

Original Article

Dignity and Access through Digital Tools: Evaluating the Impact of *SakhiSetu* App on the Holistic Wellbeing of Rural Girls

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Abstract - In India, particularly in rural settings, health information regarding menstruation is quite low or limited. This biological event has been surrounded by so many stigmas and myths, causing severe physical and psychological risks for adolescent girls during their transition period. Traditional “pad-centric” policies often ignore the deep-seated stigma that prevents autonomous decision-making. This research evaluates the efficacy of the *Sakhisetu*, a bilingual mobile application, in improving menstrual health literacy and facilitating a psychosocial shift among adolescent girls in rural Rajasthan, Uttar Pradesh, and Haryana. The app bypasses the traditional information barriers and acts as a private, comprehensive digital guide. It delivers stigma-free and scientific knowledge in easy and understandable language to young girls in these remote areas. Beyond hygiene metrics, the study investigates how digital literacy or *Sakhisetu* app helps in the transition of the participants’ narrative from shame and impurity to treating menstruation as a natural phenomenon and biological event, which doesn’t make a woman impure. A Mixed-Methods Pragmatic design (N=188 for the baseline survey and N=83 for the follow-up survey) was adopted. Quantitative data were gathered through a 25-item questionnaire followed by another 15-item questionnaire from three government girls’ schools pertaining to three different states, complemented by 6-8 weeks of ethnographic observations. Findings show that while digital literacy or mHealth increases information uptake and spreads awareness to overcome the menstrual myths and stigmas, invisible social domination (patriarchal society or male dominance) and environmental determinants (lack of private infrastructure) remain significant barriers to attaining menstrual dignity and to uproot deep-seated stigma and taboos in rural settings. Digital interventions are highly effective to teach about menstrual management, myth busting & stigma reduction, but must be paired with mandatory male education and physical infrastructure to ensure a dignified life for rural women.

Keywords - Menstrual Awareness, Adolescent Girls, Rural, Public Health, *Sakhisetu*.

1. Introduction

In a developing country like India, menstrual health literacy has become an essential factor for women’s physical health, psychological well-being, and for a dignified life. “Proper knowledge and awareness regarding menstrual health are required for every woman and people who identify as women. This would definitely add to timely care-seeking, right decision-making, and self-management” (Hennegan et al. 2021; Garg and Anand 2015). However, “substantial gaps in menstrual health literacy persist not only in India but also globally, particularly in rural and socioeconomically marginalized areas, where stigma, lack of information, and restricted or limited access to health services have been observed” (Hennegan et al. 2021; IIPS and ICF 2021). Severe menstrual pain, abnormal bleeding and menstruation continuing for more than 07 days or more, all of these are not

normal symptoms, but most of the women and girls treat these symptoms as normal, resulting in no diagnosis or delayed diagnosis, such perception and lack in self-care have contributed to these gaps. Eventually, these gaps result in long-term social and economic implications for women and girls.

“In India, menstruation is not seen as a biological process or as a natural phenomenon, but it is a matter of shame or impurity.” (Garg and Anand 2015; Sumpter and Torondel 2013). Many studies have documented how traditions, societal norms, and cultural taboos have restricted communication and transfer of knowledge among adolescents and adult women alike (Fennie, Moletsane and Padmanabhanunni 2022). “These constraints are especially observed in rural areas, where formal health education may be limited, and people



possessing correct information are not available.” (Garg and Anand 2015) Thus, information available about menstruation is often incomplete or distorted and sought only after the onset of severe symptoms.

For many women, menstrual stigma brings severe mental trauma and harm. Few cases of such intense emotional distress and harm have recently been in the news and have drawn our attention to the consequences of menstrual exclusion. In April 2025, a 36-year-old woman in Jhansi, Uttar Pradesh, took her own life as she couldn't perform Navratri rituals due to menstruation. Her inability to fulfil a sacred religious obligation led to severe emotional distress and a sense of moral failure, ultimately resulting in suicide (“Unable to Observe Navratri Due to Periods, UP Woman Dies by Suicide” – NDTV, 05 Apr 2025). In another widely reported case from Maharashtra in 2023, a 30-year-old security guard murdered his 12-year-old sister as he thought that the blood stains on her clothes were due to her sexual misconduct, whereas it was from her first period (“Thane Man Kills 12-Year-Old Sister; Mistakes Her First Period Blood Stains for Physical Relationship” – The Indian Express, 13 May 2023). This incident highlights the need for mandatory menstrual education for men and boys. Such incidents show drastic consequences. These incidents have reflected the shame faced by many, the severity of menstrual stigma prevalent in the society, silence towards this biological event, and misinformation around this. Different communities follow menstrual stigma through different practices, for example practice of menstrual isolation followed by certain tribes in certain rural regions of India. These practices make a woman live apart from her household and family during menstruation in unsafe conditions (BBC News Delhi 2021). The government, through its policy efforts and some civil society, through various initiatives, have been trying for many years to mitigate the physical risks associated with such practices, but the main cause, which is not allowing us to dismantle these deep rooted beliefs and misinformation remain largely unaddressed. Institutional settings have also recognized these persistent stigma in many instances. Recent verdicts pronounced in the matter of “Shailendra Mani Tripathi v. Union of India, 2023” and the landmark Sabarimala verdict in the matter of “Indian Young Lawyers Association v. State of Kerala, 2019” (BBC 2018) have repositioned menstruation from merely a biological to a socioeconomic and gendered issue. The judiciary now recognizes “it not merely as a matter of hygiene, but as a core component of Constitutional Morality (a doctrine that emphasizes adherence to the core principles, values, and spirit of a constitution rather than just its literal, written text), involving the rights to privacy, dignity, and non-discrimination under Articles 14, 15, and 21 of the Indian Constitution” (Dr. Jaya Thakur v. Union of India 2024).

Many policies and various initiatives on menstrual hygiene management, including national programs (*Udaan Scheme* in Rajasthan, *Kishori Suraksha Yojana* in Uttar

Pradesh, and many other such programmes at the state and national level), have been introduced by the government, focused on free or subsidized pad distribution. But unfortunately, these schemes and initiatives are not enough to address the grassroots-level problems and issues. These issues are largely unaddressed. Distribution of free pads or subsidized pad-centric approaches do not address knowledge deficits, do not dismantle stigma surrounding menstruation, or do not develop decision-making autonomy, particularly among those who live in rural settings, thus having limited or no access to formal education or health services. These barriers contribute to medical avoidance despite facing severe menstrual health problems. Recent large-scale surveys indicate that the majority of women who experience severe menstrual pain or abnormal bleeding take it very casually and normally; their perception of normalization does not allow them to seek any sort of medical care or attention (Sinharoy et al. 2023). Those who do not seek care many of them report dismissal of symptoms at all and thus do not opt for diagnosis, contributing to ongoing morbidity and reduced quality of life.

A recent study has highlighted “how digital platforms and educational tools have emerged to address the gaps in menstrual health awareness and management” (Fuadah et al. 2024). Mobile applications related to menstrual and reproductive health offer scalability, anonymity, and self-paced engagement, characteristics that are much needed for sensitive health topics. “Evidence from urban and high-income settings suggests that menstrual health apps can improve health literacy, symptom awareness, and perceived control over reproductive health” (Bucher et al. 2025). However, the existing evidence base remains limited in several important respects. Most of these apps focus on English-speaking, digitally literate users and emphasize menstrual tracking features and reproductive days rather than integration of period tracker, menstrual health education and myth-busting literature. Little is known about whether engagement with app-based educational content and tracking tools can reduce hesitation, challenge misinformation, and strengthen confidence in health-related decision-making among adolescent girls and women. However, “few attempts have been made to systematically review the mHealth programs targeted to improve young people SRH in low-and-middle-income countries” (Feroz et al. 2021).

To address these gaps, I have designed and developed *SakhiSetu*, a bilingual (Hindi–English) mobile app providing a safe, private & stigma-free space for education and self-empowerment. The app has been developed to provide adolescent girls and women with direct access to culturally relevant informational content and a period tracker. This study evaluates how access and engagement with the mHealth app influence health literacy related to menstruation, as well as perceptions of stigma and dignity in managing one's own health. By situating digital health technology within lived social contexts and anchoring *Sakhisetu's* usage as the case

study to comprehend gendered agency, the study aims to contribute evidence on how mobile health interventions can support not only information access but also confidence, agency, and equitable health outcomes in under-resourced settings or in rural settings.

2. Literature Review

2.1. The Socio-Cultural Construction of Menstrual Stigma

The scholars have noted that “the focus surrounding Menstrual Health Management (MHM) in India has undergone a paradigm shift, moving from a narrow focus on hygiene products to a broader understanding of menstrual dignity” (Sommer et al. 2021). This shift is pretty much needed in urban and rural settings, both and for each and every woman to mitigate physical and psychological well-being.

In rural India, menstruation is not considered a biological event. Society has defined it as a ‘stage of impurity’. Vashisht et al. (2018) and Garg & Anand (2015) have documented that “over 70% of adolescent girls enter menarche with zero prior biological knowledge, leading to what Phenomenologists describe as embodied trauma.”

Silence or shame on this natural phenomenon has been enforced by mothers, grandmothers, and teachers who transmit either no information or distorted information rather than explaining scientific facts or reasoning associated with this natural phenomenon. The recent fatal outcomes in Jhansi in 2025 and Maharashtra in 2023 illustrate that this menstrual stigma is an invisible killer that makes a woman ashamed to the point of psychological and physical self-harm. Scholars have documented that “this cycle of misinformation is passed from one generation to another and causes psychological and physical suffering to many women across South Asia, scholars have also stated that while educational interventions can successfully correct misbeliefs about physiological health, they remain fundamentally constrained by deeply entrenched generational social norms that dictate the secretive, often unhygienic maintenance and washing of menstrual materials out of fear of social exposure” (Castro and Czura 2025).

National programs like the Menstrual Hygiene Scheme (MHS) provide subsidized or free sanitary napkins. These programmes have adopted a traditional approach. These programmes often overlook the menstrual stigma, shame, and fear of judgment faced by a user while accessing these products. As scholar Chris Bobel (2019) notes, “giving a girl a pad does not give her agency,” a sentiment reflected in findings that many girls revert to using washed cloths even when pads are available. This regression is driven by supply chain fragility within government schools that leads to inconsistent access. Another scholar, Silvia Castro (2024), notes that “social stigma can prevent people from making optimal health choices, even when the optimal choice is readily available and affordable.” For example, the social psyche of the shopkeeper where the stigma of interacting with

male vendors creates a psychological barrier to purchase, and lack of infrastructure such as private toilets and running water, which creates the mental burden to manage menstruation discreetly and privately. Hence, just the availability of a sanitary product fails to address the prevalent menstrual stigmas and structural barriers that remain the primary obstacles to menstrual health and dignity.

2.2. The Digital Divide and mHealth as a ‘Private Space’

Digital Health (mHealth) options offer a pragmatic way to overcome social stigma and taboos. Mobile applications provide a safe space and unbiased environment that face-to-face interactions may lack. “While mHealth is effective in urban centers, rural populations face a Gender Digital Divide” (Manimegalai and Mathaiyan 2026).

Most existing apps (like *Clue*, *Flo* & *Maya*) are designed for English-speaking users. Scholars have documented that “the viability of using targeted mHealth platforms to overcome traditional resource constraints and deliver vital sexual and reproductive health (SRH) education to underserved youth is increasingly recognized across low- and middle-income countries in South Asia and Africa, where mobile interventions have demonstrated unique success in offering privacy and bypassing rigid local socio-cultural restrictions” (Laar et al. 2024). There is very little literature studying mHealth apps designed in Hindi and English both and whose content is designed especially for rural settings. This study also aims to address this gap by evaluating how *Sakhisetu* functions not just as a tracker, but as an educational intervention.

2.3. Theoretical Framework: Intersectionality and Interpretivism

This study utilizes Kimberlé Crenshaw’s intersectional feminist theory (1989) to reveal that adolescent girls’ health outcomes are shaped by more than just her gender; there are many other things intersecting social aspects. For instance, her minor status often limits her decision-making regarding health, while geographical location, particularly rurality, significantly impacts her access to essential resources like proper sanitation and running water.

Furthermore, limited digital literacy and internet access, which is quite common in rural areas, further hinder her ability to access healthcare information and services. Collectively, all of these interconnected factors create challenges to her health and well-being. Marginalization owing to caste and economic resources further add to the intersecting levels of challenges, thereby hindering the holistic development and well-being of adolescent girls.

By adopting an Interpretivist stance, we recognize that ‘health literacy’ is not just about “knowing facts,” but it also empowers a woman or adds to her self-confidence to act on those facts within a restrictive environment.

3. Methods

3.1. Research Design: Mixed-Methods Pragmatism

For this research, a Qualitative-dominant Mixed-Methods (Pragmatism) approach has been adopted. This method allowed us to analyze adolescent girls' understanding of menstrual health, mindset and their level of literacy about this natural phenomenon. The research tool comprises two questionnaires aiming to collect the survey data in two phases. This tool helped to know about their menstrual awareness, management practices, and societal restrictions followed by them before and after the use of SakhiSetu. The study is rooted in phenomenology, which helped in understanding the real-life experiences and cultural beliefs prevalent and followed in that particular setting in which these participants reside during menstruation. The data collected through the surveys and ethnographic observations was transcribed and categorized into different codes, which majorly corresponded to the themes aligned with the objectives of this research. Any discrepancy or exception has also been recorded in the analysis.

This approach is chosen to ensure that the data collected from the surveys is analyzed through a thematic approach in order to highlight the key socio-cultural challenges reflected in the statistical data. Pragmatism focuses on "what works" to solve the research question, using surveys for scale and for depth. The sample is collected using purposive sampling, focusing specifically on the adolescent girls aged between 11 to 17 years in the sites mentioned below. This method is also chosen as it allows for prioritizing the participants' own voices, their identity and beliefs. It allows us to observe how participants experience menstruation within the cultural and socioeconomic contexts they are living in, rather than just observing them from an outsider's perspective. Ethnographic approach has been adopted, whereby the 6-8 weeks of field work and community engagement within their own rural settings have been carried out to understand the social and cultural environment in which government schools were located. This is to ensure that the digital intervention (the app) is culturally grounded and adoptable in their rural setting and social context.

The research has also taken reference and cognizance of intersectional feminist theory, articulated by Kimberlé Crenshaw and Patricia Hill Collins (2000), which explains "how overlapping social identities such as gender, age, education, and rural location hinder access to health knowledge and technology." This framework allows us to analyze and understand how adolescent girls and young mothers living in different rural settings experience digital health tools within their own settings and the available socioeconomic environment. It also highlights how differentiated access to resources can result in different healthcare and holistic well-being opportunities for women belonging to diverse socioeconomic groups within the same geography.

3.2. Location of Research Sites

The sites selected for this research are located in rural areas of Sagwara (Rajasthan), Hardoi (Uttar Pradesh) & Jhajjar (Haryana). Sites are located in three major states of North India. The customs, practices being followed, local dialects, and specific barriers rooted in those particular settings regarding menstrual hygiene and management may vary from one location to another location. Choosing these diversified research sites ensures that research findings and the *SakhiSetu* app are adaptable to different cultural contexts and rural settings. Despite various government schemes distributing free or subsidized disposable pads, these specific rural locations often report inconsistent access due to fragmented supply chain issues and environmental barriers. Choosing these sites also allowed to study the "lived experience" of those girls who still rely on traditional methods (like washable cloth). They also face invisible societal dominance and are forced to follow deep-rooted stigmas and menstrual myths. For those who are facing all these barriers, how an mHealth app can bridge the gap in their knowledge for menstruation management, and self-dignity is the main point of the study.

3.3. Sample Size & Participants

The study involved a total of 188 participants from phase-1 and 83 for phase-2, all of whom are adolescent girls residing in rural areas of Sagwara (Rajasthan), Hardoi (Uttar Pradesh) & Jhajjar (Haryana). The participants were selected from different government schools and local communities across three different geographical regions to ensure a diverse representation of rural experiences. Participants were recruited through school administrators and community health volunteers (members working with local NGOs) who facilitated introductions. This ensured a significant level of trust and subsequent response rate (n=188 & n=83).

3.4. Socioeconomic Background and Inclusion Criteria

3.4.1. Age Group

The participants are primarily aged between 11 to 17 years. This age group is chosen as for adolescent girls this duration is considered to be a critical transition period. Menstrual health education in this transition phase is very much needed and may have a significant physical and psychological impact.

3.4.2. Socioeconomic Status

The group consists of students from low to middle-income rural households. Most families in these regions rely on agriculture or daily-wage labor, and the participants primarily access healthcare and education through government-funded institutions.

3.4.3. Educational Context

All participants are currently enrolled in government girls' schools. This setting was chosen as it serves as a

centralized hub for reaching adolescent girls who are most affected by the digital and health literacy divide.

3.4.4. Cultural Context

The participants belong to rural North Indian settings, where traditional practices such as the use of washed cloth for menstrual management are prevalent due to limited or no access to sanitary products or government schemes/policies providing free pad distribution.

3.5. Ethical Considerations

Adolescent girls (ages 11-17) are the participants and consist of the sample size for this study. This age group is classified as a vulnerable group under standard research ethics protocols. Since participants are not adults, the consent provided by them independently cannot be accepted legally, hence parental or guardian authorization was required. The participants are from rural areas of Rajasthan, Uttar Pradesh, and Haryana, which often experience limited access to healthcare, digital infrastructure, and economic opportunities.

Since the participants are adolescent girls (aged 11-17), the consent process involved two steps: written or verbal

informed consent was obtained from parents or school authorities after explaining the research goals, risks, and benefits. Apart from the permission from the school administration/parents, each girl also provided her own assent. They were informed in simple, local language (Hindi/local dialect) that if they are not willing, they can opt out from the survey or they can refrain themselves from answering any question at any time without giving any explanation.

To protect this vulnerable group, the research implemented strict safeguarding protocols. Participants were asked to use pseudonyms. No real names or identifying household details are stored in the primary analysis datasets or at the backend of the *Sakhisetu* App. Surveys were conducted during presence of trusted female teachers or NGO workers. It was made explicitly clear that participation is not compulsory, it is purely voluntary, and if someone opted out from the participation, it would have no impact on their school grades or standing in the community. Since the subject matter is highly sensitive, utmost care was adopted while conducting surveys. Because the data involves personal health practices and psychosocial outcomes, the dataset is treated as highly confidential.

Table 1. Participant Sample Size

S. No	Site/Location	Description of Area	Remarks	Phase I (n)	Phase II (n)
1	Govt Girls School, Sagwara	Dungarpur, RJ	Rural setting	93	37
2	Govt Girls School, Bandrahiya	Hardoi, UP	Rural setting	41	15
3	Local Community, Hasanpur Village	Jhajjar, HR	Semi-urban settings	54	31
				188	83

3.6. Data Collection Instruments and Analysis

A bilingual (Hindi/English) questionnaire consisting of 25 questions was administered to collect baseline data. A bilingual (Hindi/English) questionnaire consisting of 15 questions was administered to collect the data from the participants who used the *Sakhisetu* app for at least a week. The questionnaire covered: demographic information (age and location); access to technology/mobile; knowledge & practice scale (questions regarding biological understanding of menstruation and current hygiene practices before and after use of the app); psychosocial impact scale (measuring self-efficacy, socially rooted stigma or prejudices and social participation during menstrual cycles); and digital literacy assessment (questions exploring their comfort level using mobile applications for health tracking). Direct observations were recorded during the 6-8 weeks of field work, noting the availability of clean water and private toilets in the government schools, and the availability of smartphones for participants. For data analysis, descriptive and inferential statistics using Microsoft Excel were used to identify frequencies (e.g., % of girls using cloth vs. pads, % of girls who miss school due to menstruation). Thematic analysis was

used to code recurring qualitative patterns such as “Fear of Staining” and “Internalized Shame.”

4. Discussion

(In all the pie charts shown below, the left one represents the base line data collected prior to use of *SakhiSetu* App whereas the right one represents the follow up data i.e. after use of *SakhiSetu* app.) Response from 188 participants has been recorded for the baseline survey, and response from 83 participants has been recorded for the follow-up survey. The attrition rate has been high for the second round of data collection, and it is acknowledged as a research framework shortcoming. The absence of the exact same number of respondents for the baseline as well as the endline survey can cause significant bias in the overall results, which has been addressed in the limitations section of this paper later. However, given the limited scope of this research and the social liabilities and restrictions around respondents' mobility, it was difficult to access them for the endline survey. However, no new respondent (who was not present for the baseline survey) has been surveyed for the second leg of the survey.

4.1. Discussion 1: Awareness around Menstrual Health

Awareness of menstrual cycle and its scientific understanding among participants: Baseline vs. Follow-up

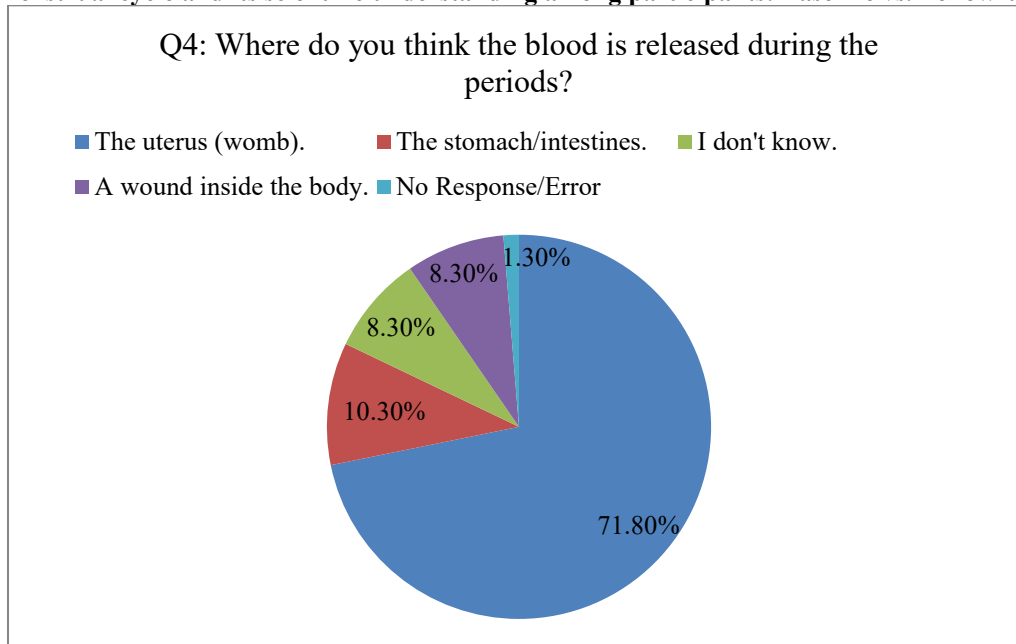


Fig. 1 Baseline: Source of menstrual blood (N = 188)

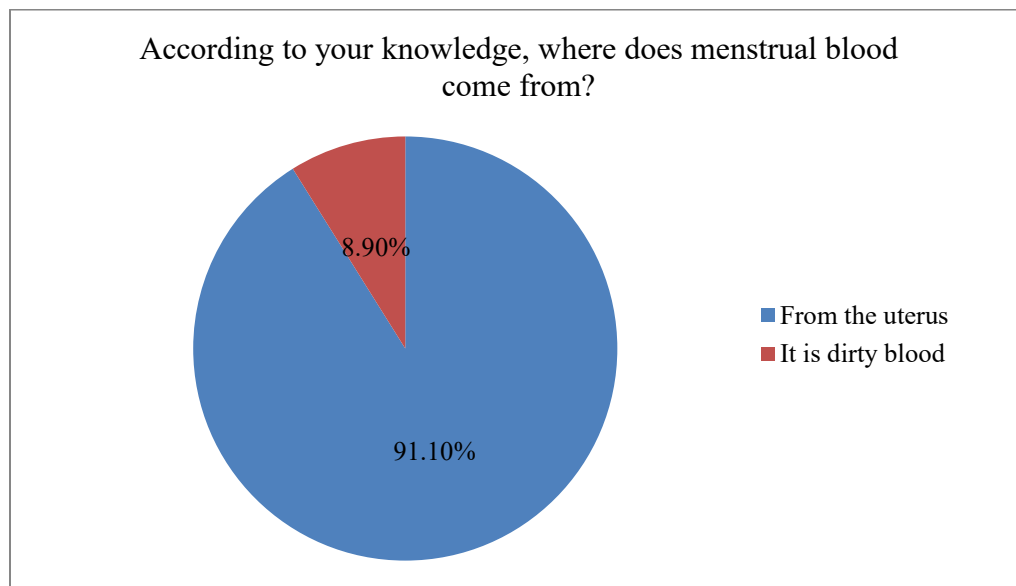


Fig. 2 Follow-up: Source of menstrual blood (N = 83)

While comparing the survey data collected from the respondents before and after using the *SakhiSetu* app, it is seen that there is a clear and positive shift toward acquiring scientific knowledge in understanding reproductive health. The initial data reveal a fragmented understanding, wherein only 71.8% of participants have correctly identified the uterus as the source of menstrual blood. During the initial survey, a significant number of girls had a misconception that the menstrual blood originates from the stomach (10.3%) or an internal wound (8.3%), while another 8.3% were entirely

unaware of the source. In contrast, the second chart shows that correct identification jumped to 91.1%, effectively eliminating the previous misconceptions. However, 8.9% of respondents in the second round of the survey labelled menstrual discharge as “dirty blood,” which reflects that absence of awareness can also lead to impressionable girls believing in the traditional patriarchal conceptions about menstruation. Nevertheless, the overall comparison proves that scientific knowledge has largely replaced earlier myths and the general lack of awareness.

4.2. Discussion 2: Overcoming Period-Related Absenteeism

Impact of Menstrual Management on School Attendance: Baseline vs. Follow-up

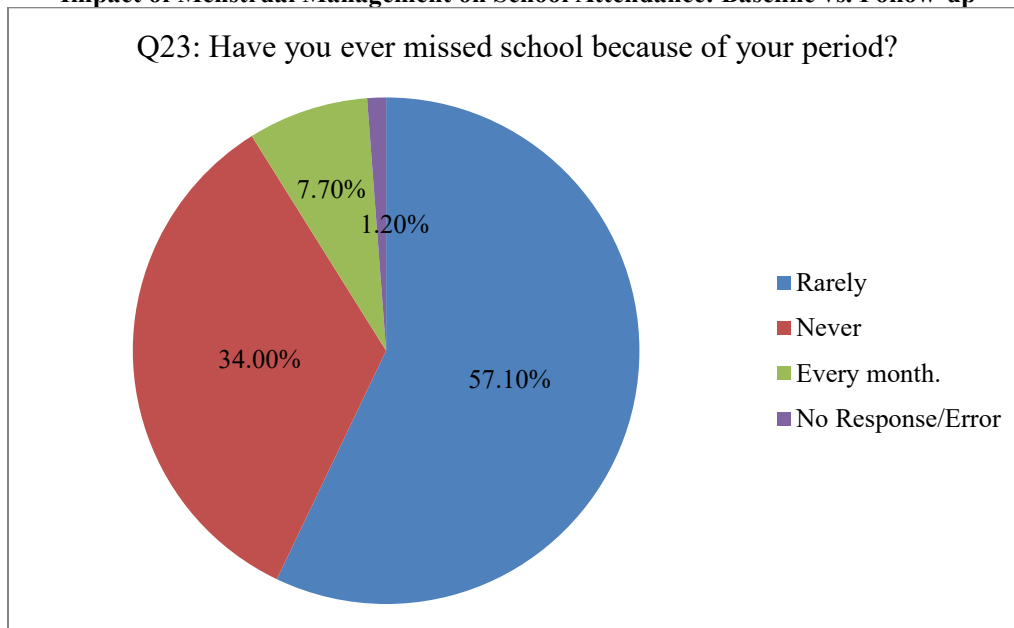


Fig. 3 Baseline: School attendance during menstruation (N = 188)

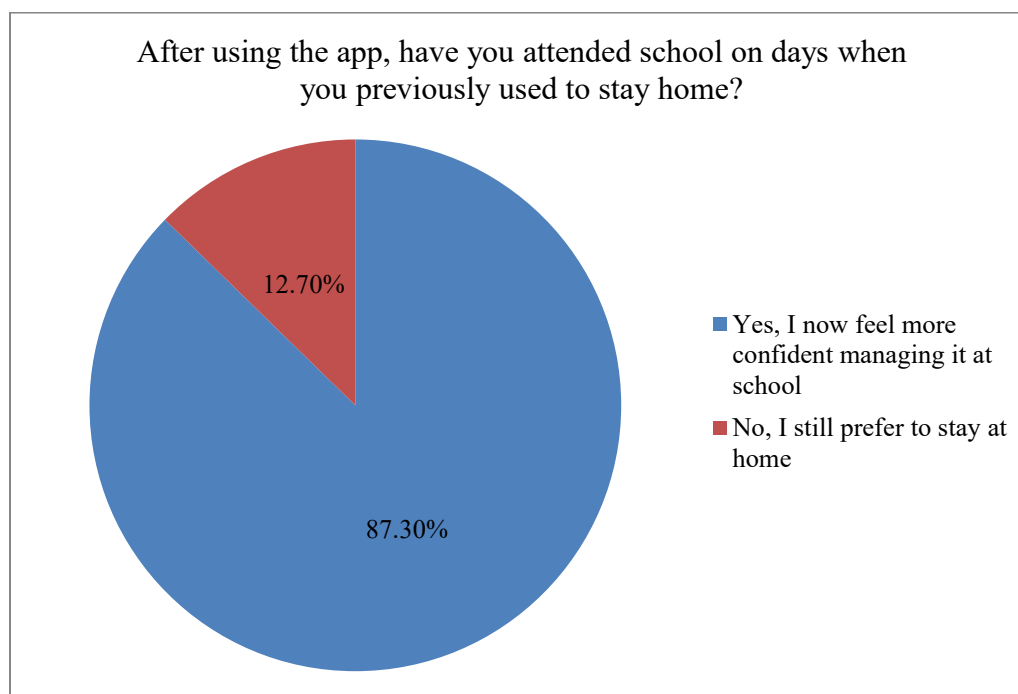


Fig. 4 Follow-up: School attendance (N = 83)

From the pie charts presented above, it can be seen that there is a significant positive shift in how participants manage going to school during menstruation. When comparing the two charts, the baseline data showed that school attendance was a major challenge, with 57.1% of participants missing school occasionally and 7.7% missing school every single month. However, the follow-up data shows a major improvement in participants' behaviour and mindset. An overwhelming 87.3%

of respondents who previously stayed home now attend school during their menstrual cycle, citing increased confidence in managing their periods. While 12.7% of participants still chose to remain at home, the transition from over 60% of participants struggling with attendance issues to nearly 90% feeling empowered to attend the school during menstruation marks a positive shift in overcoming previous barriers or mindset to attend school.

4.3. Discussion 3: Barriers to Seeking Medical Help for Menstrual Complications

Cultural and other barriers in seeking medical care during menstruation: Baseline vs. Follow-up

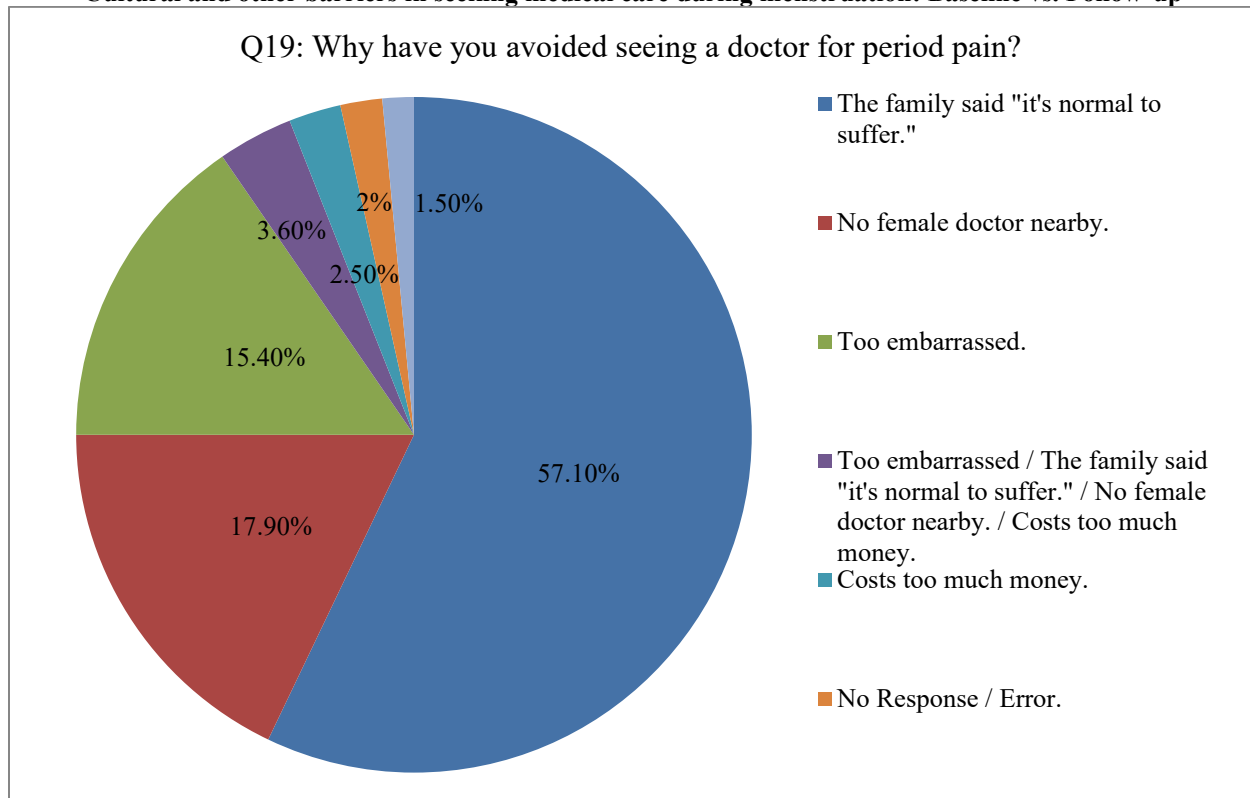


Fig. 5 Baseline: Action on severe menstrual symptoms (N = 188)

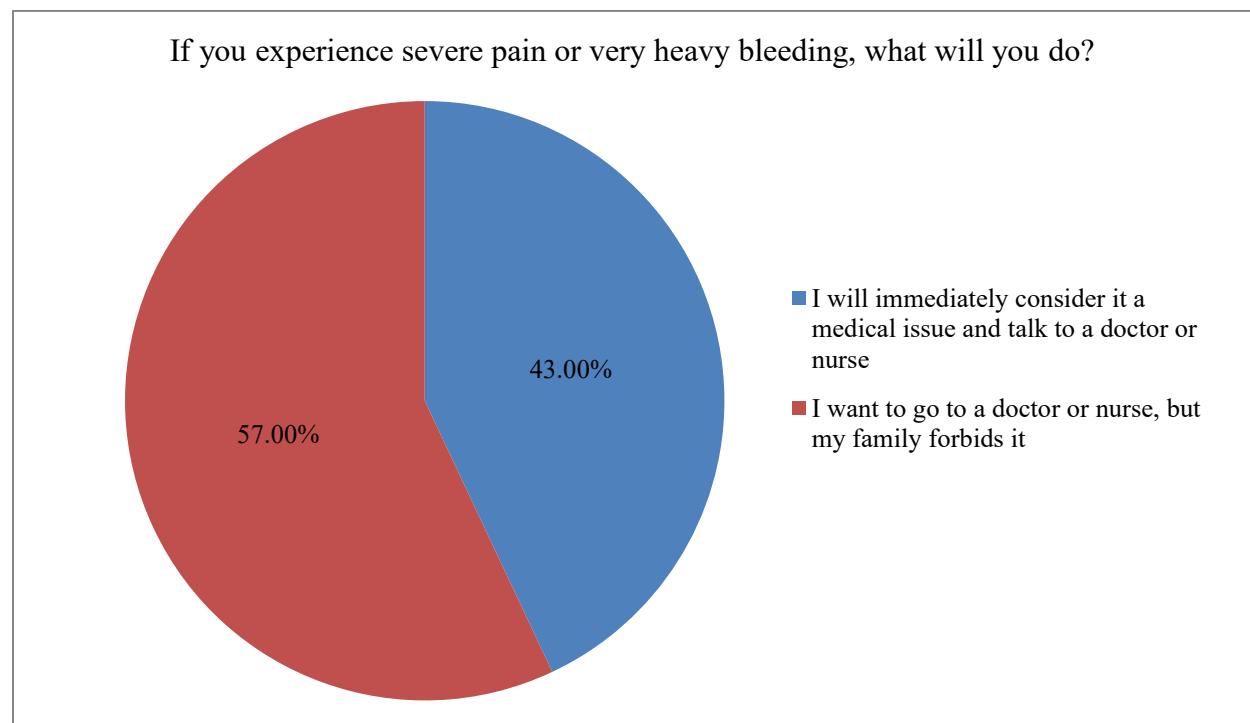


Fig. 6 Follow-up: Reasons for not seeking medical help (N = 83)

When comparing the two pie charts, it is seen that social as well as family perspectives are the primary hurdle preventing participants from seeking medical care for severe period-related issues. The first chart shows that there is a significant number of participants whose intended actions are driven by their cultural beliefs and dominated by the practices followed by the families. It is observed that 43% of respondents agree that severe pain or heavy bleeding is a medical issue which needs a doctor consultation, whereas a majority of participants, i.e. 57% feel restricted by family behaviour governed by deeply rooted stigma, thereby hindering participants to seek medical help even in case they want to.

The second chart provides specific reasons as to why they avoid seeking medical help, showing that family attitudes are the main barrier or play a dominant role. A substantial 57.1% of participants reported that they do not see a doctor because their family believes that severe menstrual pain and abnormal bleeding is quite normal and it doesn't need any medical

attention. This social pressure is compounded by logistical and other factors, such as the lack of female doctors in the vicinity (17.9%) and feeling of embarrassment (15.4%). A conversation during the participant observation had a young woman sharing her experience around sanitary pads:

"We do not get them easily in the village, so we often have to go to the city to buy them. It is quite a hassle...many women do not even end up using the sanitary pads because who would go that far and spend money to get them!"

This reflection, combined with the data collected from the survey, highlights the instances where women deprioritize menstrual health and hygiene owing to logistical and financial limitations. Together, these charts illustrate that even when a participant is aware that she requires medical care, cultural and gendered normalization of pain and family restrictions remain the most significant hurdles to accessing healthcare. Moreover, as observed during field surveys, lack of facilities, viz., proper infrastructure, unavailability of healthcare workers and logistic barriers make it more difficult.

4.4. Discussion 4: Myth vs. Science and Practices

Menstrual myths, taboos & scientific awareness: Baseline vs. Follow-up

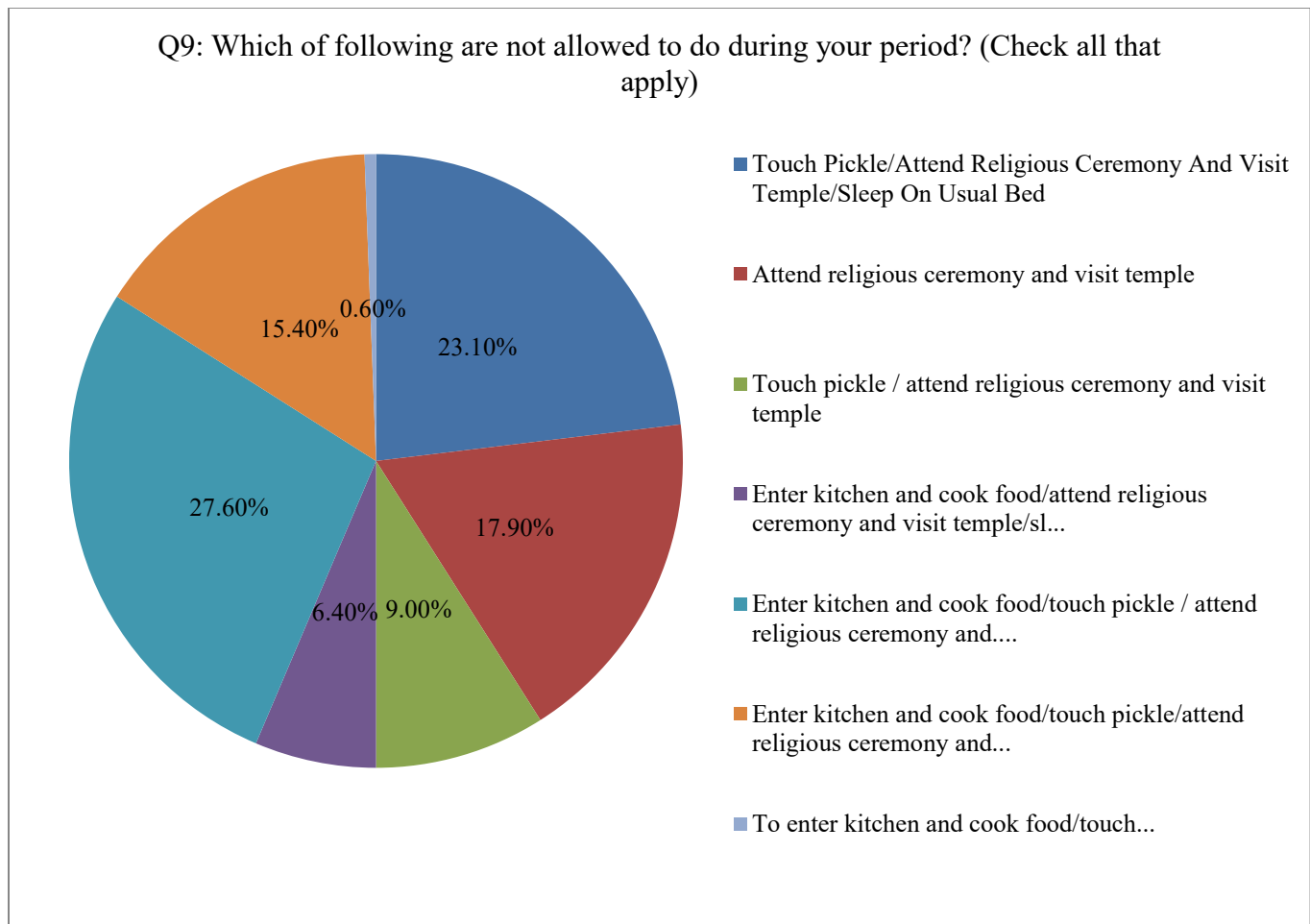


Fig. 7 Baseline: Taboos restricting participants (N = 188)

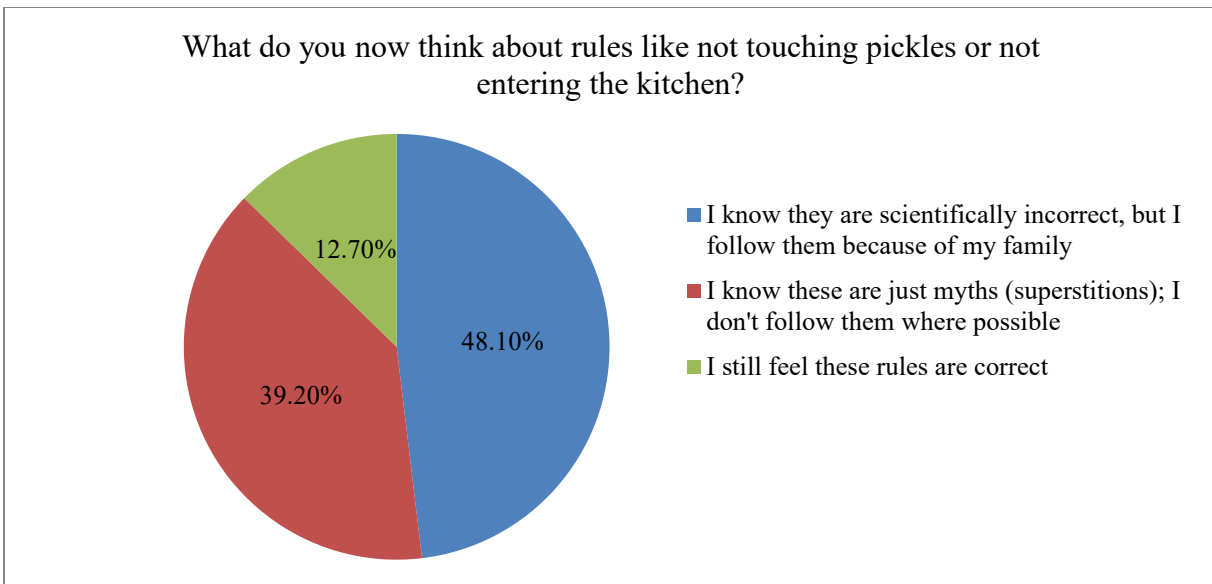


Fig. 8 Follow-up: Scientific awareness of myths (N = 83)

A comparison of the two charts highlights a major gap that, in spite of obtaining correct knowledge or facts behind prevailing myths, they are actually not allowed to overcome these myths in their daily lives. The first chart illustrates that participants are currently restricted by a wide variety of taboos. Almost all the participants are not allowed to perform one or more than one activity as shown in the legends. Combining all the segments of pie charts, it may be seen that 49.4% (6.4+27.6+15.4) being barred from entering the kitchen and cooking, 75.1% (23.1+9.0+27.6+15.4) being stopped from touching pickles, 99.4% (23.1+17.9+9.0+6.4+27.6+15.4) are not allowed to attend religious ceremonies and visit temples and 29.5% (23.1+6.4)

are prohibited from sleeping on their usual beds. However, the second chart shows that the vast majority of participants have developed a more scientific perspective, as 87.3% now believe these rules are either myths or scientifically incorrect. The data reveals that even when the participant is having awareness of menstruation, they have to abide by the family expectations, while 39.2% have started ignoring these superstitions, approximately half of the participants (48.1%) admit they still follow the rules just for the sake of the happiness of their families. This proves that even when a participant has acquired scientific knowledge and awareness, cultural and family pressure remains one among the most powerful factors in continuing these period-related restrictions.

4.5. Discussion 5: From Code Words to Correct Terminology

Shifting from Coded Language to Direct Language / Correct Terminology: Baseline vs. Follow-up

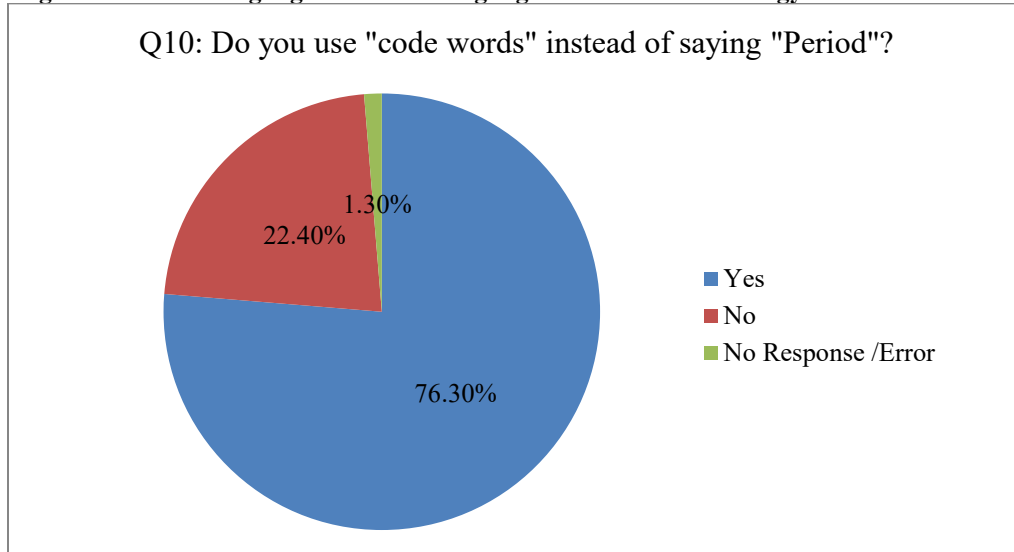


Fig. 9 Baseline: Language used for menstruation (N = 188)

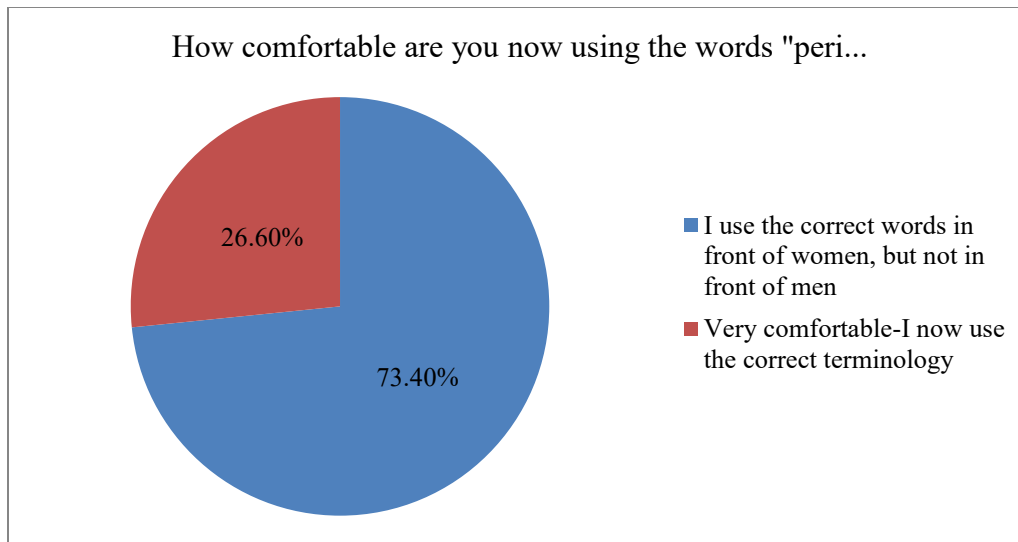


Fig. 10 Follow-up: Language used for menstruation (N = 83)

A comparison of these pie charts shows a major shift. Participants' communication style and adoption of correct terminology reveal that they are now moving away from secret or code words, such as down and outside, to correct words or more direct language.

The first chart shows that due to the high level of shame or social stigma associated with the topic, a majority of participants (76.3%) were hesitant in using the correct word and used code words such as down, problem and not well, etc. Whereas the second chart demonstrates a clear increase in confidence, with 26.6% of respondents who now feel comfortable in using the correct word.

However, the data also indicates that prevalent social stigma and taboos are major barriers hindering this transition. While participants feel comfortable in using correct words or more direct language in front of the same gender, 73.4% still only feel comfortable using the correct words in front of other women, but avoid doing so when someone from the opposite gender is present. Overall, the comparison shows that while participants are successfully breaking the habit of using coded language, a gender based comfort gap still exists. It suggests that while the internal stigma is slowly reducing, public conversations confidently in a mixed-group remain a challenge.

4.6. Discussion 6: Shift in Perception from Negative to Positive

Shift in perceptions of menstrual impurity to biological health: Baseline vs. Follow-up

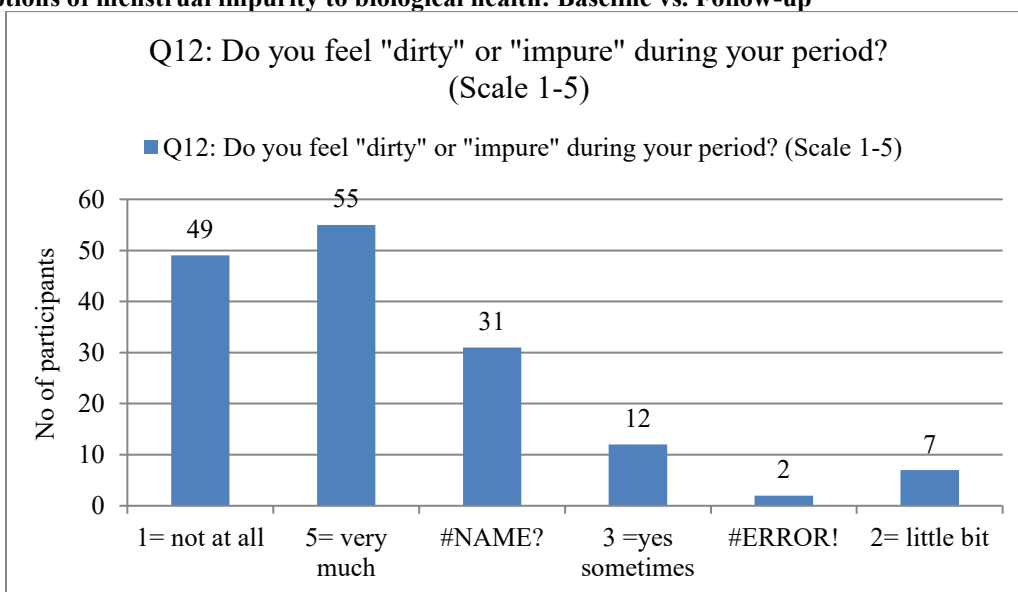


Fig. 11 Baseline: Feelings about menstruation (N = 188)

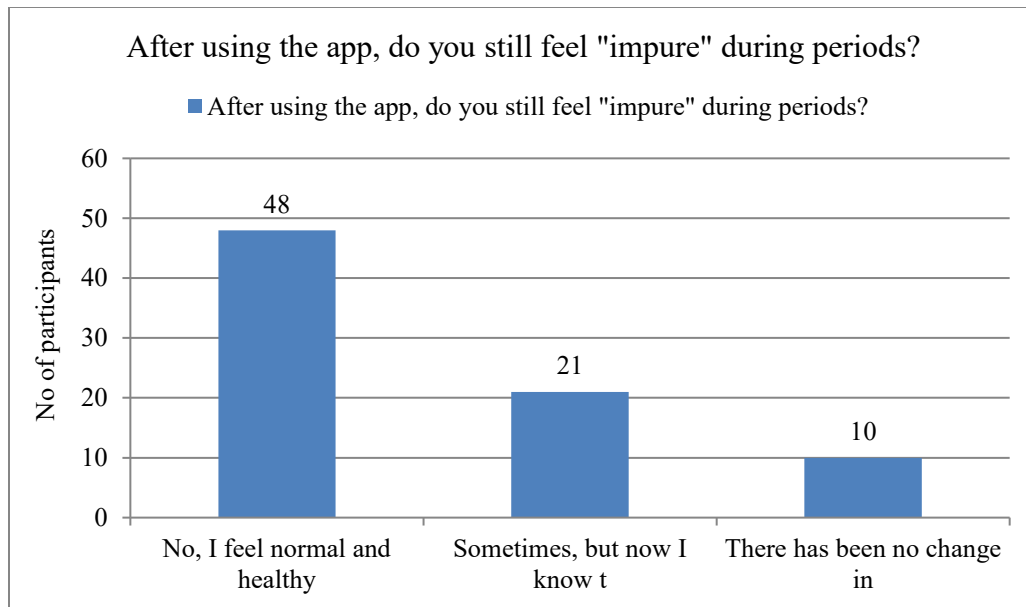


Fig. 12 Follow-up: Feelings about menstruation (N = 83)

The comparative analysis of the above two charts reveals a significant shift in participant perspective regarding menstrual impurity prior to the use of the *Sakhisetu* App and post the use of it. In the baseline survey, a substantial portion of the participants reported their negative feelings, with 55 participants feeling very much dirty or impure and 31 participants failing to respond at all, suggesting a strong presence of stigma or discomfort. However, the post-app data shows a marked improvement. The majority of participants (48) made a shift to feeling normal and healthy, while only 10 participants reported no change in their perception. This suggests that the app has been an effective educational tool. Scientific content and animated educational videos have educated the majority of participants that menstruation is a healthy biological process.

Overall, the data indicates that such digital tools could significantly contribute in dismantling deep-rooted cultural myths or societal taboos. The baseline data shows that the participants were lacking scientific knowledge and had a negative perception about menstruation. The follow-up responses were more clear, confident, and positive and shows that after the use of *Sakhisetu*, participants have got correct knowledge about this biological event. Confidence among the young users of the app was reflected in the clarity with which they answered the questions about menstrual health, the absence of shyness or embarrassment about the biological process of menstruation, and the willingness to learn more about reproductive health. The app provided a platform for understanding menstrual health. As per the above pie chart data, the application helped approximately 60% of the *Sakhisetu* users to suppress the feelings of impurity entirely, highlighting the impact of digital health education on emotional and physical well-being.

5. Limitations of the Study

This study provides valuable insights into menstrual health management and has helped the participants to understand this natural phenomenon. Here, it is important to acknowledge its limitations too. As a high school student, the most significant challenge was the lack of time, logistic support and other limited resources. These barriers limited the duration of the field study and made it difficult to reach more locations and a larger number of participants, resulting in a reduction in the number of participants participating in Phase I (188 girls) and Phase II (83 girls). Logistical dependency did not allow to spread the scope of the research, limiting it to only three sites pertaining to three different states.

Additionally, the dependency on parents' smartphones or the limited availability of internet or mobile data in rural areas also proved to be a major hurdle. Most participants in these regions do not own their own smartphones. They have to rely on their parents' or male family members' phones. This dependency often limited their access to the *Sakhisetu* app to just short periods, such as 30 minutes a day or less than that when the phone was available. The author is yet to access the scalability of the model and the app by testing it in different geocultural contexts within India. Different regions can have different cultural, gender, linguistic and accessibility challenges to which the app needs to be attuned and customized.

While the app has helped to generate awareness and the subsequent confidence, there have been several structural factors which have been involved in restricting girls from experiencing hassle and stigma-free menstruation. The study also highlighted that 15.4% girls faced other factors, such as environmental barriers like the lack of private toilets and clean

water in rural government schools, which also remained significant challenges that can't be fixed through digital education only. The same has also been observed and experienced during field visits and surveys.

6. Conclusion

In conclusion, this research proves that achieving menstrual dignity requires looking beyond the 'pad-centric' approach or just the distribution of sanitary pads. Through primary data collected through surveys and validated through scholarly arguments, the study has made earnest attempts to address its research questions regarding "how digital literacy can break the silence surrounding menstruation among young girls with limited resources and access" (Alhassan et al. 2025; Long et al. 2022).

As reflected in the data, the impact of the *Sakhisetu* app has been significant, and facilitated a psychosocial and behavioural shift in the majority of the participants from shame to scientific understanding. The baseline data and follow-up data show that digital literacy can effectively dismantle myths, as seen by the increase in the number of participants who, after the use of *Sakhisetu*, correctly identifying the uterus as the source of menstrual blood from 71.8% to 91.1%. Furthermore, the app educated the participants on scientific facts to overcome prevalent social stigma, leading to a significant increase in their confidence to attend school and to use correct terminology rather than code word viz down, out and not well, etc.

For the future scope of this research, the following developments are proposed:

6.1. Mandatory Male Education

Due to the upper hand of patriarchal mindset in the majority of Indian social settings, male dominance plays a vital role in Indian families. Therefore, future studies should

focus on how menstrual education of young men and boys can reduce both the covert and apparent acts of male domination, stigmatization and domestic hindrance that women face during menstruation.

6.2. Integrated Infrastructure

Digital interventions like *Sakhisetu* should be paired with physical infrastructure improvements, such as building private changing rooms, providing clean water and toilets in rural areas in schools.

6.3. Extended Period for Research

This research had its limitation viz paucity of time and resources. Furthermore, such research could be developed further by tracking participants over a longer period to see if these shifts in mindset lead to permanent behavioural changes in healthcare-seeking and challenging traditional taboos at home.

6.4. Expanded Geographic Reach

The app can be adapted into more local dialects to reach even more marginalized communities across different rural settings in India.

Author Contribution Statement

The author, Kratika Shah, conceived and designed the research. She has also developed the *SakhiSetu* mobile application and the bilingual data collection instruments. The author has conducted fieldwork, administered surveys, and carried out ethnographic observations across all three research sites. She has performed quantitative and qualitative data analysis and wrote the manuscript in its entirety.

Declaration of Conflicts of Interest

The author declares that there are no conflicts of interest, financial or otherwise, that could have influenced the research, findings, or conclusions presented in this paper.

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