology to support menstrual mobilities (Chapters 5) and the right to bodily integrity and autonomy (Chapters 6). Throughout, I describe the complex interplay of menstrual taboos, gender norms, the social construction of menstrual bodies, and the power of interpersonal relationships to influence one's menstrual journey beginning from menarche to menopause. Fox et al. posit [94],

> "...menstruation can be understood as an assemblage—of one's own bodily experiences, the tools one takes up to make sense of them, the actions one might be prompted to partake in as a result of tool use, wider social norms and expectations, and the standards the developers project and reinforce through the protocol of the app" [94].

My data analysis reveals how the ICTs used by menstruators and *others* (non-menstruators and key relationships) in their vicinity to support menstrual wellbeing, are social products reflexively propagating the unjust status quo associated with menstruation.

Aligning with social justice orientation of *designing for recognition* [74], the associated taboo and cultural boundaries call for carefully and critically revisiting the approach to designing menstrual technologies such that these interventions do not contribute toward sustaining inequitable

and unjust social construction of menstruation and menstrual bodies. Chapters 3-6 explore different use cases of navigating everyday settings as menstruators and offer insights into how menstrual technologies might be designed to facilitate positive menstrual experiences for menstruators and others in the vicinity and where they can fall short. In this chapter, I will present a set of reflections on how technology design could address cultural taboos and systemic barriers to support a menstruator's journey, eventually carving a pathway to period-positive futures. In the process, I will revisit the socio-technical implications for designing menstrual interventions outlined in the last four chapters. First, I will reflect on gaps in the prevalent approach to designing menstrual technologies, then summarize my recommendations for bridging these gaps. Finally, I will present reflections on researching a conversational taboo before concluding with future work.

7.1 Designing Menstrual Technologies: Prevalent Approaches and Gaps

In 2017, when I started my dissertation research, the HCI community had just begun studying technology design to support menstrual experiences. There were only two studies, one published in ACM DIS 2015 by Jain et al., which investigated the potential of culture and gamification to tackle the menstrual taboo in Assam, India [141]. The second study, published at ACM CHI 2017, conducted by Epstein et al., studied the digital menstrual trackers and their adoption by menstruators in Boston, USA [82]. Since then, the field has grown exponentially. The search hit for the keyword returns 227 papers for the keyword "menstruation" in ACM digital library [1].

The HCI literature has approached menstrual wellbeing predominantly from a health perspective using the personal informatics lens to: (i) track bodily changes and menstrual cycles in an attempt to assist in developing a better understanding of menstrual bodies (e.g., [92, 84, 127, 170]) or (ii) design interventions to enable access to educational information on the subject to promote menstrual literacy among menstruators (e.g., [141, 165, 274]). The focus has always been to design digital interventions supporting a specific menstrual transition—menarche, fertility care, avoiding pregnancy, and menopause—in isolation. Below I reflect on how these approaches are falling short

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[1]The keyword search was done on May 18, 2023.

in supporting the empowerment of menstruators and contributing toward sustaining the unjust social construction of menstrual taboos and menstrual bodies in need to be 'disciplined.'

7.1.1 Taking a Narrow View

Designing technologies to support a specific menstrual transition and/or stages entails working with many assumptions, including the age of menarche, life choices, identity, and menstrual bodies. Working with standard deductions is problematic because menstrual bodies are unique, and menstruation is not just a one-time physiological phenomenon but a journey of evolving embodied experiences spanning over the years. Designing menstrual interventions which do not account for the subjectivity of embodied experiences since the beginning of one's menstrual journey while accounting for messy, diverse, and evolving associations with their body leaves the menstruator feeling 'confused,' 'stressed,' 'burdened,' and 'uncomfortable' in their bodies (Chapter 3-6). For instance, the cases where menstruators were prepared for menarche and where menstruators were formally educated about menstruation post-menarche will need to be dealt with differently as they result in different embodied experiences and awareness shaping their association with their bodies as described in Chapters 3 and 6. The latter case causes psychological trauma, impacting one's self-image or negatively impacting one's sense of identity and self-awareness, as evident in Chapter 4, where many of our women participants found the line diagram of the vagina to be discomforting.

7.1.2 'Quantified Self' Approach

The personal informatics approach (or 'quantified self' [170, 164]) has been shown to develop a better understanding of menstrual bodies while promoting the medicalization of a natural phenomenon, which fosters a notion of 'fixing' and 'controlling' the menstrual bodies [125, 128]. Here, the design of menstrual technologies promotes menstruation as a 'problem' or a health symptom that needs to be 'fixed' (ibid). In instances when menstrual cycles do not follow the algorithm-predicted patterns, menstruators feel "distressed" and "abnormal" in their bodies, as described in Chapter 6. This approach needs to be revised at multiple levels. First, it promotes a

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monistic understanding of menstrual bodies contributing to menstruators feeling abnormal in their bodies if they do not fit into this definition. Second, it doesn't account for experiences or support meaning-making, perpetuating a dualist understanding of the self, i.e., mind and body are separable [128].

7.1.3 'Information Access' Framing

Framing lack of menstrual literacy as a"information access" problem and designing digital interventions focusing only on delivery of educational information to menstruators ceases to challenge the conversational taboo of menstruation and normalizes acquiring menstrual literacy in silence. Despite having access to both online and offline educational resources on the subject, our participants either struggled or used euphemism to articulate their queries, experiences, and/or menstrual hygiene needs among menstruators as described in Chapter 2–5. The approach to educational menstrual interventions where menstruators are the only stakeholders further propagates the inequitable social construction of menstrual wellbeing, where the subject is viewed to be of relevance only to menstruators, should only be directed to them, and should only be delivered by them as described in Chapter 3. This approach becomes problematic as it excludes prominent stakeholders in a menstruator's vicinity who have the power to shape their menstrual journey across the transitions. However, these stakeholders themselves have limited to no menstrual literacy (see Chapters 3–5).

7.2 Designing Towards Period-Positive Ecologies

In my study context, the data analysis highlights how menstruation is not just an intimate phenomenon but a journey experienced by an individual, understood within a community, spoken silently, and shaped by others. Thus, designing menstrual technologies from social justice orientation would translate to *designing for enablement*, which Dombrowski et al. elaborates [74], focuses on,

> "facilitating and developing opportunities for people to fulfill their potential and to develop their own capacity... enablement has a multi-level focus on developing op-

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portunities for change, including scaffolding individual behavior change as well as the practices and policies related to fostering structural change" [74]

Aligning with the social justice orientation of enablement to design menstrual technologies that challenge existing cultural boundaries of menstrual bodies and menstrual taboos would require working with twofold agendas: first, create avenues to develop understanding about menstrual bodies, and second, to facilitate open discourse on the subject. Next, I will elaborate on what it means to work towards these agendas.

7.2.1   Technology Nurtured Third Space for Menstrual Wellbeing

Data across all my research studies establish that although an individual experiences menstruation, varied stakeholders share and shape these experiences in a menstruator's vicinity. Here, the challenges of experiencing life as a menstruator are not rooted in access to information but in the need for more receptivity to menstrual literacy among the various stakeholders, including the menstruator. This receptivity is shaped by a lack of language, personal comfort, life choices, associated taboos, myths, and the fear of creating stigmatized identities. To support menstruators in having period-positive experiences would mean including these 'others' (non-menstruators) in the discourses on the subject, which is currently considered a stigma. My data analysis unpacks urban Indian society in a phase of transition, where mothers acknowledge the value of sensitizing their sons on the subject (Chapter 3), and adult males are making efforts to acquire menstrual literacy to support better their menstruating partners, daughters, sisters, mothers, and peers (Chapter 4). This is an opportunity for technology design to support and catalyze this transition by creating avenues and nurturing safe spaces to enable ecological participation in the discourses on menstrual wellbeing. Taking an **ecological** approach would mean involving all the stakeholders in the design process and as co-users of the menstrual technologies to facilitate open conversation towards the emancipation of the issue. Thus, through this dissertation, I argue for taking an ecological approach to designing menstrual technologies where we reorient our approach to support and promote menstrual literacy from "access" to "learning."

In contexts with deep-rooted taboos, like ours, technology-only approaches focusing only on information delivery will cease to push the cultural boundaries toward period-positive futures. We need to take an ecological approach to build socio-technical systems where technology is leveraged as a vehicle to facilitate safe spaces to nurture dialogue on the subject. Taking an ecological approach means involving all the stakeholders in the design process and as co-users of the menstrual technologies to facilitate open conversation towards the emancipation of the issue. As described in previous chapters, of the prominent stakeholders and their influence on an individual's menstrual journey (beginning with the onset of menarche till the post-menopause years), two play a pivotal role—menstruating parents and non-menstruating partners. From the healthcare perspective, it is essential to note that in specific scenarios and contexts, the decision-making and/or financial power may be disproportionately in the hands of these stakeholders. Thus, I argue for expanding the personal informatics approach to an ecological approach with collective caring at its core. However, as described throughout this thesis, the associated taboos make operationalizing an ecological approach challenging. For instance, one of the critical challenges in acquiring and disseminating menstrual literacy is the lack of period vocabulary. I argue we need to aim to nurture not just a safe space but a third space where participants from different social groups—those who menstruate but belong to different economic backgrounds, or are differently affected by stigma, as well as other individuals who are seen as judging or disapproving—could work together to envision period-positive society by developing empathy, awareness, period vocabularies, and more. Bhabha describes a third space as a space with blurred cultural and identity boundaries to nurture new possibilities while encouraging new ways of cultural meaning-making [35, 36]. However, cultivating a third space will require us to face critical questions and decide on challenging tradeoffs:

Agency: Design Empowers Whom and to What Extent?

One key finding throughout our data was that not all ecological actors are equally invested, these actors change throughout the menstrual journey, and some of them might be in the position of power to constrain menstrual mobilities, both literally and metaphorically. Thus, taking an eco-

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logical approach to designing where these stakeholders might be co-users of menstrual technology raises a pressing question around agency—*design should empower whom and to what extent?* This may seem like a bottleneck with no way to move forward without prioritizing the agency of one over the other. However, we need to prudently remember that crafting period-positive futures entails not just providing menstruators with educational information about menstruation and how to take care of their bodies, but also providing them the scaffolding to shape their menstrual journey.

Drawing inspiration from Nussbaum's stance on giving positive freedom of agency to individuals to shape their lives [196], I argue prioritizing the more vulnerable populations is a worthy choice. For women's empowerment, Nussbaum suggests carefully understanding the agencies at play and under attack to decide which freedoms are harmful eventually (ibid). In such scenarios, Nussbaum suggests it is acceptable, even essential, to sacrifice the freedoms of others (non-menstruators and close relationships). This means that even if male users are challenging to engage, we might still wish to engage female stakeholders like mothers and/or teachers in the technology design. In another approach, as described in Chapter 6, we can create avenues for *designing menstrual technology for the self*. Here, this process can be structured as a co-designing activity while preserving the agency of the menstruator to include or exclude stakeholders(s) (e.g., mother, daughter, peer, sibling, partner, etc.) in the vicinity as co-designers. Here I envision the design process nurturing a third space for co-designers to negotiate the boundaries of comfort while collectively building period vocabulary and understanding of the subject.

Advocacy vs Adoption

While taking a Justice oriented approach to technology design, Bardzell emphasizes questioning our positions as researchers and/or designers to "assert what an 'im- proved society' is and how to achieve it" [31]. It is essential to acknowledge that while taking an activist stance, the designers' opinions might differ from the predominant views in society. It becomes further complicated when there are many different views regarding the level of political emancipation that must take place among stakeholders. For example, in Chapter 3, all the menstruators strongly advocated for the

inclusion of non-menstruators in the educational discourses on menstrual health discourses but at the same time acknowledged the need for difference in the depth of the topic and the age to deliver this information. In addition to menstrual taboos, the prevalence of wide-ranging and occasionally even conflicting diverse perspectives rooted in gender, relationships, boundaries of comfort, cultural values, and religion complicates the design space. As designers, we must first garner awareness about these wide-ranging attitudes and consider how far design might be equipped to address them, which raises tension— *which views to embrace and which to reject?* For example, suppose a family strongly favors limiting menstrual mobilities during periods. In that case, we might need more prudent and effective approaches than designing technology that rejects this stance. Recognizing that the cultural context has a major role in an intervention's success is vital. No matter how progressive we might be as designers, aligning with the needs of a conservative audience and setting appropriate thresholds is critical, whether for menstrual wellbeing or other topics. This raises a pressing question: How much must design abide by societal norms to gain adoption and approval, and how far might it push these boundaries? In an attempt to unpack answers to this question, I will reflect on the recent wave of large language models and how these might (or not) catalyze the desired positive menstrual futures.

With the recent growth of large language models, Chat GPT and other similar language models would seem a promising alternative for conservative audiences to acquire menstrual literacy. However, I want to draw attention to the affordability of this approach, which will not be serving the goal of carving period-positive ecologies. Yes, Chatbots can nurture an intimate, safe space for menstruators to acquire body and menstrual literacy as per their convenience throughout their menstrual journey. Depending on the user's ability to formulate queries, these models could even meet users where they are at and where they are coming from while also factoring in how much they are willing to learn at a given time. However, in hindsight, they cease to challenge the conversation taboo associated with the subject. Several participants stressed the importance of face-to-face interaction despite acknowledging that Menstrupedia offered otherwise inaccessible educational information (Chapter 4). The emergence and adoption of large language models

provide both opportunity and caution to reflect on the larger debate in CSCW and HCI regarding achieving an appropriate balance of responsibilities between humans and technology in the context of menstrual technologies. Menstrual technologies can be designed to educate and empower in various ways, such as via chatbots or by offering mixed reality experiences. However, pushing the cultural boundaries of taboo and stigma will necessitate a human-to-human interaction component in the system design. Thus, menstrual technology design must focus on supporting, leveraging, and extending human communication, as against replacing the need for it. However, the challenge is finding a balance in advocacy so that menstrual technology adoption is not impacted. There are no absolute answers for approaching the advocacy vs. adoption tradeoff, but we might recognize that change is slow, and we may need to take small, consistent steps toward it.

7.2.2 Technology Mediated Menstrual-Body Literacy

My data across the four studies reveal how menstrual experiences are reflexively shaped by body literacy and association with menstrual bodies, and vice versa. These experiences evolve with changing bodies and life choices (e.g., celibacy, childbearing, intrauterine device contraceptive, hysterectomy, etc.) throughout the menstrual journey. However, as described in Chapter 3, the menstrual health education curriculum mainly offers cognitive awareness rather than cultivating body awareness among adolescents. This approach to menstrual health education leaves menstruators and others unprepared and might cause confusion, stress, and trauma, affecting their menstrual mobilities and sexual and reproductive health, eventually straining the association with menstrual bodies, as evident from data in Chapters 3, 4, and 6. Thus, I argue for an **embodied** approach to designing menstrual technologies that promote nurturing positive body association by shifting focus on bodily experiences, not just numbers and algorithms.

It was interesting to observe menstruators engaging with digital menstrual trackers as conformation tools for their physiological cues indicative of their upcoming cycle (Chapter 6). This engagement pattern offers an opportunity to envision and design off-the-shelf technologies which physically engage menstruators with their bodies to understand better how these are impacted by

menstruation. We can take inspiration from Madeline Balaam and colleagues' work on intimate health and wellbeing (e.g., [48, 11, 247, 25]), where they engage with intimate touch, humor, and soma design to facilitate embodied engagements. However, translating these to our cultural context will require additional efforts, given the boundaries of comfort and taboo around touching one's body and bodily fluids. We as designers should account for the experiences of our users with and around menstruation and meet them where they are—their association with menstruation, their bodies, menstrual transition, life choices, and more—which would entail taking a **long** and **adaptive** approach, where the digital menstrual interventions evolve with the menstruator throughout their menstrual journey (Chapters 3 and 6).

In Chapter 6, I unpacked how the social construction of menstrual bodies makes them a site of struggle, including for individuals with menstrual literacy. Thus, aligning with the social justice orientation, taking an ecological approach towards the emancipation of menstrual bodies would translate into supporting the acquiring of menstrual-body literacy for the self and others. In other words, we need to educate menstruators about their bodies and nurture menstrual empathy among non-menstruators. It was the lack of menstrual empathy and menstrual-body literacy that lead to a recent death of 12-year old in Thane district, Mumbai, India [211]. In a shocking case reported in May 2023, an adolescent girl was killed by her 30-year-old, married brother after mistaking her menarche stains for bleeding after sex (ibid). As discussed in Chapters 5–6, one possible way could be nurturing digital safe spaces for non-menstruators to engage them in period empathy by designing menstrual technologies (e.g., toilet locator apps and menstrual trackers) with them as co-users by possibly lining to informational content on the subject. However, taking a long, embodied, ecological, and adaptive approach to menstrual technologies would entail facing and accounting for critical questions around designing for privacy and care support:

Privacy Preservation and Seeking Care Support

Menstrual taboos give rise to diverse functional and privacy expectations from menstrual technologies depending on how deeply these taboos are rooted in the social and cultural context of

using these technologies. For example, in Chapter 6, our participants were apprehensive about installing menstrual tracking apps in their devices shared with and accessible to other stakeholders in their vicinity, worrying about creating a stigmatized identity and restricted menstrual mobilities. Similarly, in Chapter 4, non-menstruating participants were uncomfortable reading Menstrupedia comic books with explicit graphics in public spaces. These raise critical questions–*how should the design engage stakeholders (like partners and mothers) with the power to constrain menstrual mobilities and beyond as co-users of menstrual technologies?* As designers, we have to ensure that menstrual technologies are not appropriated to serve perilous purposes–surveillance and constraining menstrual mobilities. Taking inspiration from do-it-yourself kits, one possible approach, as recommended in Chapter 6, could be empowering the menstruators (re)design their menstrual interventions. Here, I envision facilitating menstruators to first design and later tailor their menstrual technology throughout their menstrual journey according to their surroundings, where they are in their journey, experience with menstruation, and life choices. This *design-it-yourself (DIY) approach* is a step toward supporting menstruators in exercising control over their environment. However, operationalizing DIY-menstrual technologies supporting embodied interaction would entail accounting for the co-dependent way of life in my study context, where intimate surroundings are not always easily created. This means we must consider design in ways that do not view privacy as a prerequisite.

7.2.3   Fieldwork Reflections

Researching a conversational taboo topic in a culturally heavy context was challenging at multiple levels. My research necessitates recognizing and addressing menstrual taboos, stigma, and gender stereotypes to engage participants across genders on a conversational taboo topic. Unsure of participation response, I began my research by conducting an online survey in 2017 and received many varied responses immediately after the survey was rolled out. While on the one hand, some participants reached out to support our efforts and ask us to share our analysis with them, others were surprised as to why we chose this topic, and some were baffled as to how technology

could help. The hesitation and discomfort of engagement with the subject were evident across my studies. People would initially show their willingness to participate but shied away once they were informed about the nature of the survey. Across the multiple surveys I conducted as part of my dissertation work, it was typical to see respondents leave the demographic sections empty. We cautiously designed our survey where the demographic sections came at the end of the survey to impact the participants' performance minimally [153, 257]. Even during interviews and focus groups, when I approached parents or young adults for an interview, their discomfort was evident from their body language, and a few of them also expressed their discomfort explicitly in talking about the topic. While interviewing parents, fathers would stand up and leave the room to grant privacy to the women. When these men were explicitly asked to stay back, they would ask why their responses would be relevant. All our initial attempts to connect with various reputed private schools were also in vain because most did not respond to our emails.

We could not engage minors in our initial studies primarily because getting schools' permission to include them was impossible due to the sensitive nature of the topic of menstruation; schools and parents were resistant to talking about menstruation and menstrual health in general and were strongly opposed to our engagement with their students/children on these topics. Our best approximation for adolescents, thus, were young adults who had only recently experienced adolescence. Therefore, I decided to engage with adults as primary participants. This critical factor shaped all my study designs and reflexively my research questions. Initially, I wanted to work with minors and focus on how technology could support formal menstrua health education in classroom settings. Given the menstrual stigma and lack of menstrual vocabulary, I followed the opportunistic approach to study design.

Since my first study in 2017, it has been evident that data collection will be challenging using traditional methods. I took it as an opportunity to explore non-traditional approaches to participant engagement through cultural probes, sketching, body mapping, think-aloud comic reading sessions, and modeling safe spaces using wooden blocks and chess pieces. These methods facilitated hard conversations but did not prepare me to face gender issues daily and on many levels, given the

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deep-rooted menstrual stigma. There were many instances where my character was questioned, and I was perceived as 'available' by the opposite gender, given the nature of my research and comfort in having a dialogue on menstrual health, which shares blurry boundaries with sexual and reproductive health. There were also incidents where my participants shared their stories of abuse and harassment during the interviews, given the lack of safe space to vent it out, leaving me more vulnerable. Thus, as a preparatory measure, I underwent certified training to become a menstrual educator and later used my experience as a menstrual educator to inform my methodology.

Our first study showed that seeking, building, and maintaining collaborations with intermediaries (like practitioners, activists, and not-for-profit organizations) is central to fieldwork in the problem space. It took us two years to find a collaboration with SachhiSaheli[2], an NGO that works on women's empowerment, menstrual wellbeing, and sexual and reproductive health rights. SachhiSaheli offered me much-needed training, safe space, support, and the opportunity to work at the grassroots as a menstrual health educator and contribute at the grassroots level beyond the scope of my dissertation work. Since then, I have participated in national-level policy discourses, given interviews, and conducted multiple menstrual health awareness sessions and workshops. I brought learning from the grassroots to shape my research and used the results of my research to inform initiatives at the grassroots. Apart from SachhiSaheli, I also worked with other prominent practitioners, including Menstrupedia[3] and HAIYYA[4]. The symbiotic relationship with field practitioners has helped add value to my dissertation while supporting me in growing as a researcher.

Since 2017, I have designed and analyzed 1050+ survey responses, conducted 123+ interviews, and had 25 design sessions/workshops across multiple studies on a conversational taboo topic. Overall, I have transcribed and analyzed 163+ hours of audio-recorded data and performed content analyses of educational content on menstrual health and wellbeing. Reflecting on my fieldwork experience, I feel we, as an HCI community, need to start recognizing the vulnerabilities of researching a taboo topic and work toward building new methods and infrastructure to support

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[2]https://sachhisaheli.org
[3]https://www.menstrupedia.com
[4]https://www.haiyya.in/

researcher care and capability-building for researching taboo topics.

7.3   Future Work

My dissertation research is a small step towards envisioned technology-mediated positive menstrual futures. There are many ways in which this work can be further extended and built upon. I will now tease out three such future research directions.

Menstrual Wellbeing and Intersectional Taboos

In my dissertation research, it was a conscious decision to focus on cis-gender menstruators, given the menstrual stigma and conversational taboo treatment the subject receives in our study context. I approached my dissertation research as a first step toward pushing cultural boundaries by challenging the social construction of menstruation, menstrual bodies, and gender binaries in my study context. Going ahead, this research can be extended to study the experiences of menstruators at different intersections of gender identity, disability, religion, and caste and how the design of contemporary menstrual technologies impacts their overall wellbeing. Learnings from this work will offer lessons for designing equitable and inclusive menstrual technologies, which can be translated to designing culturally responsive technologies for reproductive health and wellbeing.

Culture, Heritage, and Taboos

A recurring gap I encountered throughout my research is the lack of language as one of the prominent barriers to facilitating conversations on a taboo topic. Future research can explore culture and heritage as an asset to navigate the language barrier and nurture safe spaces to facilitate conversations on taboo health topics. In particular, building on my work, it would be interesting to explore the role of playfulness as probes to navigate taboos in different settings–personal settings (family, friends, and partners) and non-personal settings (educational and research settings). Lessons from this work will lead to methodological contributions as these can be translated into probes for facilitating data collection when engaging with participants on conversational taboos.

Researcher Care and Taboo Research

Working on a taboo topic for my dissertation exposed me to the challenges and vulnerabilities a researcher faces at different levels daily while preparing for, conducting, and presenting research. Such interactions impact the researcher, leaving an impression on them–both positive and negative. Much work stresses the importance of participant care, but limited work unpacks the challenges, dilemmas, and tradeoffs faced by researchers researching taboo topics. Future research is needed to design capability-building systems in the form of intellectual infrastructures and community infrastructures to support researching taboo topics.

Appendix
List of Publications

APPENDIX A
THESIS PUBLICATIONS

- **Anupriya Tuli**, Surbhi Singh, Rikita Narula, Neha Kumar, and Pushpendra Singh. 2022. Rethinking Menstrual Trackers Towards Period-Positive Ecologies. In CHI Conference on Human Factors in Computing Systems (CHI '22), April 29-May 5, 2022, New Orleans, LA, USA. ACM, New York, NY, USA, 20 pages.

- Gauri Bhatnagar, Pushpendra Singh, Neha Kumar, and **Anupriya Tuli**. 2023. Unpacking Tensions in Designing Annotation System for Public Toilets to Support Menstrual Mobilities. In Proceedings of the 2022 International Conference on Information and Communication Technologies and Development (ICTD '22). Association for Computing Machinery, New York, NY, USA, Article 27, 1–6.

- **Anupriya Tuli**, Shaan Chopra, Pushpendra Singh, and Neha Kumar. 2020. Menstrual (Im)Mobilities and Safe Spaces. In Proceedings of the 2020 CHI Conference on Human Factors in Computing Systems (CHI '20). Association for Computing Machinery, New York, NY, USA, 1–15.

- **Anupriya Tuli**, Shruti Dalvi, Neha Kumar, and Pushpendra Singh. 2019. "It's a girl thing": Examining Challenges and Opportunities around Menstrual Health Education in India. ACM Transactions on Computer-Human Interaction, 26, 5, Article 29 (July 2019), 24 pages.

- **Anupriya Tuli**, Shaan Chopra, Neha Kumar, and Pushpendra Singh. 2018. Learning from and with Menstrupedia: Towards Menstrual Health Education in India . In Proceedings of the ACM on Human-Computer Interaction, Vol. 2, CSCW, Article 174 (November 2018). ACM, New York, NY. 20 pages.

APPENDIX B

OTHER PUBLICATIONS

- **Anupriya Tuli**[*], Azra Ismail[*], Karthik S Bhat[*], Pushpendra Singh, and Neha Kumar. 2023. "Information-Backward but Sex-Forward": Navigating Masculinity towards Intimate Well-being and Heterosexual Relationships. In Proceedings of the 2023 CHI Conference on Human Factors in Computing Systems (CHI '23). Association for Computing Machinery, New York, NY, USA, Article 39, 1–16. | [*] Equal contribution.

- Ayushi Srivastava[*], Shivani Kapania[*], **Anupriya Tuli**[*], and Pushpendra Singh. 2021. Actionable UI Design Guidelines for Smartphone Applications Inclusive of Low-Literate Users. Proceedings ACM Human-Computer Interaction 5, CSCW1, Article 136 (April 2021), 30 pages. |[*] Equal contribution.

- Neha Kumar, Naveena Karusala, Azra Ismail, and **Anupriya Tuli**. 2020. Taking the Long, Holistic, and Intersectional View to Women's Wellbeing. ACM Trans. Comput.-Hum. Interact. 27, 4, Article 23 (August 2020), 32 pages.

- Koushik Sinha Deb, **Anupriya Tuli**, Mamta Sood, Rakesh Chadda, Rohit Verma, Saurabh Kumar, Ragul Ganesh, and Pushpendra Singh. 2018. Is India ready for mental health apps (MHApps)? A quantitative-qualitative exploration of caregivers' perspective on smartphone-based solutions for managing severe mental illnesses in low resource settings. PloS one, Vol. 13, Issue 9, 19 pages.

- **Anupriya Tuli**, Pushpendra Singh, Mamta Sood, Koushik Sinha Deb, Siddharth Jain, Abhishek Jain, Manan Wason, Rakesh Chadda, and Rohit Verma. 2016. Harmony: Close Knitted mHealth Assistance for Patients, Caregivers and Doctors for Managing SMIs. ACM Proceedings of International Joint Conference on Pervasive and Ubiquitous Computing: Adjunct (UBICOMP/ISWC'16). Heidelberg, Germany.

APPENDIX C

ARTICLES, PANELS, AND WORKSHOP PROPOSALS

- Vikram Kamath Cannanure, Naveena Karusala, Cuauhtémoc Rivera-Loaiza, Annu Sible Prabhakar, Rama Adithya Varanasi, **Anupriya Tuli**, Dilrukshi Gamage, Faria Noor, David Nemer, Dipto Das, Susan Dray, Christian Sturm, and Neha Kumar. 2022. HCI Across Borders: Navigating Shifting Borders at CHI. In Extended Abstracts of the 2022 CHI Conference on Human Factors in Computing Systems (CHI EA '22). Association for Computing Machinery, New York, NY, USA, Article 115, 1–5.

- Margaret Jack and **Anupriya Tuli**. 2021. Designing for liberation: our lives, mobility, and technology. interactions 28, 2 (March - April 2021), 34–41.

- Pranjal Jain, Samia Ibtasam, Sumita Sharma, Nilavra Bhattacharya, **Anupriya Tuli**, Dilrukshi Gamage, Dhruv Jain, Rucha Tulaskar, Priyank Chandra, Lubna Razaq, Rahat Jahangir Rony, Deepak Ranjan Padhi, Mohit Jain, Suleman Shahid, Nova Ahmed, Devanuj Kanta Balkrishan, and Pushpendra Singh. 2021. From the Margins to the Centre: Defining New Mission and Vision for HCI Research in South Asia. In Extended Abstracts of the 2021 CHI Conference on Human Factors in Computing Systems (CHI EA '21). Association for Computing Machinery, New York, NY, USA, Article 112, 1–6.

- Neha Kumar, Daniel A. Epstein, Catherine D'Ignazio, Amanda Lazar, Andrea Parker, Muge Haseki, and **Anupriya Tuli**. 2019. Women's Health, Wellbeing, & Empowerment. In Conference Companion Publication of the 2019 on Computer Supported Cooperative Work and Social Computing (CSCW '19). Association for Computing Machinery, New York, NY, USA, 116–121.

Appendix

Ethical Approvals & Data Collection Protocols

APPENDIX D

SUPPLEMENTARY MATERIAL FOR CHAPTER 3

This appendix contains ethical approval and data collection protocols used to collect the data presented in Chapter 3, titled *"Silence: The Language of Menstrual Literacy."* These supplementary materials include the following documents:

(a) The Institutional Review Board (IRB) Approval

(b) Online Survey Protocol

(c) Interview and Focus Group Protocol

(d) Interview/Focus Group Consent Form (English)

(e) Interview/Focus Group Consent Form (Hindi)

(f) Demographic Collection Form

INDRAPRASTHA INSTITUTE *of*
INFORMATION TECHNOLOGY DELHI
(A State University established by Government of NCT of Delhi)

IIIT

18 sept. 2017

Associate Professor Pushpendra Singh

Indraprastha Institute of Information Technology, Delhi

IIITD INSTITUTIONAL REVIEW BOARD APPROVAL

Project Title: **To understand how people (men and women) gain and disseminate knowledge about menstruation and menstrual health practices.**

We refer to your application for ethics approval with respect to the above project.

The Board has deliberated on your application and noted from your application that your research involves collecting behavioral data from participants through online surveys and personal interviews.

You have confirmed that informed consent is being obtained from participant and you have guaranteed the confidentiality of your participants in surveys and interviews.

The documents reviewed are

a) Participant information sheet and consent form

b) Data collection form.

The Board is therefore satisfied with the bioethical consideration for the project and approves the ethics application under Expedited review. The approval period is from 1 sept. 2017 to 1 sept 2018.

The following protocol and compliances are to be observed upon IIITD IRB approval.

1. The participants of surveys have age above 18 years.

2. If the participant has agreed to give personal interview then a signed copy of consent letter has to be kept for record.

3. The interviews that would be taken for this study would be recorded and kept for 7 years in archive.

4. If the interview is taken personally (face to face) then it has to be taken at a public place or at your institution.

5 Since some questions in the interview could be sensitive, prefer female interviewer for female participants and male interviewer for male participants.

6. Continuing Review Request/ Notice of study completion form should be submitted to IIITD IRB board.

Dr Vibhor Kumar
Chair, Institutional Review Board
Indraprastha Institute of Information Technology, Delhi

Menstrual Health Education Survey

#Information & Consent

"At a time when the topic of menstruation continues to be discussed in hushed tones, sensitizing boys, more than girls, is the need of the hour."

-Manish Sisodia
[Delhi Deputy Chief Minister]

We invite **men** and **women** to share their thoughts and experiences around Menstrual Health Education by filling out our 15-minute survey!

OBJECTIVE

We are running a study at IIIT Delhi and Georgia Institute of Technology to understand how people (men and women) gain and disseminate knowledge about menstruation and menstrual health practices. Developing this understanding can help inform the design of future technical aids for teaching about gender-sensitive topics like menstrual health education to school-children.

RISKS

The possible risks or discomforts of the study are minimal. You may find a few personal/sensitive questions in the survey, given the topic area.

BENEFITS OF THE STUDY

You will not directly benefit from taking part in this study. However, this research will help inform the design of technical aids for imparting menstrual health education to school-children.

CONFIDENTIALITY OF RESEARCH INFORMATION

Taking part in this study is voluntary and you can stop at any time. The survey does not collect identifying information such as your name, email address, or IP address. Therefore, your responses will remain anonymous.

At the end of the survey you will be asked if you are interested in participating in an additional interview [by phone, in person, or email]. If you choose to provide contact information, your survey responses may no longer be anonymous to the researcher. However, no names or identifying information would be included in any publications or presentations based on these data, and your responses to this survey will remain confidential.

*By clicking the 'Next' button, you will be giving consent for participation in the study.

Menstrual Health Education Survey

#Screening

* 1. What is your gender?

○ Female

○ Male

Menstrual Health Education Survey

#Associations with menstrual health

1. When did you first learn about menstruation?

◯ Before your first period

◯ After you had your first period

2. How did you first learn about menstruation?

◯ Mother/Sister   ◯ Teacher   ◯ Internet

◯ Father/Brother   ◯ Health   ◯ I don't remember
                            Professional/Counselor

◯ Friends [Female]   ◯ Books

◯ Friends [Male]   ◯ TV Commercials

◯ Other (please specify)

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3. Your knowledge of menstrual health is derived from which of the following sources? (Please select all that apply)

☐ Mother/Sister   ☐ Teacher   ☐ Internet

☐ Father/Brother   ☐ Health   ☐ Mobile Applications
                            Professional/Counselor

☐ Friends [Female]   ☐ Books   ☐ All of them

☐ Friends [Male]   ☐ TV Commercials

☐ Other (please specify)

```

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4. You are/would be comfortable in discussing menstrual health with whom? (Please select all that apply)

- [ ] Husband/Partner
- [ ] Mother/Sister/Daughter
- [ ] Father/Brother/Son
- [ ] Friends [Female]
- [ ] Friends [Male]
- [ ] Teachers
- [ ] Health Professional/Counselor
- [ ] All of them
- [ ] None

- [ ] Other (please specify)

[   ]

5. Do you think there is value (importance) for men to understand issues around menstrual health?

There is no value!	I don't think so	I'm not sure	Yes, maybe	Yes, definitely!
○	○	○	○	○

6. When you were in middle school (Class VI to VIII), did your school give you any information about menstrual health? [Please select all that apply]

- [ ] Yes, as a part of syllabus in common classroom session for both boys and girls
- [ ] Yes, a joint workshop was conducted for all the students
- [ ] Yes, separate girls-only and boys-only workshops were conducted
- [ ] Yes, a girls only workshop was conducted
- [ ] No such session was conducted
- [ ] Other (please specify)

7. In general, you feel uncomfortable talking about menstrual health with...

- ○ Males
- ○ Females
- ○ Both
- ○ None, I feel comfortable talking to both

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#Revisiting your first period!

1. Which class/standard were you in when you had your first period?

[   ]

2. What was your immediate reaction or feeling? (Please select all that apply)

☐ Confused   ☐ Sad   ☐ Happy

☐ Frustrated   ☐ Scared   ☐ Neutral

☐ Shocked   ☐ Surprised

☐ Stressed   ☐ Excited

☐ Other (please specify)

[   ]

3. When you had your first period, what did you think had happened to you?

[   ]

#That time of the
month!

1. Do you use 'secret' words to talk about menstruation so nobody else knows what is being discussed? If yes, please mention these 'secret' words.

2. Do you follow any special routine or avoid certain practices of your daily routine during menstruation/menses? [E.g.: Some places where you avoid to go, daily chores you avoid, food you avoid, etc.] Please elaborate.

3. Are there any restrictions imposed on your daily routine during menstruation/menses [E.g.: Some places where you are not allowed to go, daily chores you are not allowed to perform, foods you are not allowed to eat, etc.]? Who generally imposes them? Please elaborate.

4. Name the products you are familiar with for managing menstrual flow. [Please select all that apply]

- [ ] Disposable sanitary napkins [E.g. Stayfree, Whisper, etc.]
- [ ] Reusable cloth pads
- [ ] Tampons
- [ ] Menstrual Cup
- [ ] All of the above

5. How do you track your menstrual cycle? [Please select all that apply]

- [ ] I often forget to track.
- [ ] I mostly remember the dates.
- [ ] I use paper [E.g. a paper-based calendar].
- [ ] I use a mobile application, [E.g. my smartphone calendar, Clue, etc]. Please specify the application name.

[   ]

Menstrual Health Education Survey

#Menstrual Health Education

1. According to you, when is the best time to introduce/talk about menstrual health to a young girl?

○ Before her first period

○ After her first period

2. Please rate each of the following on the scale of appropriateness to introduce and teach menstrual health concepts to girls.

	Most Inappropriate	Inappropriate	Neutral	Appropriate	Most Appropriate
Mother/Sister	○	○	○	○	○
Father/Brother	○	○	○	○	○
Peers/Friends	○	○	○	○	○
Teachers	○	○	○	○	○
Health Professional/Counselor	○	○	○	○	○

3. Which is the most suitable class/standard for imparting Menstrual Health Education to girls in schools?

○ Class IV to V (9 -10 years)

○ Class VI to VIII (11-13 years)

○ Class IX to X (14-15 years)

○ Class XI to XII (16-17 years)

○ Schools should not impart Menstrual Health Education to girls

4. How should schools impart information about the phenomenon of menstruation and menstrual health?

○ To both boys and girls, as a part of the syllabus in a common classroom session.

○ To both boys and girls, as a part of the syllabus but in boys-only and girls-only sessions.

○ To both boys and girls, but with separate information modules designed for boys-only and girls-only sessions.

○ Only to girls in a special session.

○ School should not impart information on this topic.

○ Other (please specify)

Menstrual Health Education Survey

#Survey for
men

1. How old were you when you first learn about menstruation/periods?

2. What is the first word which comes to your mind when you hear the word 'menstruation' or 'periods'?

3. How did you first learn about menstruation?

○ Wife/Partner   ○ Friends [Female]   ○ TV commercials

○ Mother   ○ Friends [Male]   ○ Internet

○ Sister   ○ Teacher   ○ Mobile Applications

○ Brother   ○ Health   ○ I don't remember
                      Professional/Counselor

○ Father   ○ Books

○ Other (please specify)

4. Your knowledge of menstrual health is derived from which of the following sources? (Please select all that apply)

☐ Mother/Sister   ☐ Friends [Male]   ☐ TV commercials

☐ Father/Brother   ☐ Teacher   ☐ Internet

☐ Wife/Partner   ☐ Health   ☐ Mobile Applications
                            Professional/Counselor
☐ Friends [Female]   ☐ All of them
                         ☐ Books

☐ Other (please specify)

[text box]

5. Do you think there is value (importance) for men to understand issues around menstrual health?

Not Important	Somewhat Important	Neutral	Very Important	Essential
○	○	○	○	○

6. Did your school teach/organize special sessions on menstrual health? [Please select all that apply]

☐ Yes, as a part of the syllabus in a common classroom session for both boys and girls.

☐ Yes, a joint workshop was conducted for all students.

☐ Yes, separate girls-only and boys-only workshops were conducted.

☐ Yes, a girls only workshop was conducted.

☐ No such session was conducted.

☐ Other (please specify)

[text box]

7. How have you heard boys talk about menstruation/menses at school? (Please select all that apply)

- ☐ Demeaning
- ☐ Brag about knowing/predicting someone's date
- ☐ Make all kind of jokes
- ☐ Tease girls
- ☐ Curious to know more about it
- ☐ Behave maturely
- ☐ Never really discuss about it
- ☐ Other (please specify)

8. Have you heard your family discuss menstrual health issues?

- ○ Yes
- ○ No

9. Have you seen any restrictions placed on girls/women during their menstrual cycle? For example, are there places they are not supposed to go to or chores they are not allowed to perform?

10. Has your mindset about menstruation changed since you first heard about it? Please elaborate.

11. Please rate each of the following on the scale of appropriateness to introduce and teach menstrual health concepts to the boys.

	Most Inappropriate	Inappropriate	Neutral	Appropriate	Most Appropriate
Mother/Sister	◯	◯	◯	◯	◯
Father/Brother	◯	◯	◯	◯	◯
Peers/Friends	◯	◯	◯	◯	◯
Teachers	◯	◯	◯	◯	◯
Health Professional/Counselor	◯	◯	◯	◯	◯

12. Do you think that gender matters in imparting information about the phenomenon of menstruation and menstrual health to boys? If yes, you would prefer your Menstrual Health Education teacher to be a...

◯ Male

◯ Female

◯ Gender doesn't matter

13. Which is the most suitable class/standard to impart Menstrual Health Education for boys in schools?

◯ Class IV to V (9-10 years)

◯ Class VI to VIII (11-13 years)

◯ Class IX-X (14-15 years)

◯ Class XI-XII (16-17 years)

◯ Schools should not impart Menstrual Health Education to boys

14. How should schools impart information about the phenomenon of menstruation and menstrual health?

○ To both boys and girls, as a part of the syllabus in a common classroom session.

○ To both boys and girls, as a part of the syllabus but in boys-only and girls-only sessions.

○ To both boys and girls, but with separate information modules designed for boys-only and girls-only sessions.

○ Only to girls in a special session.

○ School should not impart information on this topic.

○ Other (please specify)

Menstrual Health Education Survey

#Educating kids

* 1. Do you have kids?

  ◯ Only daughter(s)

  ◯ Only son(s)

  ◯ Both, daughter(s) and son(s)

  ◯ None

#Educating kids

1. If your daughter is close to getting her first period or has already had her first period, have you explained menstruation to her?

◯ Not applicable, my daughter is in her early childhood.

◯ If yes, how?

◯ If no, why not?

Please explain...

2. Have you explained/would you explain the phenomenon of menstruation to your son(s)?

◯ I don't know, my son is in his early childhood.

◯ If yes, how?

◯ If no, why not?

Please explain...

3. Do you think talking about menstrual health to one's son should be different from talking to one's daughter?

○ There should be no difference.

○ Talking to girls is more important.

○ Other (please specify)

Menstrual Health Education Survey

#Educating daughter(s)

1. If your daughter is close to getting her first period or has already had her first period, have you explained menstruation to her?

◯ Haven't thought about it, my daughter is in her early childhood.

◯ If yes, how?

◯ If no, why not?

Please explain...

[   ]

2. If you had a son(s), would you explain menstruation to him/them?

◯ If yes, how?

◯ If no, why not?

Please explain...

[   ]

3. Do you think talking about menstrual health to one's son should be different from talking to one's daughter?

◯ There should be no difference.

◯ Talking to girls is more important.

◯ Other (please specify)

[   ]

Menstrual Health Education Survey

#Educating son(s)

1. Have you explained/would you explain the phenomenon of menstruation to your son(s)?

◯ Haven't thought about it, my son is in his early childhood.

◯ If yes, how?

◯ If no, why not?

Please explain...

| |
| |

2. Do you think talking about menstrual health to one's son should be different from talking to one's daughter?

◯ There should be no difference.

◯ Talking to girls is more important.

◯ Other (please specify)

| |
| |

Menstrual Health Education Survey

#Demographics

* 1. In which year were you born?

[   ]

* 2. Which religion do you practice ?

◯ Hindu   ◯ Sikh   ◯ Atheist or agnostic

◯ Muslim   ◯ Christian   ◯ I do not follow/practice any religion in particular

◯ Other (please specify)

[   ]

* 3. Where do you live?

[   ]

[   ]

* 4. You live with... [Please select all that apply.]

☐ Husband/Wife/Partner   ☐ Sister/sister In-law   ☐ Kids

☐ Parents/ In-laws   ☐ Brother/brother In-law   ☐ All of them

☐ Grand Parents   ☐ Uncle/Aunt   ☐ None

* 5. You have attended...

◯ A single-sex school

◯ Co-ed school

◯ Both

◯ None

* 6. You have studied in which of the following education boards? [Please select all that apply]

☐ C.B.S.E.

☐ I.C.S.E.

☐ State board

7. What is your current occupation?

[   ]

8. In which bracket does your annual family income fall?

◯ Below ₹ 1.5 Lakh

◯ ₹ 1.5 to ₹ 3.4 Lakh

◯ ₹ 3.4 to ₹ 17 Lakh

◯ Above ₹17 Lakh

9. What digital devices you personally own? [Please select all that apply]

☐ Smartphone

☐ Laptop

☐ Desktop

☐ Tablet/iPad

☐ Feature Phone

☐ All of them

☐ None

☐ Other (please specify)

[   ]

10. What digital devices do you share with other people? [Please select all that apply]

◯ Smartphone

◯ Laptop

◯ Desktop computer

◯ Tablet/iPad

◯ Feature Phone

◯ All of them

◯ None

◯ If you share more than one device, please name them...

11. Are you willing to be contacted for a follow-up 1-hour interview in-person, on phone, or on Skype?

◯ No

◯ Yes, please share your contact details/ email-id.

Interview and Focus Group Protocol

Hi, I'm Anupriya Tuli, a PhD student in the department of computer science at IIIT-Delhi. I am conducting a study about educating prepubescent girls about menstrual health. This interview will last no more than an hour. (OR this focus group will last between 30--60 minutes depending upon how our discussion develops). I have shared the information sheet and consent form with you. Please take your time to read it carefully. Feel free to ask me any clarification questions regarding the study process. Before we begin, I will re-iterate that this session will be audio recorded. Do you consent for the same? You can choose not to answer any question, and can stop the interview at any time.

Cisgender Men and Women (Age: 18+ years)

- What is the first word which comes to your mind when you hear menstruation?

- How did you first out about menstruation? What were or who was the source of your information?

- Are you familiar with specific practices that needs to be practices during menstrual days? Who has established these practices for you Or promote these practices? [Probe: things women avoid vs. things they are not allowed]

- Does gender matters in having or initiating conversations around menstrual health and wellbeing? [Probe: should men be involved in these conversations? Or only women should talk and teach?]
    - Has any women apart from your partner, discussed this with you? [Ask male participants]
    - Have you discussed this with any male peer/relative? [Ask female participants]
    - Do you think there is value for men to understand issues around menstrual health? Why?

- Does relationship matter in having or initiating conversations around menstrual health and wellbeing? [Probe: should women talk to Father/Brother/Husband/son?]
    - If a women/daughter talks about it with you, then? [Ask male participants]

- Were you taught about this in school? If yes, then how and when? [Probe: Who was the educator? What was the gender composition of the participants? Feeling of embarrassments/discomfort?]

- Should school teach this to students at school? [Probe: Why/why not? How? When?]

- What role might peers have in this regard? [Capture experiences!]

Parents (In addition to above questions, parents will be administered the following questions)

- How many kids you have? How old are they?
- Have you discussed menstruation with daughters? [Probe: How/Why not?]
  - Do you plan to explain it? [Probe: When? How?]
- Would you discuss menstruation with your son(s)? [Probe: When? How?]
  - Do you plan to explain it?
- How is it different, talking to your son vs. a daughter?

Health professionals/Social workers/Teachers (Teaching classes IV-X)

❖ **Icebreakers**

- What is the first word which comes to your mind when you hear the word 'menstruation'?

- If you see a girl who is unaware of a blood stain on her dress/uniform,
  - What would you do? Why?
  - In case she is not acquainted to the topic, how will you explain her what has happened?
- In your opinion and experience, should the schools impart information about menstruation? [Probe: When? How? Or Why not?]

- If we have to, who could be the appropriate person to teach menstruation-related education at the school? [Probe: team/individual, Science teachers, Counselors, Health Professionals, etc.]

❖ **Teaching Sensitive topic like Menstrual Health**

- Have you taught menstruation or any similar sensitive topic? [Capture experience]
- How would you feel about teaching menstruation (The Reproduction chapter, Biology for class X) in school? Can you elaborate?

- How do students respond in the class? Is there any specific incident you would like to share? [Probe: response/reaction of girls vs. boys in classroom settings]

- Have you had any experience where parents have intervened or approached you about teaching such sensitive topic? [Probe: Did you receive appreciation or complaint?]

❖ **Design Curriculum**

- If you have to design a curriculum around menstruation,
    o What would you include? [Probe: Only menstruation, puberty related education, family life education, etc.]

    o What support an instructor needs? Should there be a team of instructors or single instructor? [Probe: science teachers, counselors, health professionals, etc.]

    o What kind of aids are used? [PPT/videos/role play/etc.]

    o Do you feel a need for teacher training specifically for imparting menstrual health education? What sort of training should the instructor be provided with?

❖ **Not for Profit Organization (NGOs)/school's participation in Menstrual Health**

- Do girls receive menstrual health education at the school/NGO? [Probe: How/Why not?]

- Who teaches menstruation-related education at the school? [Probe: science teachers, Counselors, Health Professionals, inited speakers, etc.]

- Are teachers provided any sort of training for teaching sensitive topic like this? [Probe: what sort of training is provided? Or what sort of training do you feel the need for?]

Closing script: With this we have come to an end of our session. I now request you to fill out the shared demographics form. Meanwhile, are there any closing thoughts you have or any experiences you want to share with us? Thank you for you time and support!

Interview/Focus Group Consent Form

Contact Person: Anupriya Tuli
Contact: 01126907458 | anupriyat@iiitd.ac.in

Study Title: To understand how people (men and women) gain and disseminate knowledge about menstruation and menstrual health practices.

You are being invited to take part in this study. Before you make a decision, it is important for you to understand why this study is being done and what it will involve. Please take time to understand the following information carefully. Please do not hesitate to ask us if there is anything that is not clear or if you would like more information. To participate, you are required to sign the consent at the end this sheet.

OBJECTIVE

We are running a study at IIIT-Delhi to understand how people (men and women) gain and disseminate knowledge about menstruation and menstrual health practices. Developing this understanding can help inform the design of future technical aids for teaching about gender-sensitive topics like menstrual health education to school-children.

PROCEDURE

You will be asked unstructured open-ended questions around menstrual health education, to understand how people (men and women) gain and disseminate knowledge about menstruation and menstrual health practices. The session would not last more than 60 minutes, will be audio recorded and later transcribed for further analysis.

RISKS

The possible risks or discomforts of the study are minimal. You may find a few personal/sensitive questions in the survey, given the topic area.

BENEFITS OF THE STUDY

You will not directly benefit from taking part in this study. However, this research will help inform the design of technical aids for imparting menstrual health education to school-children.

CONFIDENTIALITY OF RESEARCH INFORMATION

Taking part in this study is voluntary and you can stop at any time. No identifying information such as your name or address/email address will be collected. Therefore, your responses will remain anonymous.

☐ I have read the description of the study above, and consent to participating.

(Participant Signature)
Date: _____

साक्षात्कार सहमति पत्र

संपर्क व्यक्ति: अनुप्रिया तुली
संपर्क: 01126907458 | anupriyat@iiitd.ac.in

अध्ययन का शीर्षक: लोग (पुरुष और महिला) कैसे माहवारी और मासिक धर्म के स्वास्थ्य प्रथाओं के बारे में ज्ञान का प्रसार करते हैं

आप इस शोध अध्ययन में भाग लेने के लिए आमंत्रित हैं। इससे पहले कि आप इस अध्ययन में भाग लेने का निर्णय करे ,यह महत्वपूर्ण है आप समझे यह शोध क्यों किया जा रहा है और इसमें क्या होगा। कृपया निम्लिखित जानकारी को ध्यान से पढ़े / सुनो और अगर कुछ स्पष्ट नहीं है या आप अधिक जानकारी चाहते हैं ,कृपया संकोच न करे। यदि आप भाग लेते हैं , तो आप को एक सहमति फार्म पर हस्ताक्षर करने को कहा जाएगा।

उद्देश्य

हम IIIT-Delhi में एक अध्ययन चला रहे हैं यह समझने के लिए कि कैसे लोग (पुरुष और महिला) माहवारी (menstruation/periods) और मासिक धर्म के स्वास्थ्य अभ्यासों के बारे में ज्ञान का प्रसार करते हैं। इस अध्ययन से मिली जानकारी, बच्चों को मासिक धर्म स्वास्थ्य शिक्षा (Menstrual Health Education) जैसे लिंग-संवेदनशील विषयों के बारे में पढ़ाने के लिए भविष्य के तकनीकी सहायता के डिजाइन को सूचित करने में मदद कर सकता है।

प्रक्रिया

आपसे मासिक धर्म की स्वास्थ्य शिक्षा (मेंस्ट्रअल हेल्थ एजुकेशन) के बारे में कुछ प्रशन पूछे जाएंगे यह जाने के लिए कि किस प्रकार लोग (पुरुष और महिला) माहवारी और मासिक धर्म के स्वास्थ्य अभ्यासों के बारे में ज्ञान का प्रसार करते हैं। यह साक्षात्कार आपका ऑडियो रिकॉर्ड किया जाएगा और लगभग 30 मिनट का समय लेगा।

जोखिम

इस साक्षात्कार में हम सिर्फ बात-चीत करेंगे , इस लिए इसमें भाग लेने से आपको कोई हानी नहीं पहुंचेगी| अध्ययन के संभावित असुविधाएं न्यूनतम हैं, विषय क्षेत्र को देखते हुए आपको सर्वेक्षण में कुछ व्यक्तिगत/संवेदनशील प्रशन मिल सकते हैं।

अध्ययन के लाभ

इस अध्ययन में भाग लेने से आपको सीधे लाभ नहीं मिलेगा। हालांकि, यह शोध विद्यालय-बच्चों को मासिक धर्म की स्वास्थ्य शिक्षा प्रदान करने के लिए तकनीकी सहायता के डिजाइन को सूचित करने में मदद करेगा।

अनुसंधान सूचना के गोपनीयता

इस अध्ययन में भाग लेना स्वैच्छिक है और आप किसी भी समय रोक सकते हैं। आपका नाम या पता/ ईमेल पता जैसे कोई पहचान वाली जानकारी एकत्र नहीं की जाएगी। आप जो भी जानकारी प्रदान करेंगे उसे पूरी तरह गोपनीय रखा जाएगा।

· मैंने ऊपर दिए गए अध्ययन का विवरण पढ़ लिया है, और भाग लेने के लिए सहमति व्यक्त की है।

(प्रतिभागी हस्ताक्षर)
तारीख: _____

Menstrual Health Education Survey &
Interview/Focus Groups
[Demographics]

Participant no._____

What is your gender?

- ☐ Female
- ☐ Male
- ☐ Do not wish to answer

In which year you were born?

_____

In which state you live?

_____

Which religion do you practice?

- ☐ Hindu
- ☐ Muslim
- ☐ Sikh
- ☐ Christian
- ☐ Atheist
- ☐ I don't practice any particular religion
- ☐ Other_____

Which school have you attended? [Please select all that apply]

- ☐ Single sex school
- ☐ Co-ed school
- ☐ Both
- ☐ None

You have studied in which of the following boards? [Please select all that apply]

- ☐ CBSE
- ☐ ICSE
- ☐ State Board

What is your current occupation?

_____

If you are a TEACHER,

Please share your teaching experience (in year). Also, mention your subject of expertise.

_____

In which school do you teach?

- ☐ Public School
- ☐ Government School

Which classes you teach?

- ☐ IV-V
- ☐ VI-VIII
- ☐ IX-X
- ☐ XI-XII

In which bracket does your annual family income falls?

- ☐ Below ₹ 1.5 Lakh
- ☐ ₹ 1.5 to ₹ 3.4 Lakh
- ☐ ₹ 3.4 to ₹ 17 Lakh
- ☐ Above ₹17 Lakh

Do you have kids?

- ☐ Daughter(s)
- ☐ Son(s)
- ☐ Both, daughter(s) & son(s)
- ☐ None

You live with, [Please select all that apply]

- ☐ Wife/Husband/Partner
- ☐ Parents/In-laws
- ☐ Grandparents
- ☐ Sister/Sister-in-law
- ☐ Brother/Brother-in-law
- ☐ Uncle/aunts
- ☐ Kids
- ☐ None

What digital devices you own? [Please select all that apply]

- ☐ Smartphone
- ☐ Laptop
- ☐ Desktop
- ☐ Tablet/iPad
- ☐ Feature Phone
- ☐ All of them
- ☐ None

What digital devices you share with other people? [Please select all that apply]

- ☐ Smartphone
- ☐ Laptop
- ☐ Desktop
- ☐ Tablet/iPad
- ☐ Feature Phone
- ☐ All of them
- ☐ None

APPENDIX E

SUPPLEMENTARY MATERIAL FOR CHAPTER 4

This appendix includes the ethical approval and data collection protocols employed for gathering the data presented in Chapter 4, titled *"Learning from and with Menstrupedia."* The studies discussed in Chapters 3 and 4 were conducted under a single ethical approval. The supplementary materials encompass the following documents:

    (a) Information Sheet and Consent Form

    (b) The Comic Book Reading Session Protocol

    (c) Demographic Collection Form (Menstruators)

    (d) Demographics Collection Form (Non-Menstruators)

Participant no.____

Evaluation of Menstrupedia Comic

Contact Person: Anupriya Tuli
Contact: 01126907458 | anupriyat@iiitd.ac.in

Study Title- : To evaluate Menstrupedia comic—an educational comic on Menstrual Health and Management.

You are being invited to take part in this study. Before you make a decision, it is important for you to understand why this study is being done and what it will involve. Please take time to understand the following information carefully. Please do not hesitate to ask us if there is anything that is not clear or if you would like more information. If you do take part, you will be asked to sign a consent form.

OBJECTIVE
We are running a study at IIIT Delhi to evaluate Menstrupedia comics—a menstrual health education comic developed by Menstrupedia (https://www.menstrupedia.com) in collaboration with Whisper. This study can help inform the design of future aids for teaching about gender-sensitive topics like menstrual health education to school-children.

PROCEDURE
You will be given a comic (Hindi/English) to read while thinking aloud. Post the reading session you will be asked unstructured open-ended questions around your experience with the comic, to understand what you liked and what can be improved in the artifact. The reading session and interview would typically last for 45 minutes, will be audio recorded and later transcribed for further analysis.

RISKS
The possible risks or discomforts of the study are minimal. You may find a few personal/sensitive topics in the comic and questions in the interview, given the topic area.

BENEFITS OF THE STUDY
You will not directly benefit from taking part in this study. However, this research will help inform the design of aids for imparting menstrual health education to school-children.

CONFIDENTIALITY OF RESEARCH INFORMATION
Taking part in this study is voluntary and you can stop at any time. No identifying information such as your name or address/email address will be collected. Therefore, your responses will remain anonymous.

☐ I have read the description of the study above, and consent to participating.

[Participant Signature and Date]

Menstrupedia Comic Reading Session Protocol

Hi, I'm Anupriya Tuli, a PhD student in the department of Human-Centered Design at IIIT-Delhi. I am conducting a case-study of the Menstrupedia Comic. This session will last no more than an hour. I have shared the information sheet and consent form with you. Please take your time to read it carefully. Feel free to ask me any clarification questions regarding the study process. Before we begin, I will re-iterate that this session will be audio recorded. Do you consent for the same? You can choose not to answer any question, and can stop the interview at any time.

Post-chapter probing questions

- What are the top **three things you liked** about the comic?
- What are the top **three things you disliked** about the comic?
- What is the new information or knowledge **you learnt from** this comic?

Post-Comic reading probing questions

❖ **Section—Both menstruators and non-menstruators**

- Did you like the comic? (Probe: language, vocabulary, pictures, content, characters, etc.)
- What are the top **three things you liked** about the comic?
- What are the top **three things you disliked** about the comic?
- What is the new information or knowledge **you learnt from** this comic?
- Overall, were **you comfortable** with the comic book? (Probe: Yes/No/Not sure–WHY?)
- Would you feel comfortable reading the comic **in public spaces** (e.g. while travelling in metro, library, cafe, class, in-front of your parents?) (Probe: Yes/No/Not sure – WHY?)

❖ **Section—Only menstruators**

- Would you like to include a male character – a brother/friend as one of the main characters? (Probe: Yes/No/Not sure –WHY?)

- Would you recommend the comic to an **adolescent girl** (9 – 14 years?) Would you like to make any additions and/or deletions to make it suitable for this group of readers? Please elaborate.

- Would you recommend the comic to other **young adult menstruators** like you? Would you like to make any additions and/or deletions to make it suitable for this group of readers? Please elaborate.

- Would you recommend the comic to other **young adult boys/non-menstruators** like you? Would you like to make any additions and/or deletions to make it suitable for this group of readers? Please elaborate.

- After reading the comic, do you feel comfortable or say less inhibited to have conversations about menstrual health with others? Please elaborate. (Probe: Yes/No/Not sure –WHY?)

- Do you have any questions/concerns which were not addressed in this comic?

❖ **Section—Only Non-menstruators**

- Would you like to include a male character – a brother/friend as one of the main characters? (Probe: Yes/No/Not sure –WHY?)

- Would you recommend the comic to an **adolescent boy** (9 – 14 years)? Would you like to make any additions and/or deletions to make it suitable for this group of readers? Please elaborate.

- Would you recommend the comic to other **adult boys/men** like you? Would you like to make any additions and/or deletions to make it suitable for this group of readers? Please elaborate.

- After reading the comic do you believe that you would feel more comfortable or less inhibited to have conversations about menstrual health with girls/menstruators? Please elaborate. (Probe: Yes/No/Not sure –WHY?)

- Do you have any questions/concerns which were not addressed in this comic?

Closing script: With this we have come to an end of our session. I now request you to fill out the shared demographics form. Meanwhile, are there any closing thoughts you have or any experiences you want to share with us? Thank you for you time and support!

Evaluation of Menstrupedia Comic

[Demographics: Menstruators]

Participant no._____

With which gender do you most identify?

- ☐ Cisgender female
- ☐ Cisgender male
- ☐ Other, please specify _____
- ☐ Prefer not to answer

In which year you were born?

_____

In which year/class you had your first period?

_____

Which religion do you practice?

- ☐ Hindu
- ☐ Muslim
- ☐ Sikh
- ☐ Christian
- ☐ Atheist
- ☐ I don't practice any particular religion
- ☐ Other_____

Which school have you attended? [Please select all that apply]

- ☐ Single sex school
- ☐ Co-ed school
- ☐ Both
- ☐ None

You have studied in which of the following boards? [Please select all that apply]

- ☐ CBSE
- ☐ ICSE
- ☐ State Board

You completed your schooling in which year?

_____

Please rate your preference (1 to 9, with 1 = most preferable and 9 = least preferable choice) for the type of medium to receive Menstrual Health Education:

- ☐ Comic Books
- ☐ E-Book
- ☐ Mobile Application
- ☐ Video
- ☐ Game
- ☐ Website
- ☐ Internet Forum (e.g., Quora)
- ☐ Science Text Books
- ☐ Any Other medium_____

Which comic did you read during the session?

- ☐ Menstrupedia Comic (English)
- ☐ Menstrupedia Comic (Hindi)

How did you feel while interacting with comic book?

	Yes	No	Not Sure
Informed			
Relax			
Happy			
Curious			
Entertained			
Guilty			
Uneasy			
Sad			
Nervous			
scared			
Embarrassed			

Evaluation of Menstrupedia Comic

[Demographics: Non-Menstruators]

Participant no._____

With which gender do you most identify?

☐ Cisgender female
☐ Cisgender male
☐ Other, please specify _____
☐ Prefer not to answer

In which year you were born?

_____

When did you first get to learn about Menstruation/Periods?

_____

Which religion do you practice?

☐ Hindu
☐ Muslim
☐ Sikh
☐ Christian
☐ Atheist
☐ I don't practice any particular religion
☐ Other_____

Which school have you attended? [Please select all that apply]

☐ Single sex school
☐ Co-ed school
☐ Both
☐ None

You have studied in which of the following boards? [Please select all that apply]

☐ CBSE
☐ ICSE
☐ State Board

You completed your schooling in which year?

_____

Please rate your preference (1 to 9, with 1 = most preferable and 9 = least preferable choice) for the type of medium to receive Menstrual Health Education:

- ☐ Comic Books
- ☐ E-Book
- ☐ Mobile Application
- ☐ Video
- ☐ Game
- ☐ Website
- ☐ Internet Forum (e.g. Quora)
- ☐ Science Text Books
- ☐ Any Other medium_____

Which comic did you read during the session?

- ☐ Menstrupedia Comic (English)
- ☐ Menstrupedia Comic (Hindi)

How did you feel while interacting with comic book?

	Yes	No	Not Sure
Informed			
Relax			
Happy			
Curious			
Entertained			
Guilty			
Uneasy			
Sad			
Nervous			
scared			
Embarrassed			

APPENDIX F

SUPPLEMENTARY MATERIAL FOR CHAPTER 5

This appendix contains ethical approval and data collection protocols used to collect the data presented in Chapter 5, titled *"Menstrual (Im)Mobilities."* These supplementary materials include the following documents:

(a) The Institutional Review Board (IRB) Approval

(b) Workshop Protocol: Activity 1

(c) Workshop Protocol: Activity 2

(d) Consent Form and Information Sheet

(e) Demographics Collection Form

(f) The Online Survey

INDRAPRASTHA INSTITUTE *of*
INFORMATION TECHNOLOGY DELHI
(State University established by Govt. of NCT of Delhi)

IIID

IIITD/IRB/8/4/2019-1

4st august. 2019
Professor Pushpendra Singh
Indraprastha Institute of Information Technology, Delhi

IIITD INSTITUTIONAL REVIEW BOARD APPROVAL

Project Title. Mensturation tracking and safe spaces

We refer to your application for ethics approval with respect to the above project.
The Board has deliberated on your application and noted from your application that you plan to make study at IIIT Delhi and Georgia Institute of Technology in collaboration with Sacchisaheli and HAIYYA to understand menstrual tracking practices. It also involves investigation of requirement of safe spaces to manage menstruation while in transit of Indian women. You intend to do this project to get help in design of future digital aids for managing menstrual health.

You have confirmed that informed consent is being obtained from participant and you have guaranteed the confidentiality of your participants in surveys and interviews.

The documents reviewed are
a) Project Description
b) IRB filled
c) questionnaire form
d) consent form

The Board is therefore satisfied with the bioethical consideration for the project and approves the ethics application. The approval period is from 4 august. 2019 to 4 august 2021.

The following protocol and compliances are to be observed upon IIITD IRB approval.
1. All the participants/volunteers have age above 18
2. Maintain the confidentiality about details of volunteers.
3. Keep proof of consent from volunteers for 5 years.

Dr Vibhor Kumar
Chair, Institutional Review Board
Indraprastha Institute of Information Technology, Delhi

Menstruation on the go!
Workshop Protocol: Activity-1

Hi, I am Anupriya Tuli, a PhD student in the department of Computer Science, IIIT-Delhi. I am conducting a study about managing menstruation on the go (in transit). My colleague here will be observing this session, taking notes, and helping me with the logistics. I have shared the information sheet and consent form. Please take your time to read it carefully. This interaction session will last no more than an hour. Can we record audio? You can choose not to answer any question, and can stop the session at any time.

Icebreakers (Metro Stats)

- How frequently do you travel by metro?

  - Every Day
  - 3-4 times/week
  - Once a week
  - Once in two weeks
  - Once or twice a month
  - Rarely
  - Never

- Which metro lines do you (mostly) use?

  - Orange
  - Red
  - Green
  - Violet
  - Blue
  - Yellow
  - Pink
  - Magenta
  - Aqua

- Have you ever used a washroom at a metro station? If yes, how was your experience?

- How would you like the washrooms to be? Which of the following entities and elements do you seek in the public restrooms? (Probe the participant's definition and aspiration of a safe space)

  - Dustbin
  - Toilet paper
  - Hand wash soap
  - Hand dryer
  - Sink
  - Mirror
  - Menstrual (product) machine
  - No stink
  - Water
  - Jet/mug
  - Others

_____Stories of dealing with surprise periods on the go! _____

- Have you ever been in a situation wherein you or anybody you know had surprise periods while in transit/traveling? Please share your story of approaching the situation. Can you elaborate on the steps you/your friend took to handle the situation?

    Probe the following cases:
    o   Ask for pads from women around/friends
    o   Locate medical store
    o   Locate sanitary pad dispensing machine
    o   Locate metro station for washroom
    o   Locate mall/restaurant for washroom
    o   Locate public washrooms, etc.

- Were there any particular challenges you/your friend experienced?

- What were your particular takeaways from this experience/story?

_____ Draw your journey! _____

- Now, I would like to draw your attention to the whiteboard. You can see an outline diagram of a journey. Suppose you are in transit and you have a surprise period. What would you do? Please use the whiteboard and post-it to explain the steps you would take to deal with the situation?

    Probe following cases:
    o   Contexts - Metro/Non-metro
        o   Why did you choose to use the toilet at the metro station and not the mall/restaurant? Or vise-versa!
        o   How does the state of public washrooms shape the participant's approach?

    Parameters to probe:
    o   Access and availability of sanitary products
    o   Time constraint vs. distance from destination
    o   Personal vehicle vs. public transport
    o   Impact of cleanliness and hygienic state of public washrooms

Closing script: With this we have come to an end of our session. I now request you to fill out the shared demographics form. Meanwhile, are there any closing thoughts you have or any experiences you want to share with us? Thank you for your time and support!

Menstruation on the go!
Workshop Protocol: Activity-2

Hi, I am Anupriya Tuli, a PhD student in the department of Computer Science, IIIT-Delhi. I am conducting a study about managing menstruation on the go (while traveling/in transit). I have shared the information sheet and consent form with you. Please take your time to read it carefully. My colleague here will be observing this session, taking notes, and helping me with the logistics. This interaction session will last no more than an hour. Feel free to ask me any clarification questions regarding the study process. Before we begin, I will reiterate that this session will be audio recorded. Do you consent for the same? You can choose not to answer any question, and can stop the interview at any time.

_____Stories of dealing with surprise periods on the go! _____

- What is your frequently used mode of transport? (metro/cab/bus/own vehicle/etc.)

- Have you ever been in a situation wherein you or anybody you know had surprise periods while in transit/traveling? Please share your story of approaching the situation. Can you elaborate on the steps you/your friend took to handle the situation?

  Probe the following cases:

  - Ask for pads from women around/friends
  - Locate medical store
  - Locate sanitary pad dispensing machine
  - Locate metro station for washroom
  - Locate mall/restaurant for washroom
  - Locate public washrooms, etc.

- Were there any particular challenges you/your friend experienced?

- What were your particular takeaways from this experience/story?

_____ Construct your Safe Space! _____

- Now, I would like you to revisit the scenario where you experienced a surprise period on the go (OR suppose you are in transit and you experience a surprise period). What support would you need—infrastructure/information/any other—to safely navigate the situation? Using the material provided here, I want you to construct a safe space for yourself to have a positive period experience while in transit. The white paper/sheet here represents the physical space. Here are the blocks, where each block represents an element you might want to use to include in your space. You can also use post-its and sketches to add new elements.

  - Make observations about how the participant is developing the space while focusing on **which element/aspect they built first and/or emphasize**–washroom/chemist/Ecology including crowd/safety/feeling/practices/etc.

Probe following cases:

- o Now, if I say, you experience the surprise period during **late hours of the evening**. Will you change your space to make it more suitable for night time? Please elaborate your decision to add/remove elements.

- o Now, if I add these **chess pieces** where white represents menstruators and black represent non-menstruators, will this space still be "your safe space for having a positive period experience?" If not, what will you add/remove (elements and/or chess pieces) from the space to reclaim it as your safe space?

    - ▪ Scenario-1: All menstruators in the space
    - ▪ Scenario-2: Add non-menstruators to the space
    - ▪ Scenarios-3: Mixed presence, with more non-menstruators in the space.

- o Would you like to re-define this space if you are traveling:

    - ▪ alone
    - ▪ with a group of menstruators
    - ▪ with a group of non-menstruators

- o Would you like to re-define this space if **you get stained**? Please elaborate.

- ● Have you **used Google maps** or any map application to locate safe space–toilet–in this case?

- ● Have you **used any toilet locator application** to locate public toilets? Do you think having information about these toilets in such a scenario would be helpful? Please elaborate.

- ● Overall, **what kind of information do you need** in such a scenario to help you navigate the situation with confidence and without panic?

    - ○ Please arrange these information needs in descending order of priority.
    - ○ If you are provided with the requested information via a mobile application, do you think it will be useful?

Closing script: With this we have come to an end of our session. I now request you to fill out the shared demographics form. Meanwhile, are there any closing thoughts you have or any experiences you want to share with us? Thank you for your time and support!

INDRAPRASTHA INSTITUTE *of* INFORMATION TECHNOLOGY DELHI

Managing Menstruation on the go!

Contact Person: Anupriya Tuli
Contact: 01126907458 | anupriyat@iiitd.ac.in

Study Title: To understand how Indian women manage menstruation while in transit.

You are being invited to take part in this study. Before you make a decision, it is important for you to understand why this study is being done and what it will involve. Please take time to understand the following information carefully. Please do not hesitate to ask us if there is anything that is not clear or if you would like more information. If you do take part, you will be asked to sign a consent form.

OBJECTIVE
We are running a study at IIIT Delhi and Georgia Institute of Technology to understand how Indian women manage menstruation (surprise period) while they travel (on the go). This study can help us to inform the opportunities and challenges for an ICT based solution to empower women to manage such situations.

PROCEDURE
You will be asked unstructured open-ended questions around "safe spaces" for managing menstruation while in transit, to understand how women define their safe space under varying scenarios and identify the factors that shape their choices. The questions will be accompanied by an activity in which you will be either asked to construct your own safe space or reflect on your approach to deal with surprise period in transit by sketching. The session would not last more than 30 minutes, will be audio recorded and later transcribed for further analysis.

RISKS
The possible risks or discomforts of the study are minimal. You may find a few personal/sensitive questions in the interview, given the topic area.

BENEFITS OF THE STUDY
You will not directly benefit from taking part in this study. However, this research will help inform the design of aids for imparting menstrual health education to school-children.

CONFIDENTIALITY OF RESEARCH INFORMATION
Taking part in this study is voluntary and you can stop at any time. No identifying information such as your name or address will be collected. Therefore, your responses will remain anonymous.

☐ I have read the description of the study above, and consent to participating.

(Participant Signature and Date)

Managing Menstruaion on the go!
[Demographics Form]

Participant no.____

You identify yourself as:

- ☐ Cisgender female
- ☐ Other, please specify
- ☐ Do not wish to answer

In which year you were born?

_____

In which year/class you had your first period?

_____

Which religion do you practice?

- ☐ Hindu
- ☐ Muslim
- ☐ Sikh
- ☐ Christian
- ☐ Atheist
- ☐ I don't practice any particular religion
- ☐ Other

Highest degree you have completed:

- ☐ High school (X, XII)
- ☐ Graduation
- ☐ Post –graduation and above

Current Occupation:

- ☐ Student
- ☐ Homemaker
- ☐ Professional

In which bracket does your annual family income fall?

- ☐ Below ₹ 8 Lakh
- ☐ ₹ 8 Lakh to ₹ 17 Lakh
- ☐ Above ₹17 Lakh

How do you commute on daily basis? (Please select all that apply)

- ☐ Own vehicle
- ☐ Auto rickshaw
- ☐ Metro
- ☐ Buses
- ☐ Ola/Uber/cabs

How often do you use Google maps?

- ☐ All the time
- ☐ Often
- ☐ Sometime
- ☐ Rarely
- ☐ Never

"The first thing the doctor told her assistant to ensure that my records are not registered under my name... it was their practice to avoid problems for her unmarried patients during the `*matchmaking period*'..."

[Farozan, New Delhi #HealthOverStigma]

We invite women to share their stigma experiences and stories around accessing sexual health services and menstrual management by filling out our 10-minute survey!

OBJECTIVE
We are running a study at IIIT Delhi in collaboration with Haiyya to understand Indian women's experiences of accessing sexual health services and use of public spaces for menstrual management. We seek to collect stories of shame and stigma around sexual, menstrual and reproductive choices.

PROCEDURE
On next page you will find a survey form in English. The survey includes four sections with average of five questions per section. The survey will typically take 10 minutes to complete.

RISKS
The possible risks or discomforts of the study are minimal. You may find a few personal/sensitive questions, given the topic area.

STUDY BENEFITS
You will not directly benefit from taking part in this study. However, this research will help inform the design of technical aid directed towards empowering women to access health related services over stigma.

CONFIDENTIALITY
Taking part in this study is voluntary and you can stop at any time. The survey does not collect identifying information, ensuring anonymity.

** By clicking 'Next', you will be giving your consent.

Please introduce yourself!

* You identify yourself as: (Please select all that apply)

☐ Heterosexual

☐ Cis-Gendered (e.g. born as a female and identify as a female)

☐ Homosexual

☐ Bisexual

☐ Transgender

☐ Non-Binary/Genderqueer

☐ Intersex

☐ Person Living with HIV (PLHIV)

☐ Other (please specify)

[   ]

* Relationship status

◯ Married

◯ Single

◯ Separated

◯ Cohabiting

◯ Other (please specify)

[   ]

* Age

◯ < 18

◯ 18 to 20

◯ 21 to 23

◯ 24 to 26

◯ 27 to 29

◯ 30<

Public safe spaces to manage menstruation

Do you carry extra sanitary products (like sanitary napkin/tampon/cup) in your bag?

○ Yes, I always carry extra sanitary products in my bag

○ Yes, I only carry extra sanitary products in my bag when I am expecting my periods

○ No, I don't feel the need to carry extra sanitary products

○ Other (please specify)

How do you prepare for surprise periods (menstruation)? (Please select all that apply)

○ I always track my cycle

○ I always carry extra sanitary products in my bag

○ Other (please specify)

Have you ever been in a situation wherein you or anybody you know had surprise periods while in transit? Please share your story of managing surprise periods.

Riya is traveling in the metro. She suddenly realizes that her periods have given her a surprise visit a week before. To add to the situation, she is not carrying an extra sanitary product. Help her to figure out how to approach the situation by ranking the following options according to the priority (1 to 5).

≡ ⬍ Asking for a pad from her friend/other women around

≡ ⬍ Locating a pharmacy/market nearby

≡ ⬍ Finding a metro station with washroom facility

≡ ⬍ Searching for nearby restaurants/malls to access washroom facility

≡ ⬍ Locating public convenience/washrooms

In your opinion, what all information you need in situation mentioned in above question to feel empowered and not threatened/scared? (Please select all that apply)

	Very important	Important	Moderately important	Slightly important	Not important
Info on availability of sanitary product vending machine near my location	○	○	○	○	○
Info on medical store near my location	○	○	○	○	○
Info on accessible washroom near my location	○	○	○	○	○
Info on availability of sanitary product vending machine in the washroom	○	○	○	○	○
Info on availability of water, soap, and tissue papers in the washroom	○	○	○	○	○
Info on hygiene and cleanliness rating of the washroom	○	○	○	○	○

Other (please specify)

[   ]

Demographics

Where do you live (city/state)?

[▼]

From where (city/state) do you belong?

[▼]

Which religion do you practice?

○ Hindu

○ Muslim

○ Sikh

○ Christian

○ Atheist or agnostic

○ I do not follow/practice any religion in particular

○ Other (please specify)

[   ]

Highest degree you have completed:

○ High school (X, XII)

○ Graduation

○ Post –graduation and above

Current Occupation:

○ Student

○ Homemaker

○ Professional (please specify)

[   ]

How do you commute on daily basis? (Please select all that apply)

☐ Own vehicle

☐ Auto rickshaw

☐ Metro

☐ Buses

☐ Ola/Uber/cabs

In which bracket does your annual family income fall?

◯ Below ₹ 8 Lakh

◯ ₹ 8 Lakh to ₹ 17 Lakh

◯ Above ₹17 Lakh

Are you willing to be contacted for a follow-up interview in-person, on phone, or on Skype?

◯ No

◯ Yes, please share your contact details/ email-id.

[   ]

APPENDIX G

SUPPLEMENTARY MATERIAL FOR CHAPTER 6

This appendix includes the ethical approval and data collection protocols employed for gathering the data presented in Chapter 6, titled *"Rethinking Menstrual Trackers."* The studies discussed in Chapters 5 and 6 were conducted under a single ethical approval. The supplementary materials encompass the following documents:

- (a) Pilot Survey (English)
- (b) Pilot Survey (Hindi)
- (c) Online Survey for Adult Menstruators
- (d) School Authority Consent Form
- (e) Paper-based Survey for Adolescent Menstruators (Hindi)
- (f) Cultural Probe Workshop Protocol
- (g) Survey—Cultural Probe Workshop (English)
- (h) Survey—Cultural Probe Workshop (Hindi)
- (i) Guardian Information Sheet for the Workshop
- (j) Guardian Consent Form for the Workshop
- (k) Interview Protocol
- (l) The Interview Consent Form (English)
- (m) The Interview Consent Form (Hindi)

Menstrual Health & Hygiene Practices

We invite **adult women** to share their thoughts and experiences around Menstrual Health and Hygiene practices by filling out our 10-minute survey!

`` *You are being invited to take part in this study. Before you make a decision, it is important for you to understand why this study is being done and what it will involve. Please take time to understand the following information carefully. Please do not hesitate to ask us if there is anything that is not clear or if you would like more information. If you do take part, you will be asked to sign a consent form.* ``

OBJECTIVE

We are running a study at IIIT Delhi in collaboration with *Sachhi Saheli* to understand the Menstrual Health and Hygiene practices in India. In today's digital and information age, developing this understanding can help inform the design of future technical aids for preparing and assisting women in managing their menstrual health.

PROCEDURE

You will be given a survey form in your preferred language (Hindi/English). The survey includes four sections -- *`Health, technology, and you,'* *`Product usage,'* *`Menstrual tracking,'* and *`Demographics'* -- with five to eight questions per section. The survey will typically take 10 minutes to complete.

RISKS

The possible risks or discomforts of the study are minimal. You may find a few personal/sensitive questions in the survey, given the topic..

BENEFITS OF THE STUDY

You will not directly benefit from taking part in this study. However, this research will help inform the design of technical aid directed towards empowering women by preparing and assisting them in managing menstrual health.

CONFIDENTIALITY OF RESEARCH INFORMATION

Taking part in this study is voluntary, and you can stop at any time. The survey does not collect identifying information such as your name/email address. Thus, your responses will remain anonymous.

· I have read the description of the study above, and consent to participating.

_____

(Participant Signature and Date)

Contact Person: Anupriya Tuli
Contact: 01126907458 | anupriyat@iiitd.ac.in

1. Which year were you born in? …………………………………….

2. Which gender do you identify as?

   - Female   • Male   • Other

3. Do you use any smartphone application for health?
   - If yes, what do you use this for?

   - If not, why not?

4. Do you use Fitbit or any similar wrist band for tracking health parameters?
   - If yes, what do you use this for?

   - If not, why not

5. What type of challenges do you face around menstrual hygiene management in your daily life?

6. Have you consulted a doctor regarding periods and related issues? If yes, when?

7. What is the best piece of advice someone has given you about periods and related issues?

8. What is the most inaccurate/unhelpful advice someone has given you about periods and related issues?

1. Do you carry extra sanitary products (like sanitary napkin/tampon/cup) in your bag?

   ☐ Yes, I always carry extra sanitary products in my bag
   ☐ Yes, I only carry extra sanitary products in my bag when I am expecting my periods
   ☐ No, I don't feel the need to carry extra sanitary products

2. Please select the top three products you feel a women/girl should carry in her bag for managing periods:

   ☐ Sanitary product (e.g., pads)   ☐ Panty liners   ☐ Tissue papers   ☐ Newspaper/ paper bags   ☐ Hand wash/paper soap/sanitizer

   ☐ Spare underwear   ☐ Pain relief medicine   ☐ Vaginal wash   ☐ Healthy snack & drinking water   ☐ Others (please specify):

3. Please select the most appropriate answer for each of the following statements on the basis of your opinion/ choice/preference.

	Disposable sanitary pads	Reusable cotton pads	Tampons	Menstrual cups	None
I don't know where to buy					
I find these to be expensive					
I think this might break the hymen					
I think I will not be comfortable in using					
It requires frequent changes to avoid staining					
I don't feel the need to try					

4. How often do you use the following products for managing menstrual flow? (Please select all that apply)

	Most of the time	Some of the time	Rarely	Never	Never heard of
Disposable sanitary napkin					
Reusable cloth Pad					
Tampons					
Menstrual cup					
Panty liners					

5. When using a disposable sanitary pad/tampon, how do you decide on when to change the product? (please select all that apply)

   ☐ I ensure to change the pad/tampon after 4-6 hrs.
   ☐ I decide to change the pad/tampon by looking at ``how soiled/dirty/used it is''
   ☐ I ensure to change a pad before going out (where I may not get easy access to the toilet)
   ☐ Other (please specify):

6. In your opinion, rate the practices for disposing of a used sanitary product:

	Best practice	Acceptable practice	Poor practice
Flushing in toilet			
Directly discard in Dustbin			
Discarding in the incinerator (if available)			
Wrap in newspaper and then discard in the dustbin			

1. Do you believe keeping track of your menstrual cycle is important and should be practiced?

    ☐ Strongly Agree   ☐ Agree   ☐ Undecided/neutral   ☐ Disagree   ☐ I don't feel the need

2. How do you remember your cycle date? (Please select all that apply)
    - ☐ I mostly remember and recall my dates
    - ☐ I make a note on paper (*e.g.*, mark on calendar/diary).
    - ☐ I use a mobile application (*e.g.,* my smartphone calendar, period tracking applications like Clue, etc.)
    - ☐ Others (please specify):

3. If you track your menstrual cycle, what all do you track? (Please select all that apply)

    ☐ Dates   ☐ Flow   ☐ Cramps   ☐ Other (please specify):

4. Have you tried using any software/mobile application to track your cycle?
    - ☐ No, I have never tried
    - ☐ Yes, I tried it once, but then I discontinued
    - ☐ Yes, I use (application names):

    > Please elaborate (**why/why not?**):

5. In your opinion, is sharing the menstrual tracking information with partner/parents/family members' beneficial?

    ☐ Strongly agree   ☐ Agree   ☐ Undecided/neutral   ☐ Disagree   ☐ Strongly disagree

6. You would feel comfortable in sharing your tracking information with which of the following? (Please select all that apply)

    ☐ Partner   ☐ Mother   ☐ Father   ☐ Sister/s   ☐ Brother/s
    ☐ Friend (female)   ☐ Friend (male)   ☐ Doctor   ☐ All of the above   ☐ None of the above

7. In your opinion, when should a women/girl start tracking her cycle? (Please select all that apply)
    - ☐ As soon she experiences menarche/first period
    - ☐ When she observes any variation in her cycle
    - ☐ When she wants to avoid pregnancy/conceive
    - ☐ When a doctor asks/recommends
    - ☐ Other (please specify):

1. Where do you live (state)? …………………………………………………………..

2. Highest degree you have completed:

   ☐ High School (X, XII)   ☐ Graduation   ☐ Post-Graduation and above

3. Your current Occupation:

   ☐ Student   ☐ Homemaker   ☐ Professional

4. In which bracket does your annual family income fall?

   ☐ Below ₹ 6 Lakh   ☐ ₹ 6 Lakh to ₹ 17 Lakh   ☐ Above ₹17 Lakh

5. What digital devices you own? (Please select all that apply)

   ☐ Smartphone   ☐ Feature phone   ☐ Personal Tracking device (like Fitbit, smartwatch, etc.)   ☐ None

मासिक धर्म स्वास्थ्य और स्वच्छता आचरण

हम अपने 10 मिनट के सर्वेक्षण के द्वारा मासिक धर्म स्वास्थ्य और स्वच्छता प्रथाओं से जुड़े विचारों और अनुभवों को साझा करने के लिए वयस्क महिलाओं को आमंत्रित करते हैं!

`` आपको इस अध्ययन में भाग लेने के लिए आमंत्रित किया जा रहा है। इससे पहले कि आप कोई निर्णय लें, आपके लिए यह समझना महत्वपूर्ण है कि यह अध्ययन क्यों किया जा रहा है और इसमें क्या शामिल होगा। कृपया प्रस्तुत जानकारी को ध्यान से समझने के लिए समय निकालें। इस अध्ययन से जुड़े कोई भी प्रश्न या दुविधा की स्पष्टीकरण के लिए हमसे सहयोग लेने/पूछने में संकोच न करें। यदि आप भाग लेते हैं, तो आपको सहमति फॉर्म पर हस्ताक्षर करने के लिए कहा जाएगा। "

अध्ययन के लक्ष्य

भारत में मासिक धर्म स्वास्थ्य और स्वच्छता प्रथाओं को समझने के लिए हम सची सहेली के साथ मिलकर IIIT दिल्ली में एक अध्ययन चला रहे हैं। आज की डिजिटल और सूचना युग में, यह जानकारी हमें महिलाओं को मासिक धर्म स्वास्थ्य के प्रबंधन में सशक्त बनाने की दिशा में निर्देशित तकनीकी सहायता के डिजाइन को सूचित करने में मदद करेगी ।

अध्ययन की विधि

आपको अपनी पसंदीदा भाषा (हिंदी / अंग्रेजी) में एक सर्वेक्षण प्रपत्र दिया जाएगा। सर्वेक्षण में चार खंड शामिल हैं - *'स्वास्थ्य, प्रौद्योगिकी, और आप', 'उत्पाद उपयोग,' 'मासिक धर्म ट्रैकिंग,'* और *'जनसांख्यिकी'* - प्रति अनुभाग में पांच से आठ प्रश्न हैं । यह सर्वेक्षण अत्याधिक आपके केवल 10 मिनट लेगा।

भाग लेने के जोखिम

अध्ययन के संभावित जोखिम या असुविधाएँ न्यूनतम हैं। विषय क्षेत्र को देखते हुए आपको सर्वेक्षण में कुछ व्यक्तिगत / संवेदनशील प्रश्न मिल सकते हैं।

भाग लेने के लाभ

इस अध्ययन में भाग लेने से आपको सीधे लाभ नहीं होगा। हालांकि, यह शोध महिलाओं को मासिक धर्म स्वास्थ्य के प्रबंधन में उनकी तैयारी और सहायता करके उन्हें सशक्त बनाने की दिशा में निर्देशित तकनीकी सहायता के डिजाइन को सूचित करने में मदद करेगा।

स्वतंत्रता

इस अध्ययन में आप बिना किसी मजबूरी के अपनी स्वेच्छा से भाग ले रहे हैं और आप किसी भी समय इस अध्ययन को रोक सकते हैं। सर्वेक्षण आपके नाम / पते जैसी पहचान की जानकारी एकत्र नहीं करेगा । इसलिए, आपकी प्रतिक्रियाएँ अनाम रहेंगी।

☐ मैंने ऊपर अध्ययन का विवरण पढ़ा है, और भाग लेने के लिए सहमति दी है।

(भागी का हस्ताक्षर तथा तिथि)

_____

1. आप कब पैदा हुए? …………………………………

2. आप का जेंडर क्या है?

    ☐ महिला   ☐ पुरुष   ☐ अन्य

3. क्या आप किसी स्मार्टफोन एप्लीकेशन का उपयोग अपने स्वास्थ्य संबंधित जानकारी के उपलब्ध में करते हैं ?
    ☐ अगर हां तो कैसे?

    ☐ अगर नहीं तो क्यों नहीं?

4. क्या आप फिटबिट (Fitbit) का उपयोग अपने स्वास्थ्य संबंधित जानकारी के उपलब्ध में करते हैं ?
    ☐ अगर हां तो कैसे?

    ☐ अगर नहीं तो क्यों नहीं?

5. आपको अपने पीरियड/ महावारी को मैनेज करने में क्या क्या समस्याएं आती हैं?

6. क्या आपने कभी पीरियड/ महावरी से संबंधित समस्याओं के लिए डॉक्टर को दिखाया है? अगर हां तो किस स्थिति/समस्या के संबंध में?

7. आपको आज तक पीरियड/महावारी से संबंधित सबसे अच्छी सलाह कौन सी मिली है?

8. आपको आज तक पीरियड/महावारी से संबंधित सबसे बेकार/ गलत सलाह कौन सी मिली है?

P_code:

1. क्या आप एक्स्ट्रा सैनिटरी प्रोडक्ट (जैसे, पैड इत्यादि) अपने बाग में रखती हैं?
   - ☐ हां, मैं हमेशा रखती हूँ
   - ☐ हां, मैं अपने बैग में एक्स्ट्रा सेनेटरी प्रोडक्ट विशेष तौर पर केवल तब रखते हैं जब पीरियड/ महावारी की संभावना होते हैं
   - ☐ नहीं, मुझे एक्स्ट्रा सेनेटरी प्रोडक्ट ले जाने की आवश्यकता महसूस नहीं होती

2. कृपया तीन सबसे महत्वपूर्ण उत्पादों का चयन करें जो आपके विचार में एक महिला/लड़की को अपने बैग में पीरियड/ महावारी मैनेज करने के लिए रखने चाहिए
   - ☐ सैनिटरी प्रोडक्ट (जैसे, पैड) ☐ पेंटी लाइनर ☐ टिशु पेपर ☐ अखबार ☐ हाथ धोने का साबुन
   - ☐ एक्स्ट्रा अंडरवियर ☐ दर्द के दवाई ☐ वेजाइनल वॉच ☐ पौष्टिक आहार, पानी ☐ अन्य (कृपया बताएं)

3. कृपया अपनी राय के आधार पर निम्नलिखित कथनों में से प्रत्येक के लिए सबसे उपयुक्त उत्तर का चयन करें।

	डिस्पोजेबल सैनिटरी पैड	कपड़े के पैड	टैम्पोन	मेंस्ट्रूअल कप	कोई नहीं
मुझे नहीं पता कि यह कहां से खरीदा जा सकता है					
मुझे यह महंगे लगते हैं					
मुझे लगता है कि यह हाइमन को नुकसान पहुंचा सकता है					
मुझे लगता है कि मैं इसका उपयोग करने में सहज नहीं रहूँ गी					
यदि इसे कम समय में बार बार बदला ना जाए तो दाग लगने की ज्यादा संभावना होती है					
मैं इसे आज़माने की ज़रूरत महसूस नहीं करती					

4. पीरियड्स/महावारी को मैनेज करने के लिए आप कितनी बार निम्न प्रोडक्ट/उत्पादों का उपयोग करते हैं?

	ज्यादातर	कभी कभी	बहुत कम	कभी नहीं	इसके बारे में कभी नहीं सुना
डिस्पोजेबल सैनिटरी पैड					
कपड़े के पैड					
टैम्पोन					
मेंस्ट्रूअल कप					
पेंटी लाइनर					

5. पैड या टैम्पोन का उपयोग करने पर आप उसे कब बदलती है? (कृपया लागू होने वाले सभी का चयन करें)
   - ☐ मैं हर 4 से 6 घंटे में बदलती हूँ
   - ☐ मैं यह देखकर निर्णय लेती हूँ की वह कितना गंदा हो चुका है
   - ☐ मैं बाहर (विशेष तौर पर जहां शौचालय का मिलना मुश्किल हो) जाने से पहले बदलना सुनिश्चित करती हूँ
   - ☐ अन्य (कृपया बताएं)

6. आपकी राय में, उपयोग किए गए गंदे सैनिटरी प्रोडक्ट को निपटाने की प्रथाओं को रेट करें :

	उत्तम प्रथा	सहनीय प्रथा	असहनीय प्रथा
गंदे प्रोडक्ट को टॉयलेट में फेंकना			
सीधा कूड़ेदान में फेंकना			
अगर इंसीनरेटर उपलब्ध हो तो उसमें जलाना			
अखबार में बांधकर कूड़ेदान में फेंकना			

1. आपके विचार में क्या मासिक धर्म चक्र/मेंस्टूअल साइकिल पर नजर रखना/ ट्रैक करना महत्वपूर्ण है और इसका अभ्यास किया जाना चाहिए?
   - ☐ दृढ़ता से सहमति करती हूँ
   - ☐ सहमत हूँ
   - ☐ निष्पक्ष हूँ
   - ☐ असहमत हूँ
   - ☐ मेरे विचार में नजर रखने की आवश्यकता नहीं है

2. आप अपनी धर्म चक्र/मेंस्टूअल साइकिल की तारीख को कैसे याद रखती हैं? (कृपया लागू होने वाले सभी का चयन करें)
   - ☐ मैं अपनी तारीखों को ज्यादातर मानसिक तौर पर याद रखती हूँ
   - ☐ मैं कागज पर एक नोट बनाती हूँ (जैसे, कैलेंडर/डायरी पर निशान)।
   - ☐ मैं मोबाइल एप्लिकेशन का उपयोग करती हूँ (जैसे, स्मार्टफ़ोन कैलेंडर, मेंस्टूअल साइकिल ट्रैकिंग एप्लीकेशन, आदि)
   - ☐ अन्य (कृपया बताएं):

3. यदि आप अपने मासिक धर्म को ट्रैक करती हैं, तो आप कौन से लक्षणों पर नजर रखती/ट्रैक करती हैं? (कृपया लागू होने वाले सभी का चयन करें)
   - ☐ तिथियाँ
   - ☐ प्रवाह
   - ☐ दर्द
   - ☐ अन्य (कृपया बताएं):

4. क्या आपने अपने साइकिल को ट्रैक करने के लिए किसी सॉफ्टवेयर/मोबाइल एप्लिकेशन का उपयोग करने की कोशिश की है?
   - ☐ नहीं, मैंने कभी कोशिश नहीं की
   - ☐ हां, मैंने इसे एक बार आजमाया था, लेकिन फिर मैंने इसे बंद कर दिया
   - ☐ हां, मैं उपयोग करता हूँ (एप्लिकेशन का नाम):

   > कृपया समझाएं (**क्यों / क्यों नहीं?**):

5. आपकी राय में, साथी/माता-पिता/परिवार के सदस्यों के साथ मासिक धर्म की ट्रैकिंग की जानकारी साझा करना फायदेमंद है?
   - ☐ दृढ़ता से सहमति करती हूँ
   - ☐ सहमत हूँ
   - ☐ निष्पक्ष हूँ
   - ☐ असहमत हूँ
   - ☐ दृढ़ता से असहमति करती हूँ

6. आप निम्नलिखित में से किसके साथ अपनी ट्रैकिंग जानकारी साझा करने में सहज महसूस करेंगी? (कृपया लागू होने वाले सभी का चयन करें)
   - ☐ साथी
   - ☐ माता
   - ☐ पिता
   - ☐ बहन
   - ☐ भाई
   - ☐ मित्र (महिला)
   - ☐ मित्र (पुरुष)
   - ☐ डॉक्टर
   - ☐ उपरोक्त सभी
   - ☐ उपरोक्त में से कोई नहीं

7. आपकी राय में, एक महिला/लड़की को अपनी साइकिल पर नज़र रखना कब शुरू करना चाहिए? (कृपया लागू होने वाले सभी का चयन करें)
   - ☐ जैसे ही वह पहली दफा महावारी का अनुभव करती है
   - ☐ जब वह अपने चक्र में कोई भिन्नता देखती है
   - ☐ जब वह गर्भधारण करना/ गर्भधारण से बचना चाहती है
   - ☐ डॉक्टर के सुझाव पर
   - ☐ अन्य (कृपया बताएं):

P_code:

1. आप कहाँ रहते हैं (राज्य)? ....

2. उच्चतम डिग्री जो आपने पूरी कर ली है:
   - ☐ हाई स्कूल (X, XII)
   - ☐ ग्रेजुएशन
   - ☐ पोस्ट-ग्रेजुएशन या उससे ऊपर

3. आपका वर्तमान व्यवसाय:
   - ☐ छात्रा
   - ☐ गृहिणी
   - ☐ पेशेवर

4. आपकी वार्षिक पारिवारिक आय किस वर्ग में आती है?
   - ☐ ₹ 6 लाख या कम
   - ☐ ₹ 6 लाख से ₹ 17 लाख
   - ☐ ₹17 लाख या उससे ऊपर

5. आप किस डिजिटल डिवाइस के मालिक हैं? (कृपया लागू होने वाले सभी का चयन करें)

   - ☐ स्मार्टफोन
   - ☐ फीचर फोन
   - ☐ पर्सनल ट्रैकिंग डिवाइस (जैसे फिटबिट, स्मार्टवॉच आदि)
   - ☐ कोई नहीं

*...because we, the women, "**bleed for life.**"*

We invite women to share their thoughts/experiences around
menstrual health & tracking practices
by filling out a 10-minute survey!

* **OBJECTIVE** *

We are running a study at IIIT Delhi and Georgia Institute of Technology in collaboration with *Sacchisaheli* to understand menstrual tracking practices of Indian women. Developing this understanding can help inform the design of future digital aids for the tracking.

* **RISKS** *

The possible risks or discomforts of the study are minimal. You may find a few personal/sensitive questions, given the topic area.

* **BENEFITS OF THE STUDY** *

You will not directly benefit by the study. However, this study will help inform the design of digital aids for menstrual tracking.

* **CONFIDENTIALITY** *

Taking part in this study is voluntary and you can stop at any time. The survey does not collect identifying information such as your name, email address, or IP address. Therefore, your responses will remain anonymous. Towards the end, if you choose to provide contact information, your responses may no longer be anonymous to the researcher. However, no identifying information would be included in any publications or presentations based on the data, and your responses to this survey will remain confidential.

***By clicking 'Next', you will be giving your consent for the study.**

नमस्ते :)
Thank you for participating in our survey. You are part of our community and anything you
have to say is important to us.

* Please select the appropriate statement:

◯ My periods are yet to start

◯ I have had my first period (menarche)

◯ I no longer have periods (menopause)

◯ I will never have periods

* Please select your age range:

◯ 9 - 18 years

◯ 18 - 35 years

◯ 35 - 50 years

◯ 50 & above

Which gender do you identify as:

◯ Female

◯ Male

◯ Prefer not to say

◯ Other (please specify)

Menstrual tracking practices

How old were you when you got your first period?

[   ]

Do you try to predict your next period?

○ Always

○ Very Often

○ Sometimes

○ Rarely

○ Never

How do you monitor/predict your period? (Please select all that apply)

☐ I often forget to keep a track of my periods

☐ I mostly remember and recall my dates

☐ I mark on paper based calendar

☐ I make a note on paper/diary.

☐ I use a mobile application (e.g., period tracking applications like Clue, etc.)

☐ I use digital calendar (smartphone calendar, google calendar, etc.)

☐ I don't feel the need to monitor/predict my periods

☐ Other (please specify)

[   ]

How did you come to use this method for monitoring your period? (Please select all that apply)

☐ Recommended by mother

☐ Recommended by sister

☐ Recommended by friend

☐ Recommended by teacher

☐ Recommended by doctor

☐ Search on google pay store/app store

☐ Read about it online

☐ Figured it out myself

☐ Other (please specify)

Is there anything you particularly like about your method(s)? If so, what?

Is there anything you dislike about your method(s)? If so, what?

In general, what type of challenges do you face around menstrual hygiene management in your daily life? (Please select all that apply)

☐ Changing pad/sanitary product while travelling

☐ Lack of availability of products like pads, tampons, cups in public washrooms

☐ Fear of getting stained

☐ Tracking/remembering dates

☐ Period illness like PMS/headache/mood swings/etc.

☐ Other (please specify)

Experience and attitude

Do you believe keeping track of your menstrual cycle is important and should be practiced?

- ◯ Strongly agree
- ◯ Agree
- ◯ Undecided/neutral
- ◯ Disagree
- ◯ I do not feel the need

In your opinion, is sharing the menstrual tracking information with partner/parents/family members' beneficial?

- ◯ Strongly agree
- ◯ Agree
- ◯ Undecided/neutral
- ◯ Disagree
- ◯ Strongly disagree

You would feel comfortable in sharing your tracking information with who among the following? (Please select all that apply)

- ☐ Partner
- ☐ Mother
- ☐ Father
- ☐ Sister/s
- ☐ Brother/s
- ☐ Friend (female)
- ☐ Friend (male)
- ☐ Doctor
- ☐ None
- ☐ All of the above
- ☐ Other (please specify)

In general, what about tracking periods do you find burdensome?

Do you think tracking cycles can be of benefit? If yes, explain.

In your opinion, when is the appropriate time for a women/girl to start tracking her cycle?

- ○ As soon she experiences menarche/first period
- ○ When she observes any variation in her cycle
- ○ When she wants to avoid pregnancy/conceive
- ○ When a doctor asks/recommends
- ○ Other (please specify)

Health, technology, and you

Do you use a smartphone? (Please select all that apply)

☐ Yes, I own a personal smartphone

☐ Yes, I use my mother's smartphone

☐ Yes, I use my father's smartphone

☐ Yes, I use my brother's smartphone

☐ Yes, I use my sister's smartphone

☐ Yes, I use my friend's smartphone

☐ No, I don't use a smartphone

☐ No, we don't have a smartphone at our home

☐ Other (please specify)

Would it be helpful if you get reminders and notifications on smartphone about your upcoming periods?

○ Yes

○ No

○ I am not sure

○ Other (please specify)

Have you ever used digital technology for tracking your health or accessing health-related information? If yes, then how? (Please select all that apply)

☐ Web/Google search

☐ Mobile application

☐ Social media (Facebook/WhatsApp)

☐ Fitbit/smartwatch/similar personal tracking devices

☐ I have never felt the need

☐ Other (please specify)

How often you use digital technology for accessing health-related services/information?

○ Everyday

○ Three-four days a week

○ Once a week

○ Once in two weeks

○ Once or twice a month

○ Rarely

○ Never

○ Other (please specify)

Have you ever tried using smartphone/mobile application for accessing information related to your periods?

If yes, then how?
Please share your
experience.

If no, why not?

In your experience digital tracking of health parameters (using mobile devices) is...

Almost done!

We value your time and effort =)

You were born in the year:

State you live in:

Highest degree you have completed:

- ◯ High school (X,XII)
- ◯ Graduation
- ◯ Post –graduation and above
- ◯ Other (please specify)

Your current occupation:

- ◯ Student
- ◯ Homemaker
- ◯ Professional (please specify)

Your annual family income falls in the range of:

- ◯ Below ₹ 8 Lakh
- ◯ ₹ 8 Lakh to ₹ 17 Lakh
- ◯ Above ₹17 Lakh
- ◯ Not applicable

Which religion do you practice?

○ Hindu

○ Muslim

○ Sikh

○ Christian

○ Atheist or agnostic

○ I do not follow/practice any religion in particular

○ Other (please specify)

[   ]

Are you willing to be contacted for a face-to-face interaction session?

○ No

○ Yes, please share your contact details/ email-id.

[   ]

Menstrual Health & Hygiene Practices

We invite **adolescents enrolled in your school** to share their thoughts and experiences around Menstrual Health and Hygiene practices by filling out our 10-minute survey!

``*Your students are being invited to take part in this study. Before you make a decision, it is important for you to understand why this study is being done and what it will involve. Please take time to understand the following information carefully. Please do not hesitate to ask us if there is anything that is not clear or if you would like more information. If you do take part, you will be asked to sign a consent form.* ''

OBJECTIVE

We are running a study at IIIT Delhi in collaboration with *Sachhi Saheli* to understand the Menstrual Health and Hygiene practices in India. In today's digital and information age, developing this understanding can help inform the design of future technical aids for preparing and assisting women in managing their menstrual health.

PROCEDURE

Your students (both boys and girls) will be given a survey form in Hindi before the workshop. The survey will typically take 10 minutes to complete. Then we will conduct our workshop on Menstrual Health and Hygiene. Post, the workshop we will again administer the survey to your students.

RISKS

The possible risks or discomforts of the study are minimal. Students may find a few personal/sensitive questions in the survey, given the topic area.

BENEFITS OF THE STUDY

Students will not directly benefit from taking part in this study. However, this research will help inform the design of technical aid directed towards empowering women by preparing and assisting them in managing menstrual health. Also, the study will help us in learning and improving our workshop by understanding its impact.

CONFIDENTIALITY OF RESEARCH INFORMATION

Taking part in this study is voluntary, and student can stop at any time. The survey does not collect identifying information such as name/email address. Therefore, the responses will remain anonymous.

☐ I have read the description of the study above, and consent the participation of students of my school (_____).

(Signature, Date & Stamp)

_____

Contact Person: Anupriya Tuli
Contact: 01126907458 | anupriyat@iiitd.ac.in

मासिक धर्म स्वास्थ्य और स्वच्छता आचरण

हम अपने 10 मिनट के सर्वेक्षण के द्वारा मासिक धर्म स्वास्थ्य और स्वच्छता प्रथाओं से जुड़े विचारों और अनुभवों को साझा करने के लिए वयस्क महिलाओं को आमंत्रित करते हैं!

`` आपको इस अध्ययन में भाग लेने के लिए आमंत्रित किया जा रहा है। इससे पहले कि आप कोई निर्णय लें, आपके लिए यह समझना महत्वपूर्ण है कि यह अध्ययन क्यों किया जा रहा है और इसमें क्या शामिल होगा। कृपया प्रस्तुत जानकारी को ध्यान से समझने के लिए समय निकालें। इस अध्ययन से जुड़े कोई भी प्रश्न या दुविधा की स्पष्टीकरण के लिए हमसे सहयोग लेने/पूछने में संकोच न करें। यदि आप भाग लेते हैं, तो आपको सहमति फॉर्म पर हस्ताक्षर करने के लिए कहा जाएगा। "

अध्ययन के लक्ष्य

भारत में मासिक धर्म स्वास्थ्य और स्वच्छता प्रथाओं को समझने के लिए हम सची सहेली के साथ मिलकर IIIT दिल्ली में एक अध्ययन चला रहे हैं। आज की डिजिटल और सूचना युग में, यह जानकारी हमें महिलाओं को मासिक धर्म स्वास्थ्य के प्रबंधन में सशक्त बनाने की दिशा में निर्देशित तकनीकी सहायता के डिजाइन को सूचित करने में मदद करेगी ।

अध्ययन की विधि

आपको अपनी पसंदीदा भाषा (हिंदी) में एक सर्वेक्षण प्रपत्र दिया जाएगा। यह सर्वेक्षण अत्याधिक आपके केवल 10 मिनट लेगा।

भाग लेने के जोखिम

अध्ययन के संभावित जोखिम या असुविधाएँ न्यूनतम हैं। विषय क्षेत्र को देखते हुए आपको सर्वेक्षण में कुछ व्यक्तिगत / संवेदनशील प्रश्न मिल सकते हैं।

भाग लेने के लाभ

इस अध्ययन में भाग लेने से आपको सीधे लाभ नहीं होगा। हालांकि, यह शोध महिलाओं को मासिक धर्म स्वास्थ्य के प्रबंधन में उनकी तैयारी और सहायता करके उन्हें सशक्त बनाने की दिशा में निर्देशित तकनीकी सहायता के डिजाइन को सूचित करने में मदद करेगा।

स्वतंत्रता

इस अध्ययन में आप बिना किसी मजबूरी के अपनी स्वेच्छा से भाग ले रहे हैं और आप किसी भी समय इस अध्ययन को रोक सकते हैं। सर्वेक्षण आपके नाम / पते जैसी पहचान की जानकारी एकत्र नहीं करेगा । इसलिए, आपकी प्रतिक्रियाएँ अनाम रहेंगी।

☐ मैंने ऊपर अध्ययन का विवरण पढ़ा है, और भाग लेने के लिए सहमति दी है।

(भागी का हस्ताक्षर तथा तिथि)

_____

Menstrual Health & Hygiene Workshop

Adolescent Girls Survey

1. जब आपको पहली बार पीरियड्स/मासिक धर्म हुए थे तब आप कितने साल के थे?

2. पीरियड्स/ मासिक धर्म/Menstruation क्या होते हैं, यह आपने पहली बार कब जाना?
   - ☐ आपके पहले मासिक धर्म के बाद
   - ☐ आपके पहले मासिक धर्म से पहले

3. पीरियड्स/मासिक धर्म पर जानकारी आपको सबसे पहले कहाँ (सोर्स) से मिली थी?
   - ☐ मां - बहन
   - ☐ पिता / भाई
   - ☐ मित्र [महिला]
   - ☐ मित्र [पुरुष]
   - ☐ अध्यापक
   - ☐ डॉक्टर
   - ☐ पुस्तकें
   - ☐ टेलीविज़न विज्ञापन
   - ☐ इंटरनेट
   - ☐ मुझे याद नहीं है
   - ☐ अन्य (कृपया बताएं)

4. जब आपको पीरियड्स/मासिक धर्म के बारे में पहली बार बताया गया तो क्या बायता गया?
   - ☐ यह छुपाने वाली बात है
   - ☐ यह शर्म की बात है
   - ☐ यह बताया गया की इसमें शरीर का गन्दा/अपवित्र खून निकलता है
   - ☐ यह क्यों होता है पूरी तरह से समझाया गया
   - ☐ सांस लेना जितना सामान्य है
   - ☐ पैड /कपडा लगाना होता है सिर्फ ये बताया गया
   - ☐ यह लड़कीओ को होता है बस इतना ही बताया गया
   - ☐ मुझे अच्छे तरह से जानकारी दी गई थी| बताया गया थे की इसमें कोई शर्म या छुपाने वाली बात नहीं है
   - ☐ अन्य (कृपया बताएं)

5. आपको पीरियड्स/मासिक धर्म के बारे में और जानकारी कहाँ से मिली? (लागू होने वाले सभी विकल्प चुनें)
   - ☐ मां /बहन
   - ☐ पिता / भाई
   - ☐ मित्र [महिला]
   - ☐ मित्र [पुरुष]
   - ☐ अध्यापक
   - ☐ स्वास्थ्य पेशेवर / परामर्शदाता
   - ☐ पुस्तकें
   - ☐ टेलीविज़न विज्ञापन
   - ☐ इंटरनेट
   - ☐ मोबाइल एप्लीकेशन
   - ☐ उपरोक्त सभी विकल्प
   - ☐ अन्य (कृपया बताएं)

6. पीरियड्स/मासिक धर्म से जुड़ी ऐसी कौन सी परेशानियाँ हैं जिनके बारे में हमे तुरंत माँ/टीचर/डाक्टर को बताना चाहिए? कृपया विस्तार में बताएं |

7. क्या आप मासिक धर्म के बारे में बात करने के लिए कोड वर्ड (गुप्त 'शब्दों) का उपयोग करते हैं ताकि किसी और को पता न चले कि क्या चर्चा की जा रही है? यदि हाँ, तो कृपया इन शब्दों का उल्लेख करें।

8. क्या आपको लगता है कि पीरियड्स/मासिक धर्म के मुद्दों पर लड़कीओ के साथ -साथ लड़को को भी शिक्षित करना ज़रूरी (महत्वपूर्ण) है?
   - · कोई मूल्य नहीं है!
   - · मुझे ऐसा नहीं लगता
   - · मैं ठीक से नहीं कह सकती
   - · हाँ शायद
   - · हाँ बिलकुल
   - · अन्य (कृपया विस्तार में बताएं)

9. क्या आपके स्कूल ने आपको मासिक धर्म के बारे में कोई जानकारी दी है? (लागू होने वाले सभी विकल्प चुनें)
   ☐ नहीं कोई जानकारी नहीं दी गई है
   ☐ केवल लड़कीओं के लिए वर्कशॉप आयोजित की गयी थी
   ☐ लड़को और लड़कियों दोनों को एक साथ एक वर्कशॉप में पढ़ाया गया था
   ☐ लड़को और लड़कियों को अलग -अलग वर्कशॉप में पढ़ाया गया था
   ☐ लड़कों और लड़कियों दोनों को एक साथ कक्षा में पढ़ाया गया था
   ☐ अन्य (कृपया विस्तार में बताएं)

10. यदि आपके स्कूल ने पीरियड्स/मासिक धर्म स्वास्थ्य पर कोई वर्कशॉप आयोजित की थी, तो उसका आपका अनुभव क्या था?
   ☐ मुझे ज़ादा कुछ समझ नहीं आया
   ☐ मेने तो शर्म के कारण ठीक से सुन ही नहीं पाई
   ☐ थोड़ा बहुत समझ आया (यह जानकारी के लिहाज से बहुत सीमित था)
   ☐ मुझे लगा कि पढ़ाने के दौरान टीचर असहज महसूस कर रहे थे जिसकी वजह से ज़ादा सवाल जवाब नहीं हो पाए
   ☐ विषय को समझने के लिए वर्कशॉप जानकारीपूर्ण और पर्याप्त थी, मुझे बहुत कुछ नया सीखने को मिला
   ☐ अन्य (कृपया बताएं)

11. वर्कशॉप के बाद क्या आप बाहर जाकर बात कर पाई की आपने क्या सीखा?
   ☐ हाँ, मेने घर जाके बताया था
   ☐ हाँ , मेने अपनी दोस्तों (लड़कियों) को बताया था
   ☐ हाँ, मेने अपनी दोस्तों (लड़को) को बताया था
   ☐ नहीं, मै शर्म के कारण किसी को कुछ नहीं बता पाई
   ☐ अन्य (कृपया बताएं)

12. क्या आप ज्यादातर अनुमान लगा सकती है कि आपका अगला पीरियड कब आने वाला है?
   ☐ हाँ
   ☐ नहीं
   ☐ कभी सोचा नहीं

13. आप अपने अगले पीरियड्स की तर्रिख का अनुमान (पीरियड ट्रैकिंग) कैसे लगाती हैं? (कृपया लागू होने वाले सभी का चयन करें)
   ☐ मैं अक्सर अपने पीरियड्स का रिकॉर्ड रखना भूल जाती हूँ
   ☐ मैं ज्यादातर अपनी तारीखों को याद रखती हूं
   ☐ मैं कागज के कैलेंडर पर निशान लगाती हूं
   ☐ मैं किसी कागज /डायरी पर एक नोट बनाती हूं।
   ☐ मैं एक मोबाइल एप्लिकेशन का उपयोग करती हूं (जैसे, क्लू इत्यादि की पीरियड ट्रैकिंग एप्लिकेशन)
   ☐ मैं डिजिटल कैलेंडर (स्मार्टफोन कैलेंडर, गूगल कैलेंडर, आदि) का उपयोग करती हूं
   ☐ अन्य (कृपया बताएं)

14. अपने पीरियड्स का अनुमान (पीरियड ट्रैकिंग) लगाने के तरीके का चुनाव कैसे किया?
   ☐ माँ के सुझाव पर
   ☐ बहन के सुझाव पर
   ☐ मित्र के सुझाव पर
   ☐ शिक्षक के सुझाव पर
   ☐ डॉक्टर के सुझाव पर
   ☐ इसके बारे में ऑनलाइन/इंटरनेट पर पढ़ें
   ☐ गूगल प्ले स्टोर/मोबाइल एप्लीकेशन स्टोर पर खोजा
   ☐ अन्य (कृपया बताएं)
   ☐

15. अपने पीरियड्स का अनुमान (पीरियड ट्रैकिंग) लगाने के तरीके से:
   ☐ मै पूरी तरह संतुष्ट हूँ
   ☐ मै बहतर तरीका मिलने पर बदल भी सकती हूँ
   ☐ मै अपने तरीके से संतुष्ट नहीं हूँ
   ☐ मुझे कोई तरीका पता ही नहीं है

16. आपकी राय में, एक महिला/लड़की को अपने पीरियड्स पर नज़र रखना (पीरियड ट्रैकिंग) कब शुरू करना चाहिए? (लागू होने वाले सभी विकल्प चुनें)
   ☐ मुझे नहीं लगता की पीरियड ट्रैकिंग की कोई ज़रुरत है
   ☐ जैसे ही वह पहली बारी पीरियड्स का अनुभव करे तब से हमेशा
   ☐ यदि पीरियड्स की डेट/तारिख बार -बार बदलती रहे
   ☐ डॉक्टर के सुझाव पर
   ☐ अन्य (कृपया बताएं):

17. पीरियड्स के बारे में आपको क्या-क्या बुरा लगता है? (लागू होने वाले सभी विकल्प चुनें)
    - ☐ किसी काम में मन न लगना
    - ☐ रैशेस
    - ☐ पेट में दर्द होना/ ऐंठन
    - ☐ खून का बहना
    - ☐ कपड़ों पर खून के धब्बे लगने का डर
    - ☐ मासिक धर्म की गंध
    - ☐ शरीर पर सूजन होना
    - ☐ चिडचिडपन व गुस्सा आना
    - ☐ इसके दौरान खेल कूद ना कर पाना
    - ☐ उपरोक्त सभी विकल्प
    - ☐ इनमे से कोई भी नहीं
    - ☐ अन्य (कृपया विस्तार में बताएं)

18. क्या आपने कभी अपने पीरियड्स / मासिक धर्म के कारण स्कूल से आधे या पूरे दिन की छुट्टी ली है? यदि हाँ तो किस कारण से?

19. आप पीरियड्स/ मासिक धर्म के दौरान इस्तेमाल होने वाले किन-किन उत्पादो (प्रोडक्ट्स) बारे में जानते हैं? (लागू होने वाले सभी विकल्प चुनें)
    - ☐ डिस्पोजेबल सैनिटरी नैपकिन (स्टेफ्री, व्हिस्पर, आदि)
    - ☐ कपड़ा पैड
    - ☐ पैंटी लाइनर
    - ☐ टैम्पोन
    - ☐ मासिक धर्म कप
    - ☐ उपरोक्त सभी विकल्प
    - ☐ इनमे से कोई भी नहीं
    - ☐ अन्य (कृपया विस्तार में बताएं)

20. आप पीरियड्स/ मासिक धर्म के दौरान कौनसा प्रोडक्ट (ऊपर दिए गए) इस्तेमाल करते हैं?

21. आप अपने पीरियड्स / मासिक धर्म के खून रोकने के लिए प्रोडक्ट का चयन कैसे करते हैं? (लागू होने वाले सभी विकल्प चुनें)
    - ☐ माँ/ बहन की सिफारिश पर
    - ☐ मित्र की सिफारिश पर
    - ☐ डॉक्टर की सिफारिश पर
    - ☐ सभी उत्पादों को इस्तेमाल करने के बाद चयन किया
    - ☐ केमिस्ट से इसकी चर्चा कर चयन किया
    - ☐ बाजार में आसानी से उपलब्धता के आधार पर
    - ☐ विज्ञापन
    - ☐ उपरोक्त सभी विकल्प
    - ☐ इनमे से कोई भी नहीं
    - ☐ अन्य (कृपया विस्तार में बताएं)

22. क्या आपने एमर्जेन्सी में सैनिटरी प्रोडक्ट्स (जैसे सैनिटरी पैड / नैपकिन / टैम्पोन / कप) किसी से मँगवाया हैं? (लागू होने वाले सभी विकल्प चुनें)
    - ☐ हाँ, माँ / बहन से
    - ☐ हाँ, पिता / भाई से
    - ☐ हाँ, मित्र [महिला] से
    - ☐ हाँ, मित्र [पुरुष] से
    - ☐ हाँ, अध्यापक से
    - ☐ नहीं, मुझे शर्म आती है
    - ☐ नहीं, माँ ने किसिस्को बताने से मना किया है
    - ☐ कभी ज़रुरत नहीं पड़ी
    - ☐ मै हमेशा आपने पास एक्स्ट्रा प्रोडक्ट (पद/टैम्पोन) रखती हूँ
    - ☐ अन्य (कृपया विस्तार में बताएं)

23. यदि पीरियड्स आने वाले होते हैं, तो आप अपने साथ क्या-क्या रखती हैं?
    - ☐ सैनिटरी प्रोडक्ट (जैसे, पैड)
    - ☐ पेंटी लाइनर
    - ☐ टिशु पेपर
    - ☐ अखबार
    - ☐ हाथ धोने का साबुन
    - ☐ एक्स्ट्रा अंडरवियर
    - ☐ दर्द के दवाई
    - ☐ वेजाइनल वाश (vaginal wash)
    - ☐ पौष्टिक आहार, पानी
    - ☐ अन्य (कृपया बताएं)

24. पैड या टैम्पोन का उपयोग करने पर आप उसे कब बदलती है? (लागू होने वाले सभी विकल्प चुनें)
   ☐ मैं हर 4 से 6 घंटे में बदलती हूँ
   ☐ इस बात पर निर्भर करता है कि वह कितना गंदा/गीला हो चुका है
   ☐ मैं बाहर जाने से पहले (विशेष तौर पर जहां शौचालय का मिलना मुश्किल हो) बदलती हूँ
   ☐ मै हमेशा घर लौटने पर ही बदलती हनु
   ☐ अन्य (कृपया बताएं)

25. आपको अपने पीरियड/ महावारी को मैनेज करने में क्या क्या समस्याएं आती हैं? (एक से ज़ादा विकल्प भी चुन सकते हैं)
   ☐ यात्रा के दौरान पैड बदलना
   ☐ सार्वजनिक वॉशरूम में पैड, टैम्पोन, कप जैसे उत्पादों का नहीं मिलना
   ☐ खून के धब्बे लगने का डर
   ☐ मासिक धर्म चक्र/मेंस्टूअल साइकिल पर नजर रखना/ ट्रैक करना
   ☐ पीएमएस / सिरदर्द / सूजन / आदि
   ☐ अन्य (कृपया बताएं)

26. कृपया एक शब्द में निम्नलिखित का उत्तर दें
   ☐ किस उम्र में पीरियड्स/मासिक धर्म शुरू हो जाने चाहिए ?
   (_____/मुझे नहीं पता)
   ☐ क्या लड़कियों के लिए अपने पीरियड चक्र/ मासिक चक्र/menstrual cycle को ट्रैक करना महत्वपूर्ण है??
   (_____/मुझे नहीं पता)
   ☐ आमतौर पर, पीरियड्स कितने दिनों तक रहता है?
   (_____/मुझे नहीं पता)
   ☐ क्या एक लड़की के लिए सफेद पानी (white discharge) का अनुभव करना सामान्य बात है?
   (हां / नहीं / मुझे नहीं पता)
   ☐ क्या पीरियड के दर्द के लिए दवा ली जा सकती है?
   (हां / नहीं / मुझे नहीं पता)

27. क्या आप स्मार्टफोन इस्तेमाल करते हैं?
   ☐ हाँ, मेरे पास पर्सनल स्मार्टफोन है
   ☐ हाँ, मै अपनी माता का स्मार्टफोन इस्तेमाल करती हूँ
   ☐ हाँ, मै अपने पिता का स्मार्टफोन इस्तेमाल करती हूँ
   ☐ हाँ, मै अपने पिता का स्मार्टफोन इस्तेमाल करती हूँ
   ☐ हाँ, मै अपनी बहन का स्मार्टफोन इस्तेमाल करती हूँ
   ☐ हाँ, मै अपने भाई का स्मार्टफोन इस्तेमाल करती हूँ
   ☐ नहीं, मै स्मार्टफोन इस्तेमाल नहीं करती हूँ
   ☐ नहीं, हमारे घर में स्मार्टफोन नहीं है
   ☐ अन्य (कृपया बताएं)

28. क्या आपको लगता है कि आने वाले पीरियड्स के बारे में बताने (period tracking)के लिए मोबाइल फोन में अलार्म / रिमाइंडर लेना मददगार होगा?
   ☐ हाँ
   ☐ नहीं
   ☐ शायद

29. क्या अपने स्वास्थ्य की निगरानी और स्वास्थ्य संबंधित जानकारी के लिए कभी डिजिटल तकनीकों का उपयोग किया है? यदि हाँ, तो कैसे?
   ☐ वेब/इंटरनेट/गूगल खोज
   ☐ मोबाइल एप्लीकेशन
   ☐ सोशल मीडिया (Facebook/Whatsapp)
   ☐ फिटबिट / स्मार्टवॉच / इसी तरह के उत्पादों जैसे ट्रैकिंग डिवाइस
   ☐ मुझे कभी ज़रुरत महसूस नहीं हुई
   ☐ अन्य (कृपया बताएं)

30. क्या आपने अपने पीरियड्स सम्बंधित जानकारी के लिए किसी सॉफ्टवेयर / मोबाइल एप्लिकेशन का उपयोग करने की कोशिश की है? यदि हाँ, तोह कैसे?

31. आप कितने साल के हो?

32. आप कोनसी कक्षा में पढ़ते हो?

33. आपका स्कूल एक :
    ☐ सरकारी स्कूल है
    ☐ पब्लिक स्कूल है

34. आप किस धर्म को मानते हैं?
    ☐ हिंदू
    ☐ मुसलमान
    ☐ सिख
    ☐ ईसाई
    ☐ नास्तिक या अज्ञेयवादी
    ☐ मैं विशेष रूप से किसी धर्म का पालन / अभ्यास नहीं करती हूं
    ☐ अन्य (कृपया निर्दिष्ट करें)

35. आपकी वार्षिक पारिवारिक आय (annual family income) किस वर्ग में आती है?
    ☐ ₹ 8 लाख या कम
    ☐ ₹ 8 लाख से ₹ 17 लाख
    ☐ ₹17 लाख या उससे ऊपर

बधाई हो! आपने सर्वे पूरा कर लिया है। आपकी प्रतिक्रिया पीरियड्स/मासिक धर्म स्वास्थ्य/ menstrual health and hygiene education पर हमारी वर्कशॉप को बेहतर बनाने में हमारी मदद करेगी। आपके सहयोग के लिए धन्यवाद। हम आपके प्रयास की सराहना करते हैं। कृपया ध्यान दें कि आपकी प्रतिक्रिया हमारे लिए मूल्यवान है और आपके देश की मदद करेगी।

शुभकामनाएँ!

INDRAPRASTHA INSTITUTE *of* INFORMATION TECHNOLOGY DELHI

सच्ची सहेली

Cultural Probe Workshop

Hi, I'm Anupriya Tuli, a PhD student in the department of Human-Centered Design at IIIT-Delhi. I am conducting a study to understand menstrual tracking practices of girls/adolescent menstruators. This workshop will last no more than three hours. I have shared the information sheet and guardian consent form with you. Please take your time to read it carefully. Feel free to ask me any clarification questions regarding the study process. Before we begin, I will reiterate that this session will be audio recorded. Do you consent for the same? You can choose not to answer any question, and can stop the interview at any point in time.

Discussion with NGO Staff

We will begin by conducting an informal discussion with the **NGO staff** to understand the current context and adolescent girls' approach and data collection practices around menstrual health and tracking.

- Can you please talk about the role you play in the participant's lives?

- How long have you been associated with the NGO?

- Have there been any workshops related to Menstrual Hygiene Management? If yes, then when was this conducted? Who was the facilitator and what was the content shared during these workshops?

- Do the girls share their issues related to menstrual health and wellbeing with you?

- Are there any incidences or experiences related to helping the girls with menstrual health and wellbeing, especially the hygiene practices that you would like to share with us?

- Do these girls track their menstrual cycles? Please elaborate on these practices and/or system of logging?

Workshop with Adolescent Menstruators

Read the introduction script, walkthrough the information sheet, and seek signed assent.

Phase-I: *Survey and setting-up the context (15 mins)*

Begin the workshop by administering the paper-based survey to the participants, followed by an open discussion on the topic based on their survey responses. The survey will serve as an icebreaking tool.

"
  Before we move forward, we will distribute forms, please fill them and then we will show you the period tracker that we have brought for you!"

❖ **Icebreakers for facilitating post-survey discussion**

- Do you know what periods are? How many of you have had their first periods?

- Has anyone attended any workshop/session/class on menstrual health and hygiene practices? If yes, when and where? What did you learn in those sessions?

- Do you know, you can predict your next period? Do you know how to calculate the same?

- Does anybody know if we can track our periods? If yes, then how?

- How do you track them? For example, Pinky will have her periods on 13th April. Her periods last for 7 days. Which date will she have her periods next month?

- Pinky has to track her periods. Help her by telling her what all information she needs and how to predict upcoming periods.

- Has anyone heard of period trackers? If yes, then from where? Do you use one? If not, don't worry, we have brought a period tracker for each one of you!

Phase II: *Introduce and walk through the cultural probe (15 mins)*

Next, distribute the cultural probe—the Period Journal—among the participants and give them a walkthrough. Here, observe how participants react to it and what questions they ask!

" This is a period tracker and can be used to calculate your upcoming cycle. The journal includes four sheets of stickers (including sanitary products, snacks, flow and more), monthly calendar, and blank pages. Did you notice the front cover has a quote—*my period my friend*—written with black ink on white background? Before I explain how to use this journal, let us first decorate it!"

Phase-III: *Decorating the Diary (30 mins)*

1. Next, invite the participants to decorate the journal cover to instill the sense of belongingness and gauge how they associate (accept or reject) with the printed quote. The participants will be provided with craft materials, including ribbons, craft papers, sketch pens, beads, stickers, glue, glitter pens, and more. Throughout this phase, the data will be collected in the form of photographs and written observations.

2. Invite each participant to present their decorated Period Journal in 2-minutes. Here, gauge why they chose the particular material for decorating their journal, observe if they have picked up any specific theme to decorate their journal, and the reason behind covering (or not) the quote. This session was followed by a 15-minute break.

Phase-IV: *Retrospective tracking of last month (15 mins)*

In this phase, invite the participants to mark their period days for the last two months in the Journal calendar using stickers. Explain what each sticker means and how these can be used in the journal. The objective is to gauge if and how the participants remembered their period dates. Encourage the participants to use stickers and colors to understand how they associate with their periods.

Phase-V: *Calculate and mark upcoming cycle (45 mins)*

1. Next, ask the participants to predict their upcoming cycles by marking the predicted date in the calendar using the stickers and colors. The objective is to understand if the participants were familiar with the process of calculating and predicting their cycles, if not, then to familiarize them with the steps.

2. Based on the cohort's understanding of menstrual tracking, revisit the concept of menstrual tracking by explaining the importance of tracking, the method of calculating/predicting the upcoming cycle, and addressing their queries.

3. Now, again ask the participants to revisit their past period days (which they marked in the previous phase) and if needed, re-calculate and update their next cycle dates.

1. Probe the need for reminder.

" Take a moment and think whether having reminders about upcoming periods would be helpful to you? If yes, then using clock stickers mark the date when you would like to receive a reminder about the upcoming period. You can use these stickers for any other reminder you think you would need (please specify).

❖ **Probing questions:**

- What type of reminders do our participants seek?
- How would they like to receive these reminders? (Probe: Via a computer/mobile/any other way?)

Phase-VI: *Closing (10 mins)*

Click pictures of the work done by the participants. Inform participants that this journal is a gift for them and encourage them to track and start logging their cycle in it.

" With this we have come to an end of this session. This journal is a gift for all of you! Continue using it, tracking your cycle, and logging it in this journal. I hope you will enjoy it! Are there any closing thoughts you have or any experiences you want to share with us? Thank you for you time and support!

Post-Workshop Follow-up Visit

Visit the NGO after two months of the workshop to capture the participants' use and engagement with the Journal.

"Hello! How have you been? I am here to talk to you about your experience of using the period journal I distributed in my last visit.

❖ **Probing questions:**

- Have you been tracking your menstrual cycle? (Yes/No—why? how?)
- Have you been using the journal? Please elaborate how you have been using it.
- Did using this journal help you in any way? Please elaborate.
- Did you track your periods using the journal? Was it useful?
- Do you want to add and/or remove anything to your journal? (Yes/No—why?)

"With this we have come to an end of this session. Are there any closing thoughts you have or any experiences you want to share with us? Thank you for your time and support!

Survey—Cultural Probe Workshop

1. How old were you when you got your first period?

   _____

2. Do you try to predict when your next period will be?

   o Yes
   o No
   o I have not started with my periods

3. How do you monitor/predict your period? (Please select all that apply)

   o I often forget to keep a track of my periods
   o I mostly remember and recall my dates
   o I mark on paper based calendar
   o I make a note on paper/diary.
   o I use a mobile application (e.g., period tracking applications like Clue, etc.)
   o I use a digital calendar (smartphone calendar, google calendar, etc.)
   o Others (please specify)

4. How did you come to use this method for monitoring your period?

   o Recommended by foster mother
   o Recommended by foster sister
   o Recommended by mentor
   o Recommended by teacher
   o Recommended by doctor
   o Search on google pay store/app store
   o Read about it online/internet
   o Others (please specify)

5. In general, what about tracking do you don't like or find burdensome?

   _____

   _____

   _____

   _____

6. In your opinion, when should a woman/girl start tracking her cycle? (Please select all that apply)

   o As soon she experiences menarche/first period
   o When she observes any variation in her cycle
   o When a doctor asks/recommends
   o Other (please specify)

7. In general, what type of challenges do you face around menstrual hygiene management in your daily life? (Please select all that apply)

   o Changing pad/sanitary products while traveling
   o Lack of availability of products like pads, tampons, cups in public washrooms
   o Fear of getting stained
   o Tracking/remembering dates
   o Period illness like PMS/headache/mood swings/etc.

- **Engagement with Digital Period Trackers**

  1. Do you use a smartphone?

     o Yes, I own a personal smartphone
     o Yes, I use my mentors smartphone
     o Yes, I use my foster mother's smartphone
     o Yes, I use my foster father's smartphone
     o Yes, I use my foster sister's smartphone
     o Yes, I use my foster brother's smartphone
     o Yes, I use my friend's smartphone
     o No, I don't use smartphone
     o No, nobody owns a smartphone in our Udayan home
     o Other (please specify)

  2. Do you think it would be helpful to have an alarm / reminder in mobile phone for period tracking (e.g., predicting your next period)?

     o Yes
     o No
     o Not sure

  3. Have you ever tried to use any software / mobile application for accessing period related information or period tracking? If yes, how?

     _____

     _____

     _____

- **Demographics**

  1. How old are you? _____

  2. You study in a:
     - o   Government School
     - o   Public School
     - o   I don't go to school

  3. Class you study in _____

सर्वेक्षण— सांस्कृतिक जांच कार्यशाला के लिए

1. जब आपको पहली बार पीरियड्स/मासिक धर्म हुए थे तब आप कितने साल के थे?

   _____

2. क्या आप ज्यादातर अनुमान लगा सकती है कि आपका अगला पीरियड कब आने वाला है?
   - हाँ
   - नहीं
   - कभी सोचा नहीं

3. आप अपने अगले पीरियड्स की तारीख का अनुमान (पीरियड ट्रैकिंग) कैसे लगाती हैं? (कृपया लागू होने वाले सभी का चयन करें)
   - मैं अक्सर अपने पीरियड्स का रिकॉर्ड रखना भूल जाती हूँ
   - मैं ज्यादातर अपनी तारीखों को याद रखती हूं
   - मैं कागज के कैलेंडर पर निशान लगाती हूं
   - मैं किसी कागज /डायरी पर एक नोट बनाती हूं।
   - मैं एक मोबाइल एप्लिकेशन का उपयोग करती हूं (जैसे, क्लू इत्यादि की पीरियड ट्रैकिंग एप्लिकेशन)
   - मैं डिजिटल कैलेंडर (स्मार्टफोन कैलेंडर, गूगल कैलेंडर, आदि) का उपयोग करती हूं
   - अन्य (कृपया बताएं) _____

4. अपने पीरियड्स का अनुमान (पीरियड ट्रैकिंग) लगाने के तरीके का चुनाव कैसे किया?
   - मेंटर के सुझाव पर
   - फॉस्टर माँ के सुझाव पर
   - फॉस्टर बहन के सुझाव पर
   - मित्र के सुझाव पर
   - शिक्षक के सुझाव पर
   - डॉक्टर के सुझाव पर
   - इसके बारे में ऑनलाइन/इंटरनेट पर पढ़ें
   - गूगल प्ले स्टोर/मोबाइल एप्लीकेशन स्टोर पर खोजा
   - अन्य (कृपया बताएं) _____

5. सामान्य तौर पर, पीरियड्स का अनुमान (पीरियड ट्रैकिंग) के बारे में आपको क्या बोझ लगता है?
   _____
   _____
   _____
   _____
   _____
   _____

6. आपकी राय में, एक महिला/लड़की को अपने पीरियड्स पर नज़र रखना (पीरियड ट्रैकिंग) कब शुरू करना चाहिए? (लागू होने वाले सभी विकल्प चुनें)
   ● मुझे नहीं लगता की पीरियड ट्रैकिंग की कोई ज़रुरत है
   ● जैसे ही वह पहली बारी पीरियड्स का अनुभव करे तब से हमेशा
   ● यदि पीरियड्स की डेट/तारिख बार -बार बदलती रहे
   ● डॉक्टर के सुझाव पर
   ● अन्य (कृपया बताएं)_____

   ● मासिक धर्म ट्रैकिंग और डिजिटल तकनीक

1. क्या आप स्मार्टफोन इस्तेमाल करते हैं?
   ● हाँ, मेरे पास पर्सनल स्मार्टफोन है
   ● हाँ, मै अपनी मेंटर का स्मार्टफोन इस्तेमाल करती हूँ
   ● हाँ, मै अपनी फॉस्टर माता का स्मार्टफोन इस्तेमाल करती हूँ
   ● हाँ, मै अपने फॉस्टर पिता का स्मार्टफोन इस्तेमाल करती हूँ
   ● हाँ, मै अपनी फॉस्टर बहन का स्मार्टफोन इस्तेमाल करती हूँ
   ● हाँ, मै अपने फॉस्टर भाई का स्मार्टफोन इस्तेमाल करती हूँ
   ● नहीं, मै स्मार्टफोन इस्तेमाल नहीं करती हूँ
   ● नहीं, हमारे उदयान घर में स्मार्टफोन नहीं है
   ● अन्य (कृपया बताएं) _____

2. क्या आपको लगता है कि आने वाले पीरियड्स के बारे में बताने (period tracking) के लिए मोबाइल फोन में अलार्म / रिमाइंडर लेना मददगार होगा?
   ● हाँ
   ● नहीं
   ● शायद

3. क्या आपने अपने पीरियड्स सम्बंधित जानकारी के लिए किसी सॉफ्टवेयर / मोबाइल एप्लिकेशन का उपयोग करने की कोशिश की है? यदि हाँ, तोह कैसे?

_____
_____
_____
_____
_____
_____

• जिसांखिकी

1. आप कितने साल के हो? _____

2. आप कोनसी कक्षा में पढ़ते हो? _____

3. आपका स्कूल एक :
   ● सरकारी स्कूल है
   ● पब्लिक स्कूल है
   ● मै स्कूल नहीं जाती

UDAYAN care
empathy
education
empowerment

IIITD | INDRAPRASTHA INSTITUTE *of*
INFORMATION TECHNOLOGY **DELHI**

Menstrual Health & Hygiene Practices

We invite ***adolescent girls at Udayan Care Ghar*** to share their thoughts and experiences around Menstrual Health and Hygiene practices by filling out our 10-minute survey!

> *``The Udayan Ghar inmates are being invited to take part in this study. Before you make a decision, it is important for you to understand why this study is being done and what it will involve. Please take time to understand the following information carefully. Please do not hesitate to ask us if there is anything that is not clear or if you would like more information. If you do take part, you will be asked to sign a consent form. ''*

STUDY INFORMATION SHEET

OBJECTIVE
We are running a study at IIIT-Delhi to understand the Menstrual Health and Hygiene practices in India. In today's digital and information age, developing this understanding can help inform the design of future technical aids for preparing and assisting women in managing their menstrual health.

PROCEDURE
We will be conducting a one day workshop at *Udayan Ghar*. We will begin by informal discussion with the NGO staff to understand the landscape of menstrual hygiene practices being followed in the Udayan Ghar. We will then engage your inmates (adolescent girls) in a workshop to understand their approach to menstrual tracking and menstrual hygiene practices. The workshop will include engagement with cultural probe (period journal), survey, and open discussion on menstrual tracking practices. The workshop will typically take 2—3 hours to complete. We will be collecting data in form of audio recording, photographs, and field notes.

RISKS
The possible risks/discomforts of the study are minimal. Participants may find a few personal/sensitive questions in the survey, given the topic.

BENEFITS OF THE STUDY
Individual participants or Udayan Care team will not directly benefit from taking part in this study. However, this research will help inform the design of technical aid directed towards empowering women by preparing and assisting them in managing menstrual health. Also, the study will help us in learning and improving our workshop by understanding its impact.

CONFIDENTIALITY OF RESEARCH INFORMATION
Taking part in this study is voluntary, and student can stop at any time. We will not collect identifying information such as name/email address. Therefore, the responses will remain anonymous.

☐   I have carefully read the study description and understand the risks involved.

(NGO Staff Signature)

_____

Form – C (1)
CONSENT FORM TO PARTICIPATE IN RESEARCH

This form must be signed by respondents prior to conducting qualitative interviews and surveys.

Dear _____,

My name is _____. I am working as a _____ with Udayan Care, regarding a research on _____.

It is completely your choice whether you want to answer any of these questions. If you decide to participate in this study, you are allowing us to ask you questions about you and the people you spend time with. This will take a few hours but we can take a break, stop, or restart any time if you need to. You can stop the interview at any time or withdraw at any time for any reason without any consequences.

Privacy is important to us. Your personal information is only connected to you by a number code, so no one can easily find out information about any specific participant. Your answers will not be revealed to anybody else. Any general reports that are written and shared with you or others will not have any individual participant's name on it, unless we have your written permission. Research reports will not have names on them or allow any individuals to be identified, unless permitted. In addition, if any individual responses are reported, they will be done so in a protected manner, so that the respondents remain anonymous and cannot be identified, unless permitted by you.

If you have any questions about this research, please ask me now.

Please keep this form so that you have this information.

_____   _____
Participant's Signature   Date

_____   _____
Investigator's Signature   Date

Form – C (2)
GUARDIAN CONSENT FORM FOR MINOR TO PARTICIPATE IN RESEARCH

If children are involved in any study, the following Guardian Form shall be given to their guardians. If they are unable to read for themselves, it shall be read out to them.

Start Date:

Dear _____,

Hi, my name is _____. Please let us know about any concerns regarding your child/children's participation in this research on _____ _____.

The total amount of time per child to participate in the study is _____ hours. Additionally, we may ask you to fill out some of the questionnaires listed above for the children, if the child is unable to do so themselves.

There are no direct benefits to participating in this study.

Do you have any questions or concerns?
_____
_____
_____.

Do you approve the participation of your child/ children in the study?

    ☐   Yes
    ☐   No

Do you agree to complete the questionnaires on behalf of the child/children, who are unable to do so themselves?

    ☐   Yes
    ☐   No

The children's and your participation in this study are completely voluntary and you may choose to withdraw any of the children from this study at any time for any reason. The child may also withdraw at any time for any reason.

Given the importance of seeing how children develop over time and how residential care facilities influence how children change, we at Udayan Care would like to come back yearly for follow-up research. We will be re-testing many of the children. If we continue the work and re-contact you, we would explain all the goals and procedures again and at any time in the future, you may decide not to let the children participate.

If you have any questions about this research, please ask.

Please keep this form so that you have this information.

Statement of Consent

I have understood and read the above information. I have had the opportunity to ask any questions and have received answers. I consent to participate in the study and I give permission for the children listed below on the attached document to take part in the study.

_____

_____

_____

_____

Child/children's names

_____   _____
Guardian signature   Date

_____   _____
Investigator's signature   Date

Form – C (3)
CONSENT FORM FOR USE OF PHOTOGRAPHS, VIDEOS, AND AUDIO-RECORDINGS

For still images, moving images and audio material,

I, _____, give the permission to use any of my still and/or moving images being video footage, photographs and/or frames and/or audio footage.

_____   _____
Signature   Date

Taken by (name) _____, (position) _____

on behalf of the Udayan Care, on (date) _____ at (place) _____

for any of the following uses:

- Educational materials, research materials, lecture outlines, materials required for teaching purposes and research

- Incorporating video tapes, audio CDs, CD ROMs, DVDs, and other similar communications and data storage media yet to be invented

Form – C (4)
GUARDIAN CONSENT FORM FOR USE OF PHOTOGRAPHS, VIDEOS, AND AUDIO-RECORDINGS FOR MINORS

For still images, moving images and audio material,

I, the guardian of:

1. (child's full name) _____, age _____

2. (child's full name) _____, age _____

3. (child's full name) _____, age _____

Give the permission to use any still and/or moving image being video footage, photographs and/or frames and/or audio footage depicting the child/children named above.

Name: _____

Relationship to child or vulnerable adult: _____

_____   _____
Signature   Date

Taken by (name) _____, (position) _____

on behalf of the Udayan Care, on (date) _____ at (place) _____

for any of the following uses:

- Educational materials, research materials, lecture outlines, materials required for teaching purposes and research

- Incorporating video tapes, audio CDs, CD ROMs, DVDs, and other similar communications and data storage media yet to be invented

Menstrual Tracking Practices
Remote Interview Protocol

Color Coding: Possible/expected answers | Follow up questions

Hello, I am Anupriya, a PhD candidate at IIIT-Delhi. I am doing research on understanding how menstrual tracking is weaved in the lives of Indian women. I have shared the information sheet and a consent form with you, which describes the study in detail. I will quickly summarize the study objective and participation risk once again. Regarding the same I will be asking you a few questions and will be sharing a few pictures/sketches over whats app for your feedback! There might be few personal questions, which you might not wish to answer. In such a case, please let me know and we can skip the same. Participation is completely voluntary and you can stop at any moment. The interview will be audio recorded. Please provide a verbal consent for participating in the study.

Part-1: Icebreaker

1. [Period Journal probe picture] So, I have just sent an image on your whatsapp!

My Period
My Friend

How do you feel about it? Are you able to relate with it? (yes/no—why/why not)
   a.   Was there any point in time when you could relate to the statement?

2. [TIMES Magazine probe picture] I have shared another image with you!
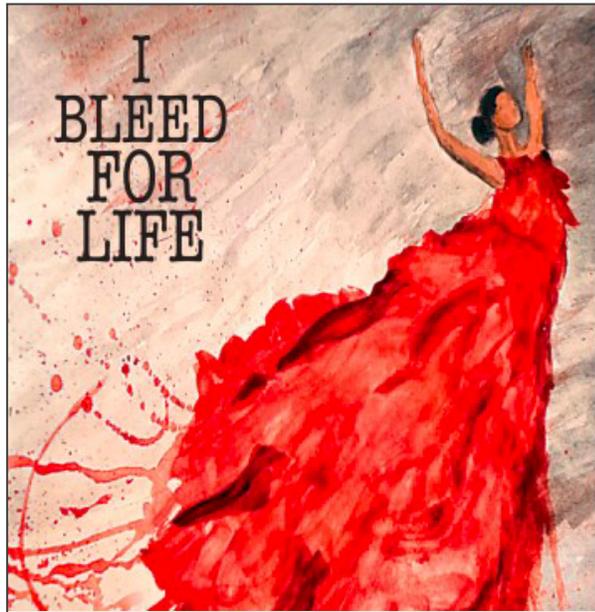
[Image source: Outlook (India)'s issue of the year: Menstruation, January 14, 2019.]

How does this speak to you?
   a. Do you relate to it? (yes/no- how/why not?)

2. How has your experience been with menstruation up till now?

3. Are you able to predict your cycle? How do you get to know that you are about to have your periods? (body as an alarm, tracking, other sign/method)

Part-2: Tracking Practices

1. What are your thoughts about menstrual tracking? Like,
   a. Do you think it is important to track one's period (what are the benefits)? (yes/no - why/why not)
   b. When is the right time to start tracking? (menarche/cycle variation/pregnancy/post marriage/on doc's recommendation)
   c. In your opinion, when is it crucial to track/unavoidable to not track one's periods?

2. When did you first realize that it is essential to track one's cycle? *(or When did you start to track your cycle?)*
   a. How did you come to this realization? *(or Who recommended it?)*

3. Now, when you look back, do you think if you knew about it from the beginning, would that have made any difference to you and your experiences?

4. How do you track your cycle? (paper/calendar/mobile app)
   a. What do you track?
      i. **Cycle:** Dates/bleeding/fertile window/ovulation
      ii. **Parameters to track:** symptoms/mood/products

<div align="center">OR</div>

   ***[for 40+ year participants]
   How did you track your cycle? (paper/calendar/mobile app)
   a. What did you track?
      i. **Cycle:** Dates/bleeding/fertile window/ovulation
      ii. **Parameters to track:** symptoms/mood/products
      iii. **Menopause Symptoms:** Hot flashes/night sweats/moods

5. Is there a specific reason behind choosing/settling for this method?
   a. Did someone recommend it? | **please elaborate**

6. Have you tried any other methods?
   a. Which methods?
   b. What made you switch away from it?

7. In particular, what do you find most helpful about this method of yours?

8. Is there anything you dislike about your method(s)? If so, what?

9. Do you or have you shared your cycle information (informally/formally) with anybody?
   a. WHEN (age/event)/WHY?
   b. HOW (via app/email/msg/over telephone/etc)?

10. Do you see any value in sharing the cycle information with other people? (partner/family/friend)

a. What value will it bring to you? (sync sisters/bonding/understanding/breaking stigma) | **please elaborate**

11. If I may ask, whom would you feel comfortable sharing your cycle details with? | **At different points in the journey?** (family/friends/partner/doctor/other)

12. In general, do you find tracking your cycle burdensome? (yes/no - why/why not)

Part-3: Tracking Across Ages

1. Do you wish for an alternative for menstrual tracking?
    What/how should it look? | **please elaborate**

    a. **Cycle:** Dates/bleeding/fertile window/ovulation
    b. **Reminders:** about to begin/safe sex days/ovulation/etc
    c. **Parameters to track:** symptoms/mood/products
    d. **Information:** menstrual process/hygiene/management/
    e. **Buddy mode (companion):** Share your info with others? Whom?

<div align="center">OR</div>

***[for 40+ year participants]
Did you wish for an alternative for cycle tracking, specifically towards the end years of menstrual journey (menopause phase)? What/how should it look? | **please elaborate**

    a. **Cycle:** Dates/bleeding/fertile window/ovulation
    b. **Reminders:** about to begin/safe sex days/ovulation/etc
    c. **Parameters to track:** symptoms/mood/products
    d. **Information:** menstrual process/hygiene/management
    e. **Buddy mode (companion):** Share your info with others? Whom?
    f. **Menopause Symptoms:** Hot flashes/night sweats/moods

GAUGE: Different for menstruation vs menopause? (yes/no why/why not)

2. Now, If I take you back in time and ask you to imagine a tracking mechanism for a
15-year-old (name of the participant). What would that look like? | **please elaborate**

   a. **Cycle:** Dates/bleeding/fertile window/ovulation
   b. **Reminders:** about to begin/safe sex days/ovulation/etc
   c. **Parameters to track:** symptoms/mood/products
   d. **Information:** menstrual process/hygiene/management/
   e. **Buddy mode (companion):** Share your info with others? Whom?

3. [only for 40+ year participants] Now, If I take you back in time and ask you to imagine a
tracking mechanism for (name of the participant), who is sexually active. What would
that look like? | **please elaborate**
   a. Will the choice to conceive/avoid pregnancy alter the mechanism?

Part-4: Closing Questions and Demographics Data Collection

1. Over these years, if I ask you to reflect on your journey with your periods, what comes to
your mind?
   a. How has it been?
   b. If given a choice, would you have altered it anyway?

2. I understand that it can be challenging to express your journey only in words. Please feel
free to use emojis/gifs/memes/images from net/doodle/sketches/poem/song/etc to
describe the same and share it with me over WhatsApp! You can share it with me now, in
a couple of hours, or over the next two days :) Also, you can choose different expressions
for different points of time in your journey!

3. We have reached the end of this session. I will need you to answer few questions
pertaining to **Demographics:** Age, Gender, Life stage (*Married/Sexually Active/Planning
to conceive/Perimenopause/Menopause),* Menstrual disorder/condition *(PMS, PCOD/S,
Irregular cycle, Endometriosis, Fibroids/etc)*, Contraception use, and Profession.

   Thank you for your participation. If there is anything you want to share, I would be happy
   to know more about your overall experience. Would you like to recommend someone,
   who would be willing to participate in the study? If there is anything you want me to not
   include in the analysis, please let me know within a month and it will not be included in
   the data analysis.

INDRAPRASTHA INSTITUTE *of* INFORMATION TECHNOLOGY **DELHI**

Menstrual Tracking Practices

We invite **adult cisgender woman** to share their experiences and perspectives around Menstrual Tracking by participating in a telephonic interview.

"You are being invited to take part in this study. Before you make a decision, it is important for you to understand why this study is being done and what it will involve. Please take time to understand the following information carefully. Please do not hesitate to ask us if there is anything that is not clear or if you would like more information. If you do take part, you will be asked to sign a consent form."

OBJECTIVE
We are running a study at IIIT Delhi in collaboration with *Sachhi Saheli* – a not for profit organization–to understand the Menstrual Tracking practices among urban Indian women at different stages of life. In today's digital and information age, developing this understanding can help inform the design of future technical aids for assisting in managing menstrual health.

PROCEDURE
You will be asked to share your experiences around menstrual health and wellbeing with a focus on menstrual tracking. There will be dedicated questions focusing on different transitions of the menstrual journey (menarche, fertility, & menopause). You will be asked questions as per where you are in your menstrual journey. The session will be audio recorded.

RISKS
The possible risks or discomforts of the study are minimal. You may find a few personal/sensitive questions, given the topic area. You can skip the question if you do not wish to answer.

BENEFITS OF THE STUDY
You will not directly benefit from taking part in this study. However, this research will help inform the design of digital technology directed towards empowering women by assisting them in managing menstrual health.

CONFIDENTIALITY OF RESEARCH INFORMATION
Taking part in this study is voluntary, and you can stop at any time. We will not collect identifying information such as your name/email address. Thus, your responses will remain anonymous.

** Please provide a verbal consent acknowledging that you have read the description of the study above, and consent to participating.

Contact Person: Anupriya Tuli
Contact: 01126907458 | anupriyat@iiitd.ac.in

मासिक धर्म ट्रैकिंग और स्वास्थ्य

हम वयस्क महिलाओं को एक टेलीफोनिक साक्षात्कार में भाग लेकर मासिक धर्म ट्रैकिंग के बारे में अपने अनुभव और दृष्टिकोण साझा करने के लिए आमंत्रित करते हैं।

"आपको इस अध्ययन में भाग लेने के लिए आमंत्रित किया जा रहा है। इससे पहले कि आप कोई निर्णय लें, आपके लिए यह समझना महत्वपूर्ण है कि यह अध्ययन क्यों किया जा रहा है और इसमें क्या शामिल होगा। कृपया प्रस्तुत जानकारी को ध्यान से समझने के लिए समय निकालें। इस अध्ययन से जुड़े कोई भी प्रश्न या दुविधा की स्पष्टीकरण के लिए हमसे सहयोग लेने/पूछने में संकोच न करें। यदि आप भाग लेते हैं, तो आपको सहमति फॉर्म पर हस्ताक्षर करने के लिए कहा जाएगा।"

—अध्ययन सूचना और सहमति प्रपत्र—

- अध्ययन के लक्ष्य

हम जीवन के विभिन्न चरणों में शहरी भारतीय महिलाओं की मासिक धर्म ट्रैकिंग प्रथाओं को समझने के लिए सच्ची सहेली (NGO) के सहयोग से IIIT–दिल्ली में एक अध्ययन चला रहे हैं। आज के डिजिटल और सूचना युग में, इस समझ को विकसित करने से मासिक धर्म स्वास्थ्य के प्रबंधन में सहायता के लिए भविष्य की डिजिटल तकनीक के डिजाइन को सूचित करने में मदद करेगी।

- अध्ययन की विधि

आपसे मासिक धर्म ट्रैकिंग के बारे में आपके अनुभव और दृष्टिकोण को साझा करने के लिए कहा जाएगा। इसमें मासिक धर्म यात्रा के विभिन्न बदलावों (मासिक धर्म के प्रारंभिक वर्ष, प्रजनन क्षमता, और रजोनिवृत्ति) से जुड़े प्रश्न होंगे। आप अपनी मासिक धर्म यात्रा के कोनसे चरण पर हैं, इसके आधार पर हम आपसे प्रश्न पूछेंगे। हमारी बातचीत की ऑडियो रिकॉर्डिंग की जाएगी.

- भाग लेने के जोखिम

अध्ययन के संभावित जोखिम या असुविधाएँ न्यूनतम हैं। विषय क्षेत्र को देखते हुए आपको सर्वेक्षण में कुछ व्यक्तिगत / संवेदनशील प्रश्न मिल सकते हैं।यदि आप किसी प्रश्न का उत्तर नहीं देना चाहेंगे तो आप प्रश्न छोड़ सकते हैं।

- भाग लेने के लाभ

इस अध्ययन में भाग लेने से आपको सीधे तौर पर कोई लाभ नहीं होगा। हालाँकि, यह शोध महिलाओं को मासिक धर्म स्वास्थ्य के प्रबंधन में सहायता करके उन्हें सशक्त बनाने की दिशा में निर्देशित डिजिटल तकनीक के डिजाइन को सूचित करने में मदद करेगा।

- स्वतंत्रता

इस अध्ययन में आप बिना किसी मजबूरी के अपनी स्वेच्छा से भाग ले रहे हैं और आप किसी भी समय इस अध्ययन को रोक सकते हैं। आपके नाम / पते जैसी पहचान की जानकारी एकत्र नहीं की जाएगी। इसलिए, आपकी प्रतिक्रियाएँ अनाम रहेंगी।

** कृपया मौखिक सहमति प्रदान करें कि आपने उपरोक्त अध्ययन का विवरण पढ़ा है, और भाग लेने के लिए सहमति दें।

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