

**A Systematic Review on Menstrual Hygiene Practices Among Adolescent Girls in  
India**

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## **ABSTRACT**

### **Background**

“Menstrual period is a physiological process that occurs throughout the reproductive years of every woman.” Teenage girls in India frequently experience menstrual issues. Menstrual hygiene directly or indirectly affects the Sustainable Development Goals and achieving these goals are vital for both the development of these young adolescents and the nation.

“MHM is a severe problem in India for school-aged teenagers due to a lack of safe, sanitary facilities and limited or no sanitary hygiene products.”

### **Methodology**

The methodology for this systematic review was developed and reported as per the “Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA)” guidelines and checklist. A literature search was conducted for “observational studies with information on MHM” (awareness, perception, knowledge, practices, and stigma) and RTIs related to poor menstrual hygiene practices among adolescent girls in India published between 2015 and September 2022. Databases including PubMed, Embase, and Scopus were used to search for the articles. “Key terms were combined through the Boolean operators (‘AND’ and ‘OR’).” The Controlled vocabulary terms such as “Medical Subject Headings (MeSH)” was used. Database-specific syntax in Embase and Scopus was also used for comprehensive searching.

### **Results**

According to this systematic review, almost half of Indian adolescent girls maintain good Menstrual hygiene. A significant proportion of the girls use disposable rags or homemade cloths for MHM and follow incorrect disposal methods of disposing of menstrual absorbents. “One in four girls missed one or more days of school” during their menstrual

period. A positive correlation was observed between safe MHM and the urban residence of adolescent girls with menstrual hygiene awareness. Based on this study, we estimated that more than half of the teenage girls in India are unaware of the cause of menarche and the source of menstrual bleeding. Majority of the adolescent girls, irrespective of their place of residence, whether urban or rural, encountered several barriers and restrictions due to cultural beliefs and the stigma attached to menstruation. We also found that girls in rural regions in community-based research tended to rely more on clothes, while commercial pads were more frequently utilized by urban region girls. As commercial pads are expensive, most of the rural girls reported having mentioned this reason for not using pads as a menstrual absorbent to collect menstrual blood. "Disposal of commercial sanitary pads is a matter of concern in India due to high content of non-biodegradable components." And the out-of-control burning of used waste menstrual materials is more prevalent in some places, and in some regions, it is strictly prohibited.

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## ABBREVIATIONS

**LMICs:** Low-and-middle income countries

**MHM:** Menstrual Hygiene Management

**MHH:** Menstrual Health and Hygiene

**PICO:** Population Intervention Comparison of Outcome

**PMS:** Pre- Menstrual Syndrome

**PRISMA:** Preferred Reporting Items for Systematic Reviews and Meta- Analyses

**UTI:** Urinary tract infections

**RTI:** Reproductive Tract Infections

**BV:** Bacterial Vaginosis

**TV:** Vulvovaginal Candidiasis

**VVC:** Trichomonas vaginalis

**WHO:** World Health Organization

**UNICEF:** United Nations International Children's Emergency Fund

**JMP:** WHO/UNICEF Joint Monitoring Programme for Drinking Water, Sanitation and Hygiene

**NFHS:** National Family Health Survey

**WASH:** Water, Sanitation, and Hygiene

## INTRODUCTION

“The Menstrual period is a physiological process that occurs throughout the reproductive years of every woman”.<sup>1</sup> This cycle is characterized “with the onset of menarche”. “The onset of menstruation (menarche) is one of the most significant transformations that girls go through during their adolescent years.” Menstrual hygiene practices and management among young girls in LMICs pose a serious threat.<sup>2</sup> The percentage of girls in LMICs who adhere to inadequate MHM in rural locations are higher than in metropolitan ones, according to studies.<sup>3</sup> Menstrual hygiene directly or indirectly affects the Sustainable Development Goals and achieving these goals is crucial for the complete growth of these teenage girls and the nation<sup>4</sup>. “Although menstruation is a natural part of life, it can be associated with several myths and misunderstandings that could adversely affect a woman’s health”. Still, menstruation is considered dirty or unpleasant in Indian culture.<sup>5</sup> The problem of MHM among teenagers in India due to a shortage of sanitary products and facilities in school is still severe. This lack of menstrual hygiene materials and services leads to many girls dropping out of school.<sup>4</sup>

Various mental and physical morbidities, such as premenstrual syndrome, are associated with menstruation. In the case of poor menstrual hygiene, women are at risk for developing life-threatening RTIs (Reproductive Tract Infections).<sup>1</sup> “Adolescent girls in villages often wear rags and old clothes during their menstrual period”, making them more susceptible to RTIs.<sup>2</sup>

In accordance with the JMP of the WHO and the UNICEF, menstruation must be handled hygienically and with dignity. It is fundamentally important that all the girls and women have access to clean menstruation hygiene products which can be changed as frequently as needed, seclusion, soap and water for washing, and proper facilities for disposal in order to manage their menstrual cycles effectively.<sup>6</sup> Education on MHH is also necessary for these young teenage girls. To lead a healthy, fulfilling life, women and girls need to have effective menstrual health and cleanliness.<sup>7</sup>

MHM practices vary greatly within and between nations, depending on the sociocultural context, economic status and educational background.<sup>8,9</sup> The type of absorbent material used and how frequently it is changed, associated body washing, the ways in which reusable pads are washed, dried, and stored, as well as other contextual factors including the “location of menstruation-related changing and washing practices”, are all characteristics of MHM. At the household level, WASH facilities can have an impact on these practices, although access to and the quality of these facilities varies greatly between and within countries.<sup>10</sup> MHM methods can be uncomfortable and unhygienic, especially in settings that have limited resources and poor access to WASH<sup>11</sup>, and have been discovered to be linked to a variety of reproductive tract infections including bacterial vaginosis (BV), and vulvar-vaginal candidiasis (VVC)<sup>11</sup> and with psychosocial stress outcomes.<sup>12</sup>

Girls experience menstrual cycle as embarrassing and uncomfortable due to inadequate WASH access in schools, inappropriate puberty education, and a lack of appropriate menstrual hygiene materials<sup>13</sup> (figure 1). Limited quantitative evidence supports the claims made in qualitative research that menstruating girls skip school because of their fear and humiliation concerning blood leakage and body odor<sup>10,14,15</sup>. Cultural taboos aggravate girls' problems by prohibiting them from seeking assistance and limiting their nutrition and activities during their periods. The urinary and genital tracts may be affected by health symptoms caused by insufficient MHM.<sup>13</sup> 64 percent of adolescent girls experience “at least one menstrual related issue”.<sup>16</sup> “Poor menstrual hygiene and a lack of self-care are major causes of morbidity and other issues in people between the ages of 10 and 19 years”. UTI, unusual abdominal pain, scabies in the vaginal area, absence from school, and pregnancy complications are some of the problems.<sup>2</sup> According to studies, “68 million of the projected 113 million teenage girls in India attend roughly 1.4 million schools”. It is believed that cultural taboos and poor MHM practices prevent them from attending school.<sup>17</sup>

Recent global attention on Menstrual hygiene has focused on the need of privacy as well as dignity, awareness raising to end stigma and silence on menstruation, on making accessibility of MHM

absorbents with safe and effective methods, and on improving WASH access environment in schools. This focus has been sparked by initiatives to enhance WASH in schools. The other features girls-only facilities, water, and cleaning supplies, as well as safe trash disposal.<sup>13</sup>

Numerous initiatives are being taken by "The Government of India" to increase awareness of the critical role that effective MHM has a role in enabling teenage girls and women to reach their full potential and to recognize the importance of promoting menstrual hygiene practices. For providing menstrual napkins at subsidized rates to the adolescent girls in rural areas<sup>9</sup>, a scheme was also introduced in 2011 as today's decisions on reproductive health will have an impact on wellbeing and health of future generation. Also, to raise awareness about the problems faced by women and girls due to their menstruation and to promote interventions that addresses these problems, on May 28<sup>th</sup> Menstrual Hygiene Day is celebrated. But despite all these efforts, majority of the girls lacks knowledge about the menstruation and hygienic practices associated with it which results in unsafe and poor menstrual hygiene practices.<sup>18</sup>

To determine the prevalence of MHM and its related factors among the teenage girls of India, numerous research have been conducted throughout India. These investigations results in inconsistent research and significant variations. There have also been several systematic reviews and meta-analyses of MHM that have included interventional research, cross-sectional, or case-control. To the extent that we are aware, there has not been a systematic evaluation of MHM research conducted in India that includes all different kinds of studies. Hence, this systematic review aims to assess the status of menstrual health and hygiene, menstruation difficulties and their related determinants, awareness, and knowledge on MHM and Menstruation, and efficacy of education among adolescent girls on menstrual hygiene in India. Our objectives are to gather, summarize, and assess already published and peer-reviewed evidence on Menstrual hygiene practices and management methods, the most prevalent menstrual morbidities, and their contributing factors among adolescent girls of India from 2015 to 2022.

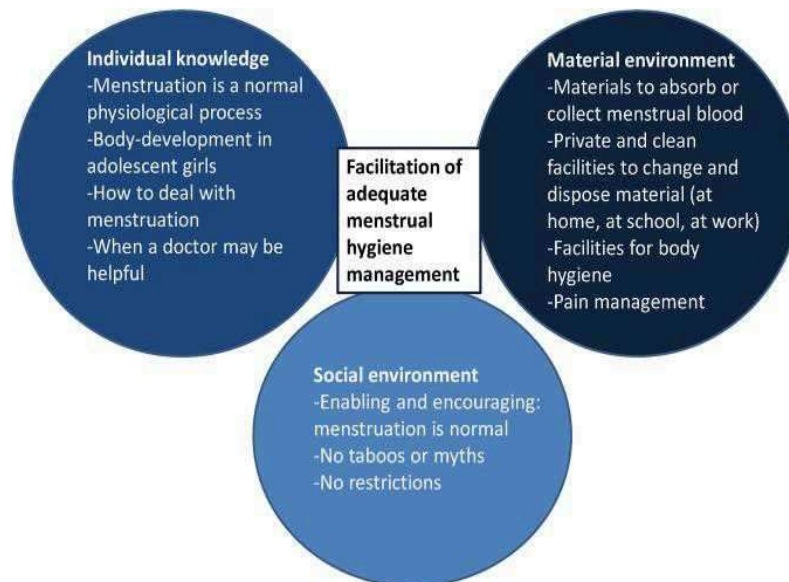


Figure 1. Menstrual Hygiene Management Essential Elements<sup>13</sup>

## **ETHICAL APPROVAL**

This study is a systematic review of previously published literature. In a systematic review, data are gathered by thoroughly reviewing the existing literature. Therefore, no ethical approval was required for this investigation. However, effort was taken to ensure that, where necessary, research included in the evaluation included proof of ethical clearance and cases' informed consent.

## **METHODS**

The methodology for this systematic review were developed and reported as per the “Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA)” guidelines and checklist. The flow diagram was prepared by the PRISMA 2020 flowchart diagram for planning the systematic review. The PICO guidelines were also used to determine the eligibility requirements.

### **Search Strategy and Data Sources**

A literature search was conducted for the “observational studies with information on MHM” (awareness/ knowledge, perception, practices, attitude, and stigma) and RTIs related to poor menstrual hygiene practices amongst adolescent (10-24 years) girls in India, which are published in between 2015 to September 2022. “Electronic databases” including PubMed, Embase and Scopus to search for the targeted articles. All the three databases were searched comprehensively including all the needed components. “Key terms were combined through the Boolean operators (‘AND’ and ‘OR’).” The Controlled vocabulary terms such as “Medical Subject Headings (MeSH)” was used for “indexing, cataloguing, and searching of biomedical and health-related information”. Database specific syntax in Embase and Scopus were also used for comprehensive searching.

The search strategy in PubMed is as follows: (((((adolescent [MeSH Terms]) OR (adolescents [Text Word]) OR (young girls) OR (puberty)) OR (teenage)) AND (((menstruation [MeSH]) OR (menses)) OR (menstrual))) AND ((((((Hygiene [MeSH]) OR (Hygiene)) OR (hygienically)) OR (sanitation)) OR

(sanitary)) OR (Feminine Hygiene Products [MeSH])) OR (Menstrual Hygiene Products [MeSH]))  
AND ((India)).

Search strategy in Embase database was developed through the PICO framework using the keywords:

[P] Population – adolescents female /exp OR adolescence /exp OR puberty /exp OR teenage

[I] Intervention or condition – menstruation /exp OR menstrual OR menses

[C] Comparison – -

[O] Outcome – hygiene /exp OR sanitation /exp OR hygienically: all

[T] Timing – [2015-2022]/py

[S] Setting – India/br

After combining the above keywords: (('adolescents female'/exp OR adolescence/exp OR puberty/exp OR teenage) AND (menstruation/exp OR menstrual OR menses) AND (hygiene/exp OR sanitation/exp OR hygienically) AND India/br) AND [2015-2022]/py

Search strategy in Scopus using Advanced document search:

“young AND girls OR puberty OR teens AND menstruation OR menses OR menstrual AND hygiene O  
R hygiene OR hygienically OR sanitation OR sanitary OR feminine AND hygiene AND products OR m  
enstrual AND hygiene AND products AND India”

All the research was done in English language and the databases were searched until 21 September 2022.

### **Selection criteria**

Prior to the literature search, inclusion and exclusion criteria were defined.

**Inclusion criteria** (1) studies that included “women of reproductive age” [10-19], (2) factors associated with menstrual hygiene practices and (3) studies which examined factors related to MHH.

**Study designs.** The reviewed articles included were qualitative, quantitative, and mixed methods with baseline measures for the outcome of interest (menstrual hygiene practices /management) were eligible for this systematic review.

**Setting.** Includes studies which were reported only in India.

*Population.* Studies with adolescent females [10-19 years] and “mixed age populations were included if adolescent girls were part of the age range”.

*Publication status.* Only published studies were considered.

*Language.* Only papers published in English were included.

*Publication year.* All the publications from the year 2015 to 21 September 2022 were considered.

***Exclusion criteria*** Studies not performed on the Indian population, systematic reviews and meta-analysis, project reports, short communications, economic analysis, unpublished research, intervention studies and policy analysis were excluded from this systematic review. Articles with grey literature, or book pages or editorials and which were published before 2015 were also excluded from the review.

### **Study selection and Data extraction**

“All the retrieved articles from each database found throughout the search process were noted” and duplicates were deleted. ‘Zotero’ was utilized as a reference manager “to collect and organize search outcomes and for the removal of duplicate articles”. After the duplication removal process, articles were imported to the ‘Rayyan Software’, that helps in independently reviewing the articles and hasten the screening process. The papers were assessed against the eligibility requirements based on their titles, abstracts, locations, and publications for inclusion in this review to check relevance and appropriateness. After initial screening, full texts were retrieved and screened for inclusion. “PRISMA flowchart diagram for data identification, screening, and eligibility is presented in Fig. 2”.

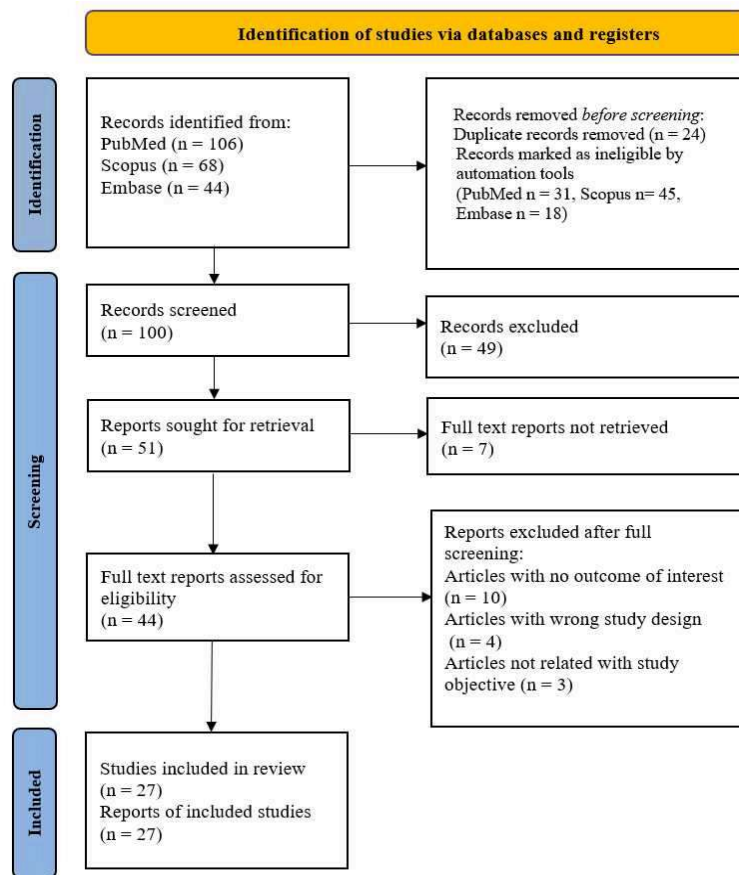


Figure 2. “PRISMA 2020 flowchart diagram”<sup>19</sup>

### **Outcome measurement**

“The primary outcome of this study was safe menstrual hygiene practice”. Adolescent girls using clean menstrual management materials for absorbing or collecting blood as often as needed for the duration of their menstruation period. Safe practices include washing the body as needed with soap and water and access to disposing facilities of menstrual management materials properly. Studies that met the above definition were included in this study. However, our search yielded studies which included similar definitions for safer menstrual hygiene practices. Therefore, we thoroughly reviewed each study's operational definitions and described them along with its proportion in a table.

In addition to the above, the outcomes which were also examined are as follows: Awareness regarding menarche before the beginning of menstruation, knowledge about the bleeding source, perception of menstruation as a natural phenomenon, the kind of menstruation absorbent that teenage girls use, how they dispose of their soiled pads, and how often they bathe, absenteeism from school, privacy for changing menstrual material, frequency of changing menstrual absorbent material, menstrual morbidities such as RTIs due to poor menstrual hygiene and stigma or cultural beliefs and restrictions imposed during menstruation.

### **Operational definitions**

*Menstrual absorbents* refer to “any product used to collect menstrual flow; commercial pads refer to those marketed and available for purchase in shops”.<sup>20</sup>

*Safe menstrual hygiene management practice* “Adolescent girls using a clean menstrual management material to absorb or collect blood that can be changed in privacy as often as necessary for the duration of the menstruation period, using soap and water for washing the body as required and having access to facilities to dispose of used menstrual management materials. They understand the basic facts linked to the menstrual cycle and how to manage it with dignity and without discomfort or fear”.<sup>21</sup>

*Adolescents* According to WHO, “Individual (girls) in the age group 10-19 years are considered as Adolescents.”

*Early adolescents* refer to “individuals with age ranges of 10 to 14 years old”.<sup>22</sup>

*Late adolescents* refer to “individuals whose age is between 15 and 19 years old”.<sup>22</sup>

*Homemade absorbents* in this study refers to “noncommercially made sanitary materials prepared by family members or girls. themselves for the purpose of menstrual hygiene practice”.<sup>22</sup>

*RTIs* Prevalence of Reproductive Tract Infections among women who practices unhygienic methods and access to WASH during menstruation. As shown in Fig. 3.

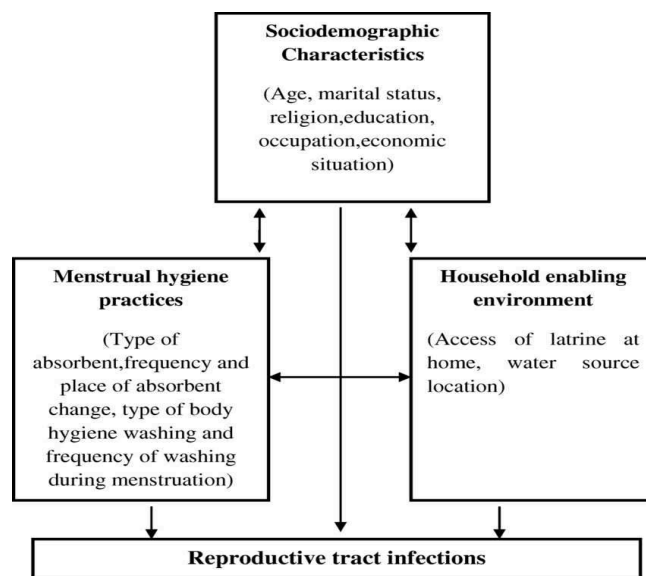


Figure 3. “Conceptual framework of risk factors associated with RTIs”

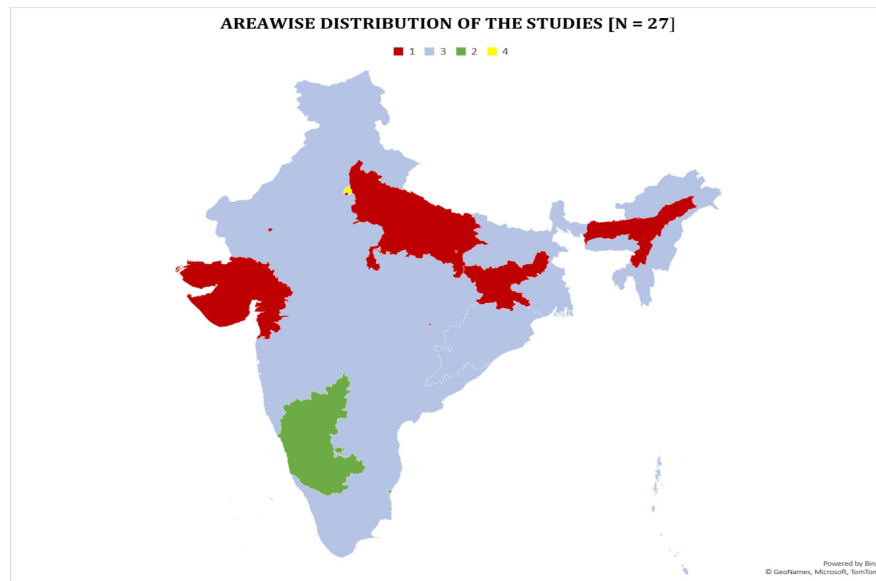
## RESULTS

### Description of included studies

A total of 218 studies were retrieved through the multiple database searches. 118 studies were excluded after de-duplication and exclusion after assessing the title-abstract of the studies. Out of the remaining 100 studies, 74 were excluded based on the eligibility criteria and articles which could not be retrieved due to unavailability of full text. Finally, 27 articles were included in the study reporting Menstrual hygiene practices among adolescent girls in India. This systematic review was achieved through the screening processes presented in the form of PRISMA flowchart (Fig.1).

### Characteristics of included studies

27 studies met the inclusion criteria as mentioned in Table 1 and were included. Majority of the Included studies were, by design, cross-sectional studies (n = 21), some studies based on data analysis of NFHS Survey Sampling Method (n = 2), other survey sampling mixed methods (n = 3) and (n = 1) was qualitative study i.e., Focus group discussion. Twenty-seven included studies were published from 2015 to 2022. In this systematic review, the sample size varied from (n = 100) small to (n = 94,034) large. According to main study data, the respondents' mean ages ranged from  $14 \pm 13$  to  $17 \pm 15$  years. The study in the Odisha region had the lowest percentage of safe MHM (13.3%), while the study in the Puducherry region had the highest percentage (92%) of safe MHM, according to this review (see Table 2 in the appendix). These 27 studies were conducted in different regions of India (figure 4). Out of 27 studies, four studies were conducted in Delhi, three in Maharashtra and three in Odisha, two in Puducherry and one-one in Rajasthan, Gujarat, Jharkhand, Bihar, Uttar Pradesh, Haryana, Karnataka, and West Bengal. One study in 3 regions Chhattisgarh, Maharashtra, and Tamil Nadu. And one study was based on survey in North India.



**Figure 4. Regional Distribution of the included studies**

#### **Premenarchial awareness, knowledge and perception about menstruation and sources of information**

Among 27 studies, majority of the studies ( $n = 23$ ) reported premenarchial awareness and sources of information or first informants of menarche. Among 23 studies with available information, awareness regarding menses before the onset of menarche and source of information was commonly reported. Along with the common information, attributes like knowledge regarding menstruation phenomena and MHM, awareness about subsidy on sanitary pads or schemes related to menstruation, knowledge about

the source (organ) of menstrual blood, and perceptions/attitude towards sanitary napkins were also reported in some studies.

“Mothers were the most mentioned source of information about menstruation” in almost 16 studies. 2 studies reported “media exposure” as the “first source of information” among the girls. Only 2 studies reported ‘sister’ as the source of information. A study conducted in Delhi, Vashisht et al., reported school sessions followed by schoolteachers as the primary source of information about menarche. ‘Friends’ was found to be the first informants in a study, Kumari et al., conducted in Jharkhand. Awareness/knowledge about menarche or menstruation were found to be satisfactory in the studies conducted in urban setting as compared to rural setting. Similarly, knowledge about the MHM was also low in rural setting as compared to urban setting. Mathiyalagen et al., a study conducted in Puducherry, found that 51.6% of the adolescent girls reporting kidneys as the source of menstrual bleeding. Similarly, Sarkar et al., reported Urinary tract as the source of bleeding by the girls of rural West Bengal. Two studies, Mishra et al. and Deshpande et al reported that 90% of the girls having no knowledge about the source of bleeding. Most of the studies found that the adolescent girls considered Menstruation as the curse of God and not a physiological process.

#### **Type of Menstrual absorbents use**

Regardless of whether participants were selected from schools or the community, or whether they lived in an urban or rural setting, using cloth was less common in school studies (Table 2) than in community studies. Some girls combined the use of pads and cloth; this was more prevalent in school studies than in community studies. Regarding materials inserted into the vagina, a study in urban Tamil Nadu elicited responses from 26.9% of participants, but it wasn't apparent if these were tampons. Tampons were only mentioned in one study (in urban Karnataka), and five girls were said to have used them. Menstrual cups were not reported in any studies. Few research has examined the use of contraceptives to delay menstruation (i.e., to attend events without menstrual discomfort).

### **Hygiene during Menstruation**

In the majority of research, urban girls follow more menstrual hygiene practices than rural girls. Urban and rural girls both, generally took baths when on their period, while one study conducted in a slum found that bathing was substantially less frequent. Daily baths were less frequent during menstruation than they were before or after, according to a subset of rural setting studies. Other studies also reported that females were not allowed to bathe while they were menstruating due to fears that it would interfere with pregnancies in future, water shortage, a lack of place for bathing, , discomfort in moving, and privacy intrusion.

### **Privacy for changing absorbents**

Privacy for absorbent changing is one of the important issues in safe MHM practices. But we found only few studies which reported privacy as a factor related to poor menstrual hygiene practices. Only six studies (refer Table 1) have been found to mention about the privacy concerns during menstrual process of adolescents. As mentioned in Table 2, Vashisht et al., founded privacy as one of the reasons for not attending schools during menstruation by adolescent girls. Garg et al., found that lack of separate toilets for girls in schools being a reason because of which the girls hesitate to change absorbents during school hours which may contribute to the unhygienic menstrual practices. Singh N et al., reported that the facilities at school were inappropriate for managing menstrual hygiene. Choudhary et al., found a significant number of girls claiming to not having privacy in toilet facilities at schools.

### **Disposal of absorbent material**

In urban areas, disposal was primarily accomplished through usual waste and burning, although in rural areas, burying and dumping waste in open areas were also frequent disposal methods. Urban areas had substantially more frequent routine waste disposal than rural ones. The prevalence of burying was higher in community-based research than in school-based studies. In open areas like the side of the road or in

rivers and lakes, about 23% of girls threw the absorbent; this was much greater in community-based research than in school-based studies.

### **Stigma, Restrictions and Cultural Beliefs**

Restrictions during the menstrual cycle of the adolescent girls were most common in all the studies. The most common restrictions were “visiting places of worship, and touching religious items or praying, with no difference by setting” (Table 2). Other common restrictions were related to food or “touching people or special foods”. In few studies, the girls reported “sleeping or sitting separately from members of their house during menstruation”. All girls encountered restrictions at home in cooking, doing routine household work, exercising, and playing, and attending family or any social functions. Some studies found to have reported that girls were not allowed to talk to boys or men at school or outside home, which was observed more in rural setting.

### **Reproductive Tract Infections**

Reproductive morbidities are common and significantly associated with poor or unsafe menstrual hygiene practices. Many studies in this systematic review revealed the prevalence of RTIs associated with poor MHM. Only 6 studies reported about RTIs, which clearly showed that the girls who used poor or unhygienic methods during menstruation were more likely to have symptoms of RTIs. Three studies, Anand et al., Das P et al., and Torondel et al., found some infections which were observed to have a significant associated with poor MHM. One study reported the evidence of at least one infection which was associated with unhygienic practices such as Bacterial Vaginosis (BV), Vulvovaginal Candidiasis (VVC) and *Trichomonas vaginalis* (TV). BV was most prevalent infection in the study Torondel et al., “women diagnosed with candida infection were more likely to use reusable absorbent material”. In the studies, Mathiyalagen et al., and Barthakur et al., reported only about RTI and UTI symptoms. Kansal et al., found that the respondents following hygienic practices reported less infection than the respondents who followed unhygienic practices.

**Evidence from the reviewed studies**

Among the associated factors with safe MHM in India, the following were the most consistent. (a) economic and sociodemographic factors like maternal educational status, residential place, monthly income of the family, access to media sources such as Television (b) characteristics of teenage girls such as age, grade of school and ever have her received advice on menstruation (c) WASH facility access at home and at schools, (d) pre-menarche awareness/information and knowledge about menstrual periods.

The review shows that the higher maternal education, employment of mother, access to water and toilet facility, higher socioeconomic status, and girls who reported to use media (electronics/television) as the “common source of information about menses, and the adolescent girls with proper knowledge about menstruation, were associated with the higher odds of safe MHM.”

**Table 1. Summary of Studies Included in the Systematic Review**

| Author(s)                       | Journal                                                           | Location  | Study Design           | Year of Public ation | Sample Size | Location (Urban/Rural /both) | Schooling (School going/Out of school/Both) | Key Issues Covered in the Study         |                                      |                                          |                                |                                                   |                |
|---------------------------------|-------------------------------------------------------------------|-----------|------------------------|----------------------|-------------|------------------------------|---------------------------------------------|-----------------------------------------|--------------------------------------|------------------------------------------|--------------------------------|---------------------------------------------------|----------------|
|                                 |                                                                   |           |                        |                      |             |                              |                                             | Knownl ge/Attitud e/Awarene ss (Yes/No) | Hygienic Practices/ Methods (Yes/No) | Privacy for changi ng materia l (Yes/No) | Disposal of material (Yes/No ) | Stigma/ Cultural Beliefs/ Restricti ons (Yes/No ) | RTIs (Yes, No) |
| Avijit Roy et al. <sup>23</sup> | The European journal of contraception and reproductive healthcare | India     | Survey sampling method | 2021                 | 94,034      | Both                         | Both                                        |                                         | Yes                                  |                                          |                                | Yes                                               |                |
| Choudhary et al. <sup>24</sup>  | Journal of family medicine and primary care                       | Rajasthan | Cross-sectional study  | 2019                 | 450         | Both                         | School Going                                | Yes                                     | Yes                                  | Yes                                      | Yes                            | Yes                                               |                |
| Enu A et al. <sup>25</sup>      | Sexual and Reproductive Healthcare                                | India     | Survey/ Mixed methods  | 2015                 | 38,928      | Both                         | Both                                        | Yes                                     | Yes                                  |                                          |                                |                                                   | Yes            |
| Das P et al. <sup>26</sup>      | International journal of Environment research and public health   | Odisha    | Cross-sectional study  | 2021                 | 509         | Both                         | Both                                        |                                         | Yes                                  |                                          |                                |                                                   | Yes            |
| Torondel et al. <sup>27</sup>   | BMC Infectious Disease                                            | Odisha    | Cross-sectional study  | 2021                 | 558         | Both                         | Both                                        |                                         | Yes                                  |                                          |                                |                                                   | Yes            |
| Wagh et al. <sup>28</sup>       | International Journal of Reproduction, Contraception,             | Nagpur    | Cross-sectional study  | 2018                 | 100         | Urban                        | Both                                        | Yes                                     | Yes                                  |                                          | Yes                            | Yes                                               |                |

|                                         |                                                     |                    |                                                 |      |      |                                    |              |     |     |     |     |     |     |
|-----------------------------------------|-----------------------------------------------------|--------------------|-------------------------------------------------|------|------|------------------------------------|--------------|-----|-----|-----|-----|-----|-----|
|                                         | Obstetrics and Gynecology                           |                    |                                                 |      |      |                                    |              |     |     |     |     |     |     |
| <b>Kumari S et al.<sup>29</sup></b>     | Industrial Psychiatry Journal                       | Jharkhand          | Community-based cross-sectional study           | 2021 | 150  | Tribal                             | School Going | Yes | Yes |     | Yes | Yes |     |
| <b>Singh et al.<sup>30</sup></b>        | Journal of family medicine and primary care         | North India        | Cross-sectional study                           | 2021 | 120  | Both                               | School Going | Yes | Yes | Yes | Yes | Yes |     |
| <b>Yaliwal et al.<sup>31</sup></b>      | Obstetrics and gynecology international             | Karnataka          | Cross-sectional prospective study               | 2020 | 1016 | Both (60.2% girls from urban area) | School Going | Yes | Yes | Yes | Yes | Yes |     |
| <b>Deshpande et al.<sup>32</sup></b>    | Journal of family medicine and primary care         | Karad, Maharashtra | Cross-sectional study                           | 2018 | 100  | Urban Slum                         | Both         | Yes | Yes |     | Yes | Yes |     |
| <b>Garg S et al.<sup>33</sup></b>       | Osong public health and research perspectives       | Delhi              | Community based Cross-sectional study           | 2022 | 1130 | Urban low-income areas and slums   | Both         | Yes | Yes | Yes | Yes |     |     |
| <b>Savarna et al.<sup>34</sup></b>      | European Journal of Molecular and Clinical Medicine | Darbhanga          | School-based, cross-sectional study             | 2021 | 400  | Both                               | School Going | Yes | Yes |     |     | Yes |     |
| <b>Mathiyalagen et al.<sup>35</sup></b> | Journal of family medicine and primary care         | Puducherry         | Observational descriptive cross-sectional study | 2017 | 242  | Both                               | School Going | Yes | Yes |     | Yes | Yes | Yes |
| <b>Kansal et al.<sup>36</sup></b>       | Indian journal of Community Medicine                | Varanasi           | Community based cross-                          | 2016 | 650  | Rural                              | Both         | Yes | Yes |     | Yes |     | Yes |

|                                      |                                                               |                                           |                                                   |      |        |         |              |     |     |     |     |     |  |
|--------------------------------------|---------------------------------------------------------------|-------------------------------------------|---------------------------------------------------|------|--------|---------|--------------|-----|-----|-----|-----|-----|--|
|                                      |                                                               |                                           | sectional study                                   |      |        |         |              |     |     |     |     |     |  |
| <b>Sarkar et al.<sup>37</sup></b>    | Journal of family medicine and primary care                   | Hooghly, West Bengal                      | School-based cross-sectional study                | 2017 | 307    | Rural   | School Going | Yes | Yes |     | Yes | Yes |  |
| <b>Sivakami et al.<sup>38</sup></b>  | Journal of global health                                      | Chhattisgarh, Maharashtra, and Tamil Nadu | Survey (Quantitative)                             | 2019 | 3617   | Both    | School Going | Yes | Yes | Yes | Yes | Yes |  |
| <b>Chauhan et al.<sup>39</sup></b>   | PloS one                                                      | Uttar Pradesh and Bihar                   | Sampling Survey design                            | 2021 | 14,016 | Both    | Both         | Yes | Yes |     |     |     |  |
| <b>Vashisht et al.<sup>40</sup></b>  | Journal of family & community medicine                        | Delhi                                     | Cross-sectional study with mixed method approach  | 2018 | 600    | Urban   | School Going | Yes | Yes | Yes |     | Yes |  |
| <b>Senapathi et al.<sup>41</sup></b> | International journal of Community Medicine Public Health     | Mangalore, Karnataka                      | Community based cross-sectional study             | 2018 | 244    | Both    | School Going | Yes | Yes |     |     | Yes |  |
| <b>Priya S et al.,<sup>18</sup></b>  | International journal of community medicine and public health | Puducherry                                | Community based descriptive cross-sectional study | 2017 | 502    | Rural   | School Going | Yes | Yes |     | Yes |     |  |
| <b>Parikh et al.<sup>42</sup></b>    | Journal of Family Medicine and Primary care                   | Gujarat                                   | Descriptive cross-sectional study                 | 2022 | 127    | Unclear | School Going | Yes | Yes |     | Yes | Yes |  |
| <b>Aggarwal et al.<sup>43</sup></b>  | Indian Journal of Gender Studies                              | Rural Maharashtra                         | Mixed Methods                                     | 2021 | 122    | Rural   | Unclear      | Yes | Yes |     | Yes | Yes |  |

|                                      |                                                          |             |                                                      |      |     |        |              |     |     |  |     |     |     |
|--------------------------------------|----------------------------------------------------------|-------------|------------------------------------------------------|------|-----|--------|--------------|-----|-----|--|-----|-----|-----|
| <b>Bhatia et al.<sup>44</sup></b>    | European Journal of Molecular & Clinical Medicine        | Gurugram    | Cross-sectional study                                | 2021 | 115 | Rural  | School Going | Yes | Yes |  | Yes | Yes |     |
| <b>Barthakur et al.<sup>45</sup></b> | National Journal of Community Medicine                   | Assam       | Community based cross sectional study                | 2017 | 119 | Slums  | Both         |     | Yes |  |     |     | Yes |
| <b>Shilpi et al.<sup>46</sup></b>    | Indian Journal of Public health research and development | North Delhi | Qualitative study – Interview/Focus Group Discussion | 2020 | 400 | Both   | School Going | Yes | Yes |  | Yes | Yes |     |
| <b>Rastogi et al.<sup>47</sup></b>   | Health Education journal                                 | Delhi       | Cross-sectional study using mixed method approach    | 2019 | 187 | Both   | School Going | Yes | Yes |  | Yes | Yes |     |
| <b>Mishra et al.<sup>48</sup></b>    | Indian Journal of Public Health Research & Development   | Odisha      | Cross-sectional study                                | 2020 | 740 | Tribal | School Going | Yes | Yes |  | Yes |     |     |

## DISCUSSION

MHH is essential for empowering adolescent girls of India. Menstrual health is more than just an access to low-cost sanitary methods and suitable toilets although those are also essential. But it is also about ensuring, that the adolescent girls live in an environment that can support their ability to manage their menstruation in a dignified manner. Poor MHM would have a significant negative impact on girls' education, self-assurance, and respect in addition to increasing their chance of infection. In India, MHM among adolescent girls has not received much attention to date. Thus, this comprehensive systematic review focused on the "proportion of safe MHM and its associated factors" in India.

This systematic review has included 27 studies reporting to investigate "MHM among adolescent girls". According to the review, only 50 percent of the total young adolescent girls in India maintain good MHM, a significant portion of girls utilize disposable rags or homemade cloths for MHM, incorrect disposal was widespread and one in four girls missed one or more days of school during menstruation. Additionally, we discovered a positive correlation between safe MHM and adolescent girls' urban residence and menstrual hygiene awareness.

Based on this analysis, we estimated that more than half of the adolescent girls in India had menarche with unawareness about its cause and without knowing or understanding the source of bleeding. Only one in eight females experienced no limits at all, whereas most of the girls encountered several barriers and restrictions. Girls in rural regions and in community-based research tended to rely mostly on cloths, while commercial pads were more frequently utilized in metropolitan settings or schools. One out of every five females disposed of their used absorbents improperly. One-fourth of girls said they skipped school when they were menstruating. As commercial pads are expensive, most of the rural girls reported to have mentioned this reason for not using pads as a menstrual absorbent to collect menstrual blood. Cloths have traditionally been used to absorb menstrual flow because they are more affordable and environmentally friendly, but pads are gradually replacing them, especially in urban areas. If girls lack

access to water, privacy, and a place to dry clothes, cleaning and drying them can be an issue. “Drying in the sun instead of damp cupboards or under other clothes is recommended for its microbiocidal effect, but girls prefer hiding cloths because of shame”. The authors of the study under review and the participants favoured commercial pads, but cost prevents broad usage, particularly in rural areas.

Although there are local manufacturers, insertable menstrual products like tampons and menstrual cups were hardly ever mentioned in the studies we analysed. Given that one cup might last up to 10 years, menstrual cups may be cost-effective; they were used by schoolgirls in Nepal and Kenya. Even though the association between virginity and breaking the hymen has been disproved, there may be a connection between the low use of insertable goods and concerns about virginity.

Disposal practices of the commercial sanitary absorbents/pads are matter of severe concern in India as well as globally due to its “high content of non-biodegradable components”. And the “uncontrolled burning of used sanitary wastes are more common in some areas, in some regions it is strictly prohibited”. As more women turning to commercial sanitary pads, unsafe disposal of menstrual waste will soon become a growing problem across India, with the “potential for 9000 tonnes of waste (for 432 million pads) annually”.<sup>49</sup> Commercial pad manufacturers have not yet modified their products to ensure safe and secure disposal in all situations.

Girls need an equitable learning surroundings in order to participate in class and continue their education. India has a wide range of legislation and programmes designed to offer absorbents, counselling from frontline staff, and building of girls' restrooms. More accessible and separate restrooms for women have increased in India. Poor MHM interventions are linked to school absences, according to qualitative studies, but only WASH studies have found a link between toilet improvements and absences, as well as increased enrolment of “adolescent girls when girls-only restrooms” were built. In univariate analysis, we found a link between pad use and girls' absence, but not after adjusting for geographical region. Considering that “schools with high prevalence of commercial pad use may also be more resourceful with their investments for school toilets and cleaning, this relationship may be confounded by socioeconomic status and WASH.” Just one third of the girls in our study claimed to changing their

menstrual absorbent in the school toilet. It should be noted that physical discomfort was frequently stated, and that insufficient restrooms are not the sole factor contributing to menstrual-related absenteeism. According to numerous Indian women, the “lack of toilets at home” is a serious problem for their safety, privacy, and dignity.

While some parts of India celebrate menarche, our research shows that for most of the girls, menstruation "poses a huge physical and psychological stress." These negative experiences are exacerbated by societal restrictions and beliefs. While education might reduce some limitations (on certain activities as well as food, for example), negative beliefs and attitude are strongly ingrained in Hinduism and other religions. To effect transformation, creative cultural and societal initiatives will be needed.

Many studies reported to have girls being unaware by menarche and experiencing anxiety, depression, dirtiness, stress, and anger as a result. While the significance of puberty education is widely acknowledged, there is disagreement over who should educate girls. With varying success, the “National Health Mission programme” in India for this reason has included female community health workers; mothers were found to be the most common information sources in this review. Thus, while schools teach physiology, overall MHM package needs to improve mothers' awareness of MHM in practice to support girls. In order to familiarize children with puberty changes, many nations address this issue by incorporating “age- and culture-appropriate sex and relationship packages into the school curricula”.

It is gratifying to see that there is growing interest among Indian researchers as seen by the rise in publications on MHM. Considering the limitations, our data indicate that these studies can offer information useful for the creation of MHM packages that support girls' menstrual needs; they highlight the necessity of raising awareness, bolstering life skills instruction, improving facilities and access to WASH, and enhancing public health procedures.

## **LIMITATIONS**

This review has a few limitations. Firstly, causality can be inferred as most of the studies were cross-sectional. Secondly, social desirability bias was probably present as the research included already used self-administered interviews or questionnaires. Thirdly, even though they covered common components, some of the research which were included, utilized distinct definitions of proper MHM. Due to this, we carefully retrieved each outcome definition's prevalence from the papers.

The information we had at our disposal limited our review; not all included studies had an MHM-only emphasis. Any review could be biased or selectively reported due to publication considerations.

Numerous results were discovered during our review, ranging from inverse to significantly positive relationships. Given the time and resources at our disposal, we tried to expand our review to incorporate these studies. However, due to time and resource limitations, this was not feasible.

## **CONCLUSION**

In India, teenage girls frequently experience issues with their periods. According to studies, menarche causes stress, anxiety, sadness, and anger. According to our research, the majority of adolescent girls in India didn't know why they were menstruating, and only a small percentage knew the precise cause of their bleeding. Reproductive tract infections and effects caused by them may be prevented by more awareness and knowledge on healthy menstrual hygiene. "Menstrual morbidities" in early life stages of adolescent young girls should also be addressed.

MHH lacks strong evidence base in India. It is necessary to generate higher quality of evidence on the impact of MHH on lives of adolescent girls and the effectiveness of MHM interventions. "Information may not be available about specific subpopulations, such as remote geographical areas, specific cultural or religious groups, girls with varying types of disabilities or transgender individuals on previous studies in the areas on MHH".<sup>50</sup>

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## APPENDIX

**Table 2. Key Findings of the Studies**

| S. N | Author(s)                                                                                              | Key Issues Covered in the Study      |                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                     |                         |                                                                                                                                                                                                                                                      |      |
|------|--------------------------------------------------------------------------------------------------------|--------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|-------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
|      |                                                                                                        | Knowledge/<br>Attitude/<br>Awareness | Practices                                                                                                                                                                                                                                                                                                                                                                                                                               | Privacy for<br>changing<br>material | Disposal of<br>material | Stigma/ Cultural<br>Beliefs/<br>Restrictions                                                                                                                                                                                                         | RTIs |
| 1.   | Avijit Roy,<br>Pintu Paul, Jay<br>Saha, Bikash<br>Barman,<br>Nanigopal<br>Kapasias &<br>Pradip Chouhan |                                      | Nearly half of the young currently married women (49.3%) practice at least one hygienic method to protect from bloodstains during their menstruation. Only one-third (34%) of women report the use of sanitary napkins, whereas 72.6% of women use clothes to protect bloodstains during their menstruation. However, about 0.14% of women do not use any method at all.<br>The use of menstrual hygienic methods is higher among urban |                                     |                         | Rural women often hesitate to buy sanitary napkins from male shopkeepers because of social stigma around it. Additionally, sanitary napkins are expensive; therefore, many women use cloths and unhygienic rags as alternatives to avoid bloodstain. |      |

|    |                        |                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                       |                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |  |
|----|------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
|    |                        |                                                                                                                                                                                                                                                                                                                                                                        | women as compared to their rural counterparts (70% vs. 42.1%).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                       |                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |  |
| 2. | Choudhary N, Gupta MK. | <p>Urban girls were significantly more aware of the subsidy on sanitary napkins.</p> <p>Immediateness in passing the information about first bleeding was significantly higher among urban adolescent girls.</p> <p>Approximately two-third of the adolescent girls reacted abnormally to the first bleeding, and this was significantly higher among rural girls.</p> | <p>Significantly a greater number of girls from an urban area were using sanitary napkins during menstruation. Whereas in a rural area significantly a smaller number of girls (29%) were doing so. As much as 84.3% girls were reusing the cloth after washing. Most of them (93.5%) were reusing it after washing with soap and water.</p> <p>87.3% of girls were having toilet facilities at their home.</p> <p>Majority (97.3%) of the girls were taking a daily bath during menstruation. 89.4% urban girls and 60.9% of rural girls were having good practice of satisfactory cleaning (<math>\geq 2</math> times a day) of</p> | Shockingly, approximately 40% of girls claimed of not having privacy in toilet facilities at schools. | Throwing the used sanitary napkin in dustbin was a common method of disposal. One out of four girls were changing pads in the school. Most common reason for not changing pads at school was feeling shy/uncomfortable, followed by no facility of the dustbin and uncleaned toilets. | Urban girls (50%) were following significantly more restriction practices compared to rural girls which is 30%. Most common restrictions were not allowing girls to enter the kitchen followed by avoiding going to temple, attending religious function, and going to school. Contrary to this, food restrictions were significantly more prevalent among rural girls. It was shocking to know that 23.3% of girls perceived that restriction practices should be imposed during menstruation. |  |

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|    |                                               |                                                                                                                                                                                                                                                                                                         | external genitalia ( $P < 0.01$ )<br>Only 47% of girls in an urban area and around one-third girls in a rural area had a good practice of drying the washed cloth in sunlight                                                                                                                                                                                                                                                                                                                        |  |  |  |                                                                                                                                                                                                                                                                                                                                                                                                                |
| 3. | Enu Anand,<br>Jayakant Singh,<br>Sayeed Unisa | Nearly 83% of the women answered that they had media awareness about personal hygiene.<br><br>As the number of years of education increased, the use of hygienic practices also increased. The use of hygienic method was higher among women with above secondary education as compared to other women. | Majority of women used clothes (90%) during their menstruation to prevent blood stains from becoming evident. The use of sanitary napkins and locally prepared napkins that is considered as hygienic method in the current study was 11.2% and 3.9% respectively. There were 1.3% of respondents who did not use any method during menstruation at all.<br><br>Use of hygienic method among women belonged to tribal community was higher (18%) as compared to women from scheduled caste (10%) and |  |  |  | Significant association between practice of hygienic method during menstruation and symptoms of RTI as well as vaginal discharge. The women who used unhygienic method were 1.04 times more likely to have any symptom of RTI (OR = 1.046, $p < 0.001$ ). Similarly, the women who did not use hygienic method were 1.3 times more likely to report any abnormal vaginal discharge (OR = 1.303, $p < 0.001$ ). |

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|    |                                                                                                 |  | <p>other backward class (14%).</p> <p>The use of hygienic method among women from scheduled caste category was low (10%) and was higher among women from higher caste (26%).</p> <p>3.6% of women used hygienic methods who had no toilet facility as compared to 36% who had flush toilet.</p> <p>The use of hygienic method was higher among women (20%) who reported to have media awareness about personal hygiene as compared to those who did not have (6%) media awareness about personal hygiene.</p> |  |  |  |                                                                                                                                                                                                                           |
| 4. | Das P, Lisnek D, Sahoo KC, Sinha S, Mohanty J, Sahoo P, Bilung B, Panda B, Tanton C, Torondel B |  | <p>More than half of women changed their absorbents inside of a toilet facility (52.1%), with only 22.0% changing their absorbent three or</p>                                                                                                                                                                                                                                                                                                                                                                |  |  |  | <p>In total, 207 (40.7%) women were diagnosed with BV, 234 (46.0%) women were diagnosed with VVC, and 76 (14.7%) women had coinfection. Therefore, in total, 365 (71.7%) women had at least one vaginal infection. No</p> |

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|    |                                                 |  | <p>more times per day. All women reported washing themselves at least once per day. Women primarily used old cotton material (52.3%) or old silk/nylon (42.6%) as their primary absorbent during the past six cycles. More than half of women washed their absorbents inside the latrine or bathroom area (54.6%), while 45.4% washed their absorbents outside including at the tube well, public pond or river. About half of women dried their absorbents in the sun or open space (48.7%).</p> |  |  | <p>evidence for an association between the location of absorbent changing, reusable product material, or method of storing absorbents between cycles with BV or VVC. No evidence for an association between absorbent changing frequency and VVC, yet frequent absorbent changing was protective against BV (<math>p</math> trend = 0.01). Washing the full body during menstruation rather than only vaginally was protective against VVC (OR: 0.6 (0.4–0.9)), but washing, either vaginally or the full body, more than twice per day was associated with 1.5 (95%CI 1.0–2.1) times greater odds of BV compared to washing once per day. Drying and storage practices were associated with VVC but not BV. There was very strong evidence that drying absorbents inside the house rather than in a sunlit or open space was associated with 3.4 (95%CI 2.3–4.8) times the odds of VVC. Storing absorbents inside the latrine area was associated with increased odds of VVC (OR: 1.8 (1.3–2.6)).</p> |
| 5. | Torondel B, Sinha S, Mohanty JR, Swain T, Sahoo |  | Women diagnosed with Candida infection were more likely to use                                                                                                                                                                                                                                                                                                                                                                                                                                    |  |  | 62.4% were diagnosed with at least one of the three tested infections and 52% presented with one or more RTI                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |

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|    | P, Panda B, Nayak A, Bara M, Bilung B, Cumming O, Panigrahi P, Das P |                                                                                                                                                            | reusable absorbent material (aPRR = 1.54, 95%CI 1.2–2.0) and practice lower frequency of personal washing (aPRR = 1.34, 95%CI 1.07–1.7). Women with BV were more likely to practice personal washing less frequently (aPRR = 1.25, 95%CI 1.0–1.5), change absorbent material outside a toilet facility (aPRR = 1.21, 95%CI 1.0–1.48) whilst a higher frequency of absorbent material changing was protective (aPRR = 0.56, 95%CI 0.4–0.75). |  |                                                                                                                                                        |                                                                                                                                                                            | <p>symptoms. BV was the most prevalent infection (41%), followed by Candida infection (34%) and TV infection (5.6%).</p> <p>No studied factors were found to be associated with TV infection. In addition, among women reusing absorbent material, Candida but not BV or TV - infection was more frequent who dried their pads inside their houses and who stored the cloth hidden in the toilet compartment.</p> |
| 6. | Reena V. Wagh, Aditi J. Upadhye, Jayshree J. Upadhye                 | (71%) knew about menstruation before menarche. 29 (29%) did not have any knowledge about menstruation. s, 71 (71%) girls knew the cause of menstruation as | 64% girls use sanitary pads during menstruation. The girls using sanitary pads were from middle class and upper class and belong to educated families. 19% girls used old cloth while                                                                                                                                                                                                                                                       |  | 69% girls dispose pads or used cloth in dustbin. These girls belong to educated families and were from upper and middle class. 19% girls flush them in | 96% girls avoid going to temple, 68% girls restrict their daily activities, 56% girls avoid going to functions, 50% girls avoid going to kitchen, 50% girls avoid going to |                                                                                                                                                                                                                                                                                                                                                                                                                   |

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|  |  | <p>physiological. They knew that menstruation is the change in the body occurring in girls. They knew this change is necessary for the reproduction. 18 (18%) girls didn't know the cause, 11 (11%) girls still believe it as curse of God.</p> <p>68 (68%) girls knew the source of bleeding during menstruation as uterus. They knew that this cyclical change is due to hormonal changes.</p> <p>20 (20%) girls thought it as vagina while 12 (12%) thought it as urethra.</p> <p>source of information about menstruation in 62% was mother. Source of information was friend in 30%, media like TV/radio/newspaper in 5% and relative in 3% girls</p> | <p>17% girls used new cloth during menstruation as adsorbent material. These girls were from low socio-economic class.</p> |  | <p>toilet while 12% girls throw them roadside.</p> | <p>kitchen while 45% girls avoid touching things at home. These taboos were due to cultural environment at home.</p> |  |
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| 7. | Kumari S, Sood S, Davis S, Chaudhury S  | A large number (51.33%) of the girls were unaware about menstruation before they experienced it. The respondents were asked to reveal the major sources of information about menstruation, and it was found that 53.33% of the respondents had received information from friends, while the source of information for others was mothers 21.33%, magazines 16%, movies 2.67%, relatives 8.5%, and 0% reported from T.V. because in Munda villages, there is a scarcity of electricity and so they are not exposed to television. | In this study, all subjects use reusable cloths to absorb menstrual blood and they are usually torn from old saris. No one was using sanitary napkins. |                                                                                 |                                                                                           | There were many social and religious restrictions on girls during menstruation. Girls received these instructions for do's and don'ts from mothers, elder sisters, and friends. Restrictions particularly related to prohibitions in going to religious places, offering prayers and keeping fast, and other taboos/myth were also reported by maximum subjects |  |
| 8. | Singh N, Kumari R, Agarwal D, Jauhari S | 21 people in the premenstrual group and 22 in the postmenstrual group had knowledge of                                                                                                                                                                                                                                                                                                                                                                                                                                           | Hygienic practices were followed by 66.67% of participants in the postmenstrual group. 60% of                                                          | 17 out of 60 people in the premenstrual group and 5 people in the postmenstrual | The pads were not re-used by the majority of respondents; instead, they were disposed-off | 23 people in the premenstrual group and 34 in the postmenstrual group knew that menstruation was a                                                                                                                                                                                                                                                              |  |

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|    |                                                                      | <p>menses prior to the onset of menses. The respondents were aware of the organ from where the bleeding occurred. 9 people in the premenstrual group and 31 in the postmenstrual group thought it was the uterus, 20 people in the premenstrual group and 14 in the postmenstrual group thought it was the stomach, the rest don't know.</p> | <p>respondents took bath daily during menses. 53.3% respondents used sanitary pads during menses, 20% use cloth and rest 26.7% used both cloth and sanitary pads during menses. 45% of the respondents changed pad thrice a day for hygiene purposes. 63.3% subjects washed their hands with soap and water after using the sanitary pads.</p> | <p>group perceived those facilities available at school were inappropriate for managing menstrual hygiene.</p>                                                                                                                                 | <p>in dustbins, flushed in toilets, buried in pits or burnt.</p>                                                                                                                                          | <p>physiological process, whereas the rest still considered it as a disease or curse from God. People in both groups follow restrictions like not visiting temples or other religious restrictions, food restrictions, sitting separately, restrictions in doing household work, in walking around or playing. Only 4 people in the premenstrual group and 5 people in the postmenstrual group out of 60 followed no restrictions.</p> |  |
| 9. | Yaliwal RG, Biradar AM, Kori SS, Mudanur SR, Pujeri SU, Shannawaz M. | <p>Some of the urban girls (12.1%) and rural girls (12.6%) said that they had no knowledge about commercial sanitary pads. A few of the urban girls (7.8%) and rural girls (6.9%) said that said that they were costly.</p>                                                                                                                  | <p>69.8% of the urban girls and 72% of the rural girls were using commercial sanitary napkins whereas 15.4% of the urban girls and 10.1% of the rural girls were using reusable cloths during their periods. There were 14.2% of the urban girls and 16.3% of the</p>                                                                          | <p>Facility to change their pads at school was said to be adequate by 21.4% of the urban girls and 23.3% of the rural girls. Most of the urban girls (72.5%) and rural girls (73.8%) said that they could get a spare pad at school. These</p> | <p>14.7% of the urban girls and 15.8% of the rural girls said that they had a problem with disposal of the pad. It was interesting to note that 28.9% of the urban girls and 46.5% of the rural girls</p> | <p>8.9% of the urban girls and 10.6% of the rural girls were made to sit outside the house during their periods, which was statistically significant (<math>P=0.033</math>). Girls from both the groups were asked to sleep separately from the family members.</p>                                                                                                                                                                    |  |

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|  |  |  | <p>rural girls who were using both cloth and pads.</p> <p>The reasons given by the girls of both urban and rural areas for using cloth was that the elder women of the house asked them to use cloth and that they were easily available, cheap, and safer than pads. A majority of the urban girls (60%) and the rural girls (51%) who were using cloth as an absorbent were not drying the cloth in sunlight. This is statistically significant (<math>P=0.005</math>). Most of the urban girls (59.5%) and rural girls (54.7%) were washing their genitals more than 2 times a day; however, the rest were washing infrequently. It was seen that the rural girls were washing their genitalia less frequently as compared to their</p> | <p>pads were available with a certain teacher. They were meant for emergency. These pads were not easily available or kept in the washrooms.</p> | <p>disposed their pads by burning them, which is statistically significant (<math>P</math> value <math>&lt; 0.001</math>). In addition, 60.3% of the urban girls and 41.38% of the rural girls of then disposed them in the dust bin (<math>P &lt; 0.001</math>) and 4.1% of the urban girls and 5.7% of the rural girls buried them.</p> | <p>Restrictions regarding food and water were there in both the groups with 16.7% of the urban and 15.8% of the rural girls not allowed to touch food. The number of urban girls and rural girls who were asked to stay away from people during their periods was 18.3% and 17.8%, respectively. Restrictions regarding food and water were there in both the groups with 16.7% of the urban and 15.8% of the rural girls not allowed to touch food. A higher percentage of rural girls in comparison to their urban counterparts were made to sit outside the house during their periods (10.6 vs. 6.9%, <math>P</math> value 0.033). 20.3% of the rural girls were not allowed to play during their periods</p> |  |
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|     |                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | urban counterparts ( $P=0.039$ ). The study observed that 92.8% of the urban girls and 94.8% of the rural girls were having bath during menses, and 87.2% were using soap along with water.                                                                                                                                                                                                                                                                                                                                                               |  |                                                                                                                                                                                                                                                                                                      | in comparison to 15% of the urban girls which was statistically significant ( $P=0.029$ ).                                                                                                                                                                                                                                                                                                                                                                                    |  |
| 10. | Deshpande TN, Patil SS, Gharai SB, Patil SR, Durgawale PM. | As the adolescent girls lived in slum areas and the majority of the girls were school dropouts, their knowledge about menstruation was very poor. The girls in majority were unaware of the scientific basis and physiology of process of menstruation. Only 24% girls were aware of the term menstruation before menarche. Mother was the first informant in 84% cases. 84% of girls did not know about the organ from where menstrual bleeding initiates. Only 16% of the girls could | 60% of the girls used sanitary pad, about 19% used old household cotton, while 16% bought new cloth from the market, and only a 5% used both pad and cloth. of 60 girls who used sanitary pad, 63.34% of the girls changed the pad frequently (>3 times/day). About 70% washed the same cloth and reused it for more than three times. All the girls practiced hand washing during menses. They used soap and water in majority (78%), but a few (22%) used only water to wash. Bathing everyday was found in almost all the girls and washing of private |  | Sanitary pads were wrapped in paper and disposed into a dustbin by only 51.67% of the girls. But an unusual practice of washing the sanitary pad and then disposing it in a carry bag was observed in our study. About 30% girls used this method of disposal and 18.4% disposed their pads in open. | Only few (20%) of the girls did not follow any restrictions, whereas a majority of them had restrictions. Few (27%) believed that the restrictions imposed on them are by Gods commands. Almost a maximum (80%) of girls did not visit temple during menses, separation from the family members and not entering the kitchen was found in 27% girls, whereas some (21%) girls said that they were not allowed to touch anyone and had to stay out of the house during menses. |  |

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|     |                                                                                      | comment uterus as the bleeding organ. 20% of girls believed it to be a physiological process and 76% were unaware of the reasons for menstruation. The adolescent girls had no information about proper method of disposal of sanitary pad.                                                                                                                                                      | parts during menses was practiced by them during bathing.                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                      |  |  |
| 11. | Garg S, Bhatnagar N, Singh MM, Basu S, Borle A, Marimuthu Y, Azmi F, Dabi Y, Bala I. | Preparedness for menarche was absent in a majority (51.2%) of the participants. A total of 675 participants (59.8%) reported usually consulting a person outside the formal health system for menstruation-related problems, of whom 572 (84.7%), 54 (8.0%), 40 (5.9%) and 9 participants (1.3%) consulted their mothers, sisters, relatives, and friends, respectively. Younger participant age | 954 participants (84.4%) used only disposable sanitary pads, 150 (13.3%) used both sanitary pads and cloths, and 26 (2.3%) used only cloths. The frequency of changing adsorbent material per day during menstruation was reported as 1 to 2 times by 273 (24.2%) and $\geq 3$ times by 857 participants (75.8%). Among the participants who used cloths or both cloths and pads (n=176), 171 (97.1%) discarded cloths after using | Among the school/college/working participants (n=792), 420 participants (53.0%) changed their soaked material in toilets, while 372 adolescent girls (47.0%) reported never changing their soaked adsorbent material at school or workplaces. Most girls had access to an individual toilet at home (90.2%), or an improved community toilet (9.2%), along | 1,051 (93.3%) reported correctly disposing the used adsorbent material, while 81 (7.2%) performed improper disposal. |  |  |

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|     |                                                                                                                                                     | (<15 years) was associated with a lack of awareness of the optimal frequency of changing menstrual absorbent material ( $p=0.003$ ), but educational status was not ( $p=0.274$ ). Consultation of a healthcare provider is necessary for menstruation-related problems (15.4%)                                                                                                                      | them, whereas 4 (0.3%) reused cloths after washing them with soap and water and drying them in the sunlight.                                                                                                                                                                                                                                                                                                                               | with a continuous running water source within those toilets (83.0%) |  |                                                                                                                                                                                                                                                                                                                                                                                                                              |  |
| 12. | Dr. Neha Savarna, Dr. Hem Kant Jha, Dr. Prabhat Kr Lal, Dr. Vijay Kumar Choudhary, Dr. Hemant Kumar, Dr. Chittaranjan Rai, Dr. (Mrs) Kamlesh Tiwari | Knowledge about the use of sanitary pads was found to be present among 325 (81.25%) rural and 342 (85.5%); not statistically significant ( $\chi^2=2.61$ , $p=0.11$ ). However, knowledge about proper disposal of used absorbents was present among 258(64%) rural and 335 (83.75%) urban girls. This was found to be statistically significant ( $\chi^2=38.64$ , $p=0.00$ ). In case of using old | Washing of hands after changing menstrual absorbent (330 (82.5%) rural and 380 (95%) urban] was found to be statistically significant ( $\chi^2=32.29$ , $p=0.00$ ). Taking regular bath (211 (52.75%) rural and 287 (71.75%) urban] was found to be statistically significant ( $\chi^2=30.72$ , $p=0.00$ ). and change of menstrual absorbent at least thrice or more daily [200 (50%) rural and 270 (67.5%) urban] was also significant |                                                                     |  | Not attending school 172(43%) rural & 62(15.50%) urban ( $\chi^2=73.08$ , $p=0.00$ ), not attending religious function 370 (92.5%) rural & 376(94%) urban ( $\chi^2=0.51$ , $p=0.48$ ); not entering Pooja room 388(97%) rural and 376(94%) urban ( $\chi^2=4.19$ , $p=0.04$ ); not touching Holy books 376 (94%) rural and 356 (89%) urban ( $\chi^2=6.38$ , $p=0.01$ ); not sleeping on routine Bed 187 (46.75%) rural and |  |

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|  |  | <p>clothes as absorbents after washing, 156 (39%) rural and 178 (44.5%) urban participants knew that the cloth pieces should be dried in direct sunlight after washing. This difference was not found to be statistically significant (<math>\chi^2=2.49</math>, <math>p=0.11</math>). 330 (82.5%) of rural and 380 (95%) of urban participants were aware that they should wash hands after changing menstrual absorbent, the difference of which was statistically significant (<math>\chi^2=32.29</math>, <math>p=0.00</math>). Taking bath regularly 211 (52.75%) rural and 287 (71.75%) urban and changing of absorbent at least thrice or more daily (<math>\chi^2=30.72</math>, <math>p=0.00</math>) 200 (50%) rural and 270 (67.5%) urban (<math>\chi^2=25.27</math>, <math>p=0.00</math>)</p> | <p>(<math>\chi^2=25.27</math>, <math>p=0.00</math>). Cleaning of external genitalia rural 325 (81.25%) and urban 342(85.5%) and use of both soap and water for cleaning rural 310 (77.5%) and urban 330(82.5%) were not significant.</p> |  |  | <p>250(62.50%) urban (<math>\chi^2=20.02</math>,<math>p=0.00</math>) were there striations that were found to be statistically significant.</p> |  |
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|     |                                                                               | <p>were other practices about which the participants knew, and they were statistically significant. The difference in knowledge about cleaning external genitalia 325(81.25%) rural and 342(85.5%) urban (<math>\chi^2=2.61</math>, <math>p=0.11</math>) was not significant.</p>                                                                                                |                                                                                                                                                                                                                                                                                                                                                                           |  |                                                                                                              |                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| 13. | <p>Mathiyalagen P, Peramasamy B, Vasudevan K, Basu M, Cherian J, Sundar B</p> | <p>Knowledge- about 71.5% of respondents knew that the menstruation is a natural physiological process and only 38.8% knew that the source of menstrual blood is uterus. The sanitary pad was mentioned as ideal absorbent by 95.5% of the study population. Unsatisfactory cleanliness of external genitalia was reported (frequency of washing external genitalia was &lt;</p> | <p>78.1% girls were using sanitary napkin whereas 21.9% girls were either cloth or mixed users during menstruation. The majority (85.5%) were changing the absorbent 2–4 times during the menstruation. Among cloth users, many were drying it inside the house without sunlight (34%). Majority washed their genitalia using only water (53.7%) during menstruation.</p> |  | <p>Most of the girls were disposing the absorbent by burning (64.5%) followed by public dustbin (19.4%).</p> | <p>58.7% of girls sleep separately, 44.6% of girls were restricted to attend any religious event, 34.7% of girls did not go to school, 33.1% of girls did not carry out any household activities, 21.9% girls did not play, 7.9% of girls did not attend any marriages and 7% of girls were eating separately during the menstrual period.</p> | <p>A high proportion of respondents reported having at least one reproductive tract problem (88.4%). The commonly reported reproductive morbidity were symptoms of lower abdominal/lower back pain (69.8%), discharge from genitalia (25.2%), itching from genitalia (22.3%), difficulty in micturition (20.7%), and pustules over genitalia (14%). Some of the symptoms suggestive of reproductive tract infections were observed to be more common among the girls who were having unsatisfactory menstrual hygiene practices, and this difference was found to be statistically significant (<math>P &lt;</math></p> |

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|     |                            | 2/day) by 29 (12%) girls<br>Attitude- 67.4% of respondent girls perceived that on using sanitary pads they felt comfortable, 49.6% perceived that it would not stain clothes, 34.3% felt that it absorbed adequately whereas 24.8% felt that there was no itching with its use. On the other hand, 57.9% adolescent girls perceived it to be expensive, and 28.1% felt that it was not available everywhere. 27.3% adolescent girls felt that the advertisement about sanitary napkins was useful while 14% felt it embarrassing and 12.8% as not useful. |                                                                                                        |  |                                                                                               |  | 0.05) for itching in genitalia and pustules over genitalia.                                                                                                             |
| 14. | Kansal S, Singh S, Kumar A | Out of 590 adolescents who attained menarche, only one-third of the respondents were aware about                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Only one-third (31%) of the respondents were using sanitary pad, whereas rest of them were still using |  | School going - The method of disposal of the used pads/clothes is in regular dustbin and none |  | The respondents who were following hygienic practices reported less infection than their counterparts, although the difference was not found statistically significant. |

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|     |                                                  | menarche before its onset. Regarding the sources of information sisters (55%) played the vital role and only 15.5% were mothers. Role of teachers was observed negligible in imparting education about various aspects of menstruation.                                | clothes (69%). Among those respondents who were using clothes, 17.6% were washing and reusing it. Group discussion with school going respondents reveals that Only half of the respondents were using sanitary pads, while rest of them were using clothes. All school dropout respondents were using clothes during menstruation and out of the eight only one was reusing the old cloth. |  | of them were reusing it.<br><br>School Dropout-out of the eight only one was reusing the old cloth, whereas rest of them disposed the clothes either in the regular dustbin or by burring in the ground. |                                                                                                                                                                                 |  |
| 15. | Sarkar I, Dobe M, Dasgupta A, Basu R, Shahbabu B | Most of the respondents (50.2%) said that the primary source of information regarding menstruation was their mother. Majority of the students knew that menstruation was a normal physiological process (97.0%). The majority of the respondents had a wrong knowledge | Majority of the study population (47.9%) use both sanitary napkin and cloth. 20.8% use only sanitary napkins whereas 31.3% use only cloth. Those who were using cloth majority of them were reutilizing it (74.1%). Majority of the study population did not dry the re-utilizable clothes in sunlight (72.2%).                                                                            |  | Majority of the study population dispose the menstrual absorbent in vat (42.3%).                                                                                                                         | 60.6% of the study population restricted sour foods, 86.3% restricted religious activities, 63.5% restricted shampooing hair, and 6.19% restricted wearing washed clean clothes |  |

|     |                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |  |
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|     |                                                                                                                                                                                                                 | that the source of menstrual blood is urinary tract (56.7%). Only 28.3% had a correct knowledge that the source of menstrual blood is uterus.                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |  |
| 16. | Sivakami M, Maria van Eijk A, Thakur H, Kakade N, Patil C, Shinde S, Surani N, Bauman A, Zulaika G, Kabir Y, Dobhal A, Singh P, Tahiliani B, Mason L, Alexander KT, Thakkar MB, Laserson KF, Phillips-Howard PA | Nearly all (93%) menstruating girls had received some information about menstruation. Parents or guardians were the major source (68%), with friends the next most reported source. Half (48%) of girls did not hear about menstruation until their first period began; the proportion of girls who were informed before menarche was significantly higher in model schools compared to regular schools (56% vs 36%, $P < 0.001$ ). | Overall, 45% of girls used disposable sanitary pads, 28% used cloths, and 21% reusable pads. Menstrual cups and tampons were reported by 1% each, 2% of girls said they did not use anything, and 3% did not respond. The majority of girls in Chhattisgarh used cloths (61%), whereas the majority of girls in Maharashtra and Tamil Nadu used disposable pads (47% and 66%, respectively). Reusable pads were mainly used in Maharashtra (37%) and Tamil Nadu (21%). Girls who used disposable pads were significantly more likely to report | Only 37% of girls stated their school had toilets exclusively for them, with the highest proportion in Tamil Nadu (60%). Access to toilets differed by state, with 48% of girls in Chhattisgarh stating they could use them any time, while the majority of girls in other states were only allowed during break-time. For accidental leaking of blood during lessons, a higher proportion of girls in model schools stated they were allowed to leave the class (63% in | Only 27% of girls reported that their schools had good disposal facilities for menstrual waste, and options varied widely across states and schools. The most frequently mentioned option for disposal was taking the soiled item home (21%), with 41% of girls in regular schools in Maharashtra saying this. Burn pits (20%), rubbish pits (17%), or bins (16%) were the next most common, with a low proportion (7%) reporting an incinerator for waste. | Religious restrictions (not going to temple, <i>etc.</i> ) were common, affecting 88% of girls overall, and nearly all (91%) girls in regular schools. girls reported less restrictions in the model schools in Maharashtra (64%) and Tamil Nadu (76%) compared to the regular schools (94% and 93%, respectively, $P < 0.001$ ). Restrictions during exercise were prevalent (83% overall); again, this was significantly lower in model schools in Maharashtra (89% vs 50%, $P < 0.001$ ) and Tamil Nadu (92% vs |  |

|     |                                                                                                           |                                                                                                                                                                                                         |                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                    |  |
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|     |                                                                                                           |                                                                                                                                                                                                         | attending school during menstruation (95%), and less frequently reported concentration or other problems during menstruation (39%, and 47%, respectively) than girls who used cloths (81%, 53%, and 68%, respectively). | regular vs 76% in model schools, $P < 0.001$ ). Most girls thought there was enough time for changing their menstrual item during break (55% in regular and 73% in model schools, $P < 0.001$ ). Washing facilities in schools were insufficient, with overall just 51% of girls reporting washing was always possible. | In Tamil Nadu, 19% of girls reported throwing menstrual waste down the toilets, compared with <5% in the other two states where free napkins were less available. When limiting analysis specifically to the 1153 girls using disposable pads, 37% reported disposal in burning or rubbish pits, 17% in buckets, 9% in an incinerator, 11% in toilets, and 19% reported taking the used pad home. | 69%, $P < 0.001$ ) but not in Chhattisgarh (78% vs 84%, $P = 0.205$ ) one in five reported different sleeping arrangements, 16% reduced social interactions within the home, 12% reduced social interactions outside the home, and 7% had restricted food choices. |  |
| 17. | Shekhar Chauhan, Pradeep Kumar, Strong Pillar Marbaniang, Shobhit Srivastava, Ratna Patel, Preeti Dhillon | Sanitary napkins were more prevalent among adolescents who reported frequent exposure to mass media (65.8 percent), and it was lowest among those who had no exposure to media (25.6 percent). Mother's | The use of sanitary napkins was significantly higher among late adolescents (54.5%), and it was low among early adolescent girls (26.1%). A higher proportion of girls with 8–9 (53.2%) and 10 or more (75.4%) years of |                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                    |  |

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|     |                                                           | education and wealth index were significantly positively associated with the use of sanitary napkins. A higher proportion of girls whose mothers had 10 or more years of education (84.3 percent) used sanitary napkins than those whose mothers had no education (46 per cent). | schooling used sanitary napkins than those who were uneducated (26.4%). The use of sanitary napkins was higher among adolescents who were not working (54.7%) than those working (40.8%). The use of sanitary napkins was significantly higher among girls who lived in urban areas than those who lived in rural. |                                                                                                                                                                                                                                                                                                                             |  |                                                                                                                                                                                                                                                                                                                                                   |  |
| 18. | Vashisht A, Pathak R, Agarwalla R, Patavegar BN, Panda M. | The majority of students had some information on menstruation and the major source was from school in sessions (85%) followed by schoolteachers (18%).                                                                                                                           | Students who used pieces of cloth were 3.10 times more likely to miss school than their counterparts (adjusted odds ratio [AOR] (95% confidence interval [CI]): 3.10 [1.97–4.67])                                                                                                                                  | Girls in schools with no water, separate toilets, and other facilities for MHM were 5.60 times more likely to be absent from school during their menstrual period than girls from schools (AOR [95% CI]: 5.60 [3.90–7.40]) The girls indicated that they felt awkward to use toilet facilities when they did not have good- |  | The most prominent challenges girls face at school include fear, shame, and teasing by classmates. Most of them said they would rather remain absent as the boys might figure out what was going on by their movements and grimaces because of cramps. On the restrictions imposed, most of the girls stated that they were not allowed to attend |  |

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|     |                                         |                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | quality sanitary supplies to use in the course of the day. They identified the lack of soap, clean toilets, clean water, privacy, and sanitary supplies as the main challenges at school. |  | school their periods. They mentioned such traditions as not being allowed to cook or play with boys, though they said they continued with other household chores.                                                                                                                                                                                                                                                                                     |  |
| 19. | Pradeep Senapathi, Brig Dr Hemant Kumar | 170 (69.67%) respondents were aware about menstruation before attaining their menarche and considered it as normal physiological process. The awareness was also found to be more among urban schoolgirls (72.32%) as compared to rural girls (67.42%). However, there were differences in the reactions to first menses among these girls i.e., in rural area 46.96% of the respondents felt it to be normal, while in urban | 49.24% of the girls in the rural area and 65.17% of the girls in urban area were using sanitary pads and this difference was also found to be statistically significant ( $p=0.022$ ). 33 (25%) girls in rural and 90 (80.35%) girls in urban school changed their pads every 8 hrs and this difference infrequency of change of pads, was also found to be statistically highly significant ( $p<0.01$ ). It was also observed that 67.42% of the girls in rural area clean their external genitalia twice a day |                                                                                                                                                                                           |  | 96.21% of rural and 83.92% of urban schoolgirls were not allowed to attend any religious function or even touch an idol of God/goddess. Other significant restrictions among urban schoolgirls includes playing outdoors, attending school and helping mothers in kitchen i.e., 41.96%, 5.35% and 23.21% respectively ; while these restrictions were higher among rural schoolgirls i.e. 85.60%, 15.15% and 65.15% respectively . The differences on |  |

|     |                                                                                         |                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                        |  |                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                    |  |
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|     |                                                                                         | schools 70.53% felt it as normal.                                                                                                                                                                                                                                                                                                                                     | while in urban area only 49.10% of the girls did it (p=0.009).                                                                                                                                                                                                                                                                                                                                         |  |                                                                                                                                                                                                                                                                                   | restrictions between rural and urban schoolgirls on attending schools (15.15% and 5.35%), playing outdoors (85.60% and 41.96%) and helping mothers in kitchen (65.15% and 23.21%) were also found to be statistically highly significant (p<0.01, p<0.01 and p<0.01 respectively). |  |
| 20. | Hema Priya S., Partha Nandi, Seetharaman N, Ramya M. R., Nishanthini N., Lokeshmaran A. | Among 502 study participants, 261 (52%) girls had any information regarding menarche and menstruation before attainment of menarche, whereas 241 girls (48%) didn't know that information. After menarche, 32.1% girls reported their mothers to be the primary source of information, followed by sisters in 24.7% girls and 23.9% girls mentioned their friends and | Among total 502 girls, majority of the girls (89.2%) were using sanitary pads as menstrual absorbent. Only 7.2% and 3% girls, used fresh cloths and reusable cloths respectively. With respect to the number of changing times of menstrual absorbent, it was found that majority (65.3%) of the girls changed their soaked menstrual absorbent satisfactorily (2-5 times per day), on other hand 5.8% |  | In the view of disposing the used absorbent, majority of the girls (60.8%), burnt or buried their used menstrual absorbent, 29.1% girls threw it in the dust bin and 4.2% girls were washing and reusing the cloth material, whereas 6% girls disposed by flushing in the toilet. |                                                                                                                                                                                                                                                                                    |  |

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|     |                               | <p>relatives. Interestingly, 15.3% girls reported that they got information from ANM or AWW. Only less than 0.5% girls mentioned that teachers are their source of information</p> | <p>girls stated that they changed according to the need. Dangerously, 19.1% girls changed absorbent only once in a day. 9.8% mentioned that they were changing their absorbent more than 5 times in a day. Out of total girls, nearly half of the girls (54.4%) were using soap and water for cleaning purpose during menstruation, but a large number of girls (40.2%) were using only water. Small proportion of girls was practicing good habit of using antiseptics like Dettol. Dangerously 1.4% mentioned that they were using ash, mud etc.</p> |  |                                                                                                                        |                                                                                                                                                 |  |
| 21. | Parikh, Vidhi Nagar, Shashwat | <p>78.7% had proper knowledge about menstruation. About 31.3% of the girls received information from the school, 39.8% from their parents,</p>                                     | <p>Many of the study subjects (96.06%) used sanitary pads, 2.36% used reusable cloths, 3.15% used fresh cloths, 1.57% used tampons, and 0.7% used menstrual</p>                                                                                                                                                                                                                                                                                                                                                                                        |  | <p>90.6% practised disposing the absorbent material in the trash can, whereas 5.5%, 2.4%, 3.1%, and 0.8% practised</p> | <p>Three quarters avoided themselves from visiting the places of worship, 43% avoided attending marriages or other rituals, 20.47% were not</p> |  |

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|     |                                  | 3.9% from their friends, and the rest (around 3.1%) from other sources      | cups. Only a small proportion of study subjects (11.7%) changed the absorbent material more than thrice in a day, whereas 2% changed it thrice, 73% changed it twice in a day, and 10.2% changed it only once in a day. The frequency of washing and cleaning the genital area for hygiene with a frequency of more than 5 times a day was found in about 10% of the subjects only. About 12% practiced cleaning less than twice a day. Nearly half of them used water for cleaning, whereas 9.4%, 9.4%, and 30.5% used soap and water, Dettol, and other agents (wash and other specific medicated soaps), respectively. |  | the wash and reuse method, burning the absorbent, flushing it in the toilet, and disposing it in the incinerator, respectively. | allowed to cook/serve food, 17.32% stayed indoors, 21% avoided physical exercise, and 7.87% had to remain isolated with minimal social contact |  |
| 22. | Sumit Aggarwal, Deepti Ambalkar, | Most of the girls (65%) were of the view that menstrual bleeding is just an | 60.7% of the girls used sanitary pads while                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |  | Most of the girls dis-posed of them by throwing them in                                                                         | Girls had to observe various menstrual taboos.                                                                                                 |  |

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|     | Jayaprakasam Madhumathi, Vijay Badge and Arun Humne                                                         | <p>age-related change without any scientific knowledge about it and 41.8% felt that hormonal change is responsible. About 4.9% did not have any idea about its cause.</p> <p>The girls received information about menstruation mostly from their mothers (51.6%), teachers (27%), friends (16.4%), sisters (3.3%), relatives (0.8%) and grandmothers (0.8%).</p> | <p>the remainder (39.3%) used home-made cloth or cotton-based sanitary pads. Most of the girls cleaned themselves twice a day (43.4%), followed by three times (23.8%), once a day (21.3%) and four times (11.5%). Out of a total of 122 girls, 68 (55.7%) girls used soap and water and the rest 54 (44.3%) used only water.</p> |  | <p>the garbage whereas 31.1% disposed of them by burning and 24.6% reused cloth pads after washing.</p>                                                                                                        | <p>They were not allowed to participate in any religious activity (43.4%), preparation of particular or special foods (2.5%) like egg and wheat halwa and were isolated (27%) from other family members. Restrictions included a particular diet and relief from household work. It was observed that only 27% girls were not under any kind of restrictions</p> |  |
| 23. | Palkin Bhatia, Archana Chaudhary, Bhupinder Kaur Anand, Manvinder Pal Singh Marwah, Swamy HM, Dinesh Bhatia | <p>92.3% had some knowledge about periods. The most common response given by 43% of girls was that "periods come every month once for 4 -5 days" which showed their acumen regarding the menstruating process. 32% of the respondents knew</p>                                                                                                                   | <p>80% menstruating girls used pads as the sanitary product and the majority changed their sanitary product twice a day. 95.3% of girls obtained their sanitary products from shops, 98.4% of menstruating girls took baths daily during periods.</p>                                                                             |  | <p>87.5% disposed of their used sanitary products into the dustbin as a routine solid waste. 4.69% disposed in a special container. 4.69% of the girls burned the material. 1.56% used to bury and 1.5% of</p> | <p>Regarding the societal discrimination and stigma faced during the process of menses, 80% girls were not allowed to enter the temple or become a part of any holy ritual or marriage. According to data collected, only 18.6% girls faced</p>                                                                                                                  |  |

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|     |                                      | that uterus was the actual source of bleeding. Mothers in 66% of cases were the first informant about the phenomenon of menstruation surprisingly followed by the lady teachers at school in 26.3% of cases. | 84.3% of girls cleaned their genitalia once daily and 93.7% changed their undergarments daily.                                                                                                                                                                                                                                                                                                                                                                                            |  | the girls bury the absorbents. | no restrictions in their region during menstruation period. |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| 24. | Chinmayee Barthakur, Monjuri Katakya |                                                                                                                                                                                                              | Out of 119 adolescent girls 57.1% (68) and 42.9% (51) belonged to 10-14 years and 15-19 years respectively Overall, 67.2% girls attained menarche. Majority 52.5% (42/80) used sanitary pads while 42.5% (34/80) used cloth and 5% used both cloth and sanitary pads. It was observed that on average majority 43.7% of the girls changed their absorbents twice in a day. Out of sanitary pad users 35.7% (15/42) changed it $\geq 3$ times a day and of cloth users 50% (17/34) did so. |  |                                |                                                             | Regarding RTI symptoms, in the 10-14 year and 15-19-year age groups 14.7% and 27.5% respectively reported one or more symptoms of RTI. It shows an increasing trend with age. Among girls attaining menarche, 22.5 % (18/80) and among those not attaining menarche 15.4% (6/39) were RTI symptomatic. The percentage of girl presenting with UTI was 24.4%. Majority of them was from 10-14-year age group. It was more common among those without menarche 30.7% (12/39) than those attaining menarche 21.3% (17/80). Out of 119 girls 9.2 % (11) presented with symptoms for both RTI and UTI. |

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|     |                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | Among cloth users 100% cleaned it with soap and water but 30.3 % did not dry it under sunlight.                                                                                                                                                                                                                                     |  |                                                                                                                                                                                                                                                                                     |                                                                                                                                            |  |
| 25. | Amrita Shilpi, Rajasree Roy, Gobina, Spriha Roy | <p>Awareness regarding menarche and menstruation among respondents before attaining menarche was found to be low. Out of 400 respondents, 252 knew about it after menarche. When asked about the cause of menstruation, 61% of the respondents believed it to be a physiological process. It was interesting however to note that 9.5% of the total respondents believed it to be curse. 27% of the respondents had no idea about the cause of menstruation. Out of 400 respondents 336 replied that mothers were the first informants for them. It was</p> | <p>Girls used both cloth and sanitary pads (268 out of 400) as absorbent during menstruation depending on the availability. However, some of the girls informed that they preferred cloth pieces (79 out of 400) rather than sanitary pads as menstrual absorbent because they did not have proper undergarments to support it.</p> |  | <p>The most common method of disposal of the used absorbent was wrapping it in paper and disposing it in routine dustbin (221) which was used for solid waste disposal. However, 32% of the respondents admitted to throwing the sanitary waste on the roadside as it got dark.</p> | <p>Restrictions were practiced by most of the girls, visit to holy places and touching stored food being the most common restrictions.</p> |  |

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|     |                                      | followed by friends/sister (35), teacher/health worker (20). Amongst other options, television was an important source of information about menstrual hygiene (9).                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |  |                                                                                                                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |  |
| 26. | Rastogi, S., Khanna, A., & Mathur, P | Only 40% of the girls were aware of menstruation prior to the attainment of menarche. Out of 187 girls, most of the girls (95.7%) did not know the source of menstrual blood. Nearly two-third of the girls (65.8%) did not know that menstrual blood flow could be affected by anemia. About 75.4% girls believed that menstrual blood flow was influenced by the hot and cold foods. 29.4% girls stated that menstruation affected their school attendance as 52.7% girls absented | While the majority (96.8%) of the girls agreed that more attention needed to be paid to hygiene during menstruation compared to other days, this was not reflected in their menstrual practices as 34% girls did not bathe at all during their menstrual period and 33% of girls did not bathe daily while menstruating. However, the daily cleaning of the external genitalia on normal and menstruating days was reportedly undertaken by 93% and 91.4% girls, respectively. Only 35% girls cleaned their external |  | 91.9% of the girls throw the absorbents in the dustbin, 8% were seen to throw it in in open ground/garbage. Wrapping of used absorbent in any material before disposal is seen in 100% girls. | Around 21.9% girls adhered to the cultural belief that it was important to cease all activities involving physical exertion during menstruation. Other sociocultural practices observed during menstruation included restrictions on visiting religious places, avoiding certain foods, not touching, and picking flowers, and not entering the kitchen or cooking. More than half (53.4%) of the girls stated that they socially withdrew during menstruation. |  |

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|     |                | themselves on the first day and 40% for the first 2–3 days of their menstrual cycle. In addition to this, 42.8% of girls stopped performing all household duties during their periods.                                                                                                                                                                                                | genitalia every time they went to the toilet.                                                                                                                                                                                                                                                                                                                          |  |                                                                                                                                                                                                                                                                                                                        |  |  |
| 27. | Pallavi Mishra | Only 36 % (n=268) respondents had appropriate knowledge. 59 % reported absence from college during menstruation. The major reason for college absenteeism was heavy bleeding and fear of staining their clothes (76 %). Mother- major source of information (69%) and higher educational status of adolescent's mothers to be an important predictor of knowledge about menstruation. | Most of the respondents used homemade cloth (62%) and economic constraints (75%) seemed to be the main reason. Only 67 % respondents disposed used absorbents whereas 33 % washed and reused them. Only 22 % students changed adsorbents at school. Out of 740 respondents, only 29 % girls changed their menstrual absorbent more than twice and 71 % only once a day |  | Almost half the respondents felt uncomfortable being in school during menstruation because of inability to change menstrual absorbent due to dirty toilets and lack of disposal facilities. Only 22 % students changed adsorbents at school. 33% of the girls don't dispose or reuse the cloths after using them once. |  |  |