

The Intersections between Menstrual Health and Reproductive Health: An Annotated Bibliography

October 2018

A review of journal articles, reports, and briefs on the topic of menstrual health and reproductive health.

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Acknowledgments:

As this annotated bibliography builds from a forthcoming commentary on the same topic, the co-authors of that paper deserve recognition here. Sarah Fry, Kate Rademacher, Geeta Nanda, Rebecca Callahan, and Julia Rosenbaum contributed to the concepts and organization of that paper, which are used here, and in the process suggested many of the articles and reports that are included. Celia Mizelle worked to identify many of the articles and reports here. David Henderson edited the final document.

INTRODUCTION

The fields of menstrual health and reproductive health have multiple linkages that have often gone unexplored. The menstrual hygiene management field has mainly been led by the water, sanitation, and hygiene (WASH) and education sectors but has not been fully integrated within the reproductive health sector. Within this bibliography, menstrual health is used as a broad term that is inclusive of menstrual hygiene management, as well as other health issues related to menstruation.

This annotated bibliography presents sources of evidence on these potential synergies to advocate for the inclusion of menstrual health within an expanded definition of reproductive health. It was prepared with an intended audience of professionals in the reproductive health field. As such, it includes a background section with resources that provide an overview of menstrual health, detailing the literature on menstrual hygiene management and related challenges as well as interventions focused on ameliorating these issues. The remainder of the articles and reports provide information on the potential linkages and intersections of menstrual and reproductive health to highlight existing evidence and opportunities for integrated services.

METHODS

Many of the publications in this bibliography were found in the development of a forthcoming commentary on the intersection of menstrual and reproductive health. We also collected articles and reports utilizing a snowball strategy, in which we used the reference lists of key resources to identify new resources. Many of these key resources are within the *setting the stage* theme. Resources were included if they presented evidence on the context of menstrual health needs and challenges or if they addressed the potential linkages between menstrual and reproductive health.

There is an abstract, summary, or comment for each annotation; summaries and abstracts are from the original resource. If the resource did not include an abstract or summary, a comment was written for it. Comments are a general overview of the resource with an emphasis on the linkage between menstrual and reproductive health.

The bibliography begins with background information, and then transitions to biological linkages between menstrual and reproductive health, followed by sociological linkages, and concludes with examples of interventions. Key themes within these broad categories have been identified and resources are categorized by these themes. Articles are first organized within sections by sub-theme and then by author last name. Articles that fit into multiple themes have been cross-referenced accordingly.

BACKGROUND

Setting the Stage

This section consists of overview reports, commentary articles, and correspondence, rather than original research, which provide background information for addressing menstrual health and reproductive health; several resources address the intersection between the two fields. They identify gaps in research and programming and detail the importance of developing effective interventions focused on menstrual health and reproductive health.

1. **Geertz, A., Iyer, L., Kasen, P., Mazzola, F., & Peterson, K. (2016). *An Opportunity to Address Menstrual Health and Gender Equity*. Retrieved from FSG website: <https://www.fsg.org/publications/opportunity-address-menstrual-health-and-gender-equity#download-area>.**

Comment: This overview report includes a description of the evidence base on menstrual health challenges and outcomes, the response to these challenges, and opportunities for future programs and innovation. The report addresses the response from multiple sectors including sexual and reproductive health; water, sanitation and hygiene; and education. Within the sexual and reproductive health sector, there is an increasing focus on using puberty as an entry point for reproductive health education. Comprehensive programs that address puberty education and menstrual hygiene are mentioned as “bright spots” in the field. In the conclusion, the authors describe four cross-cutting opportunities to ameliorate menstrual health challenges. These opportunities include: using menstruation as an entry point for other services, encouraging collaboration across menstrual health actors, tackling social norms surrounding puberty, and catalyzing market development.

2. **Keith, B. (2016). *Girls’ and women’s right to menstrual health: Evidence and opportunities*. Outlook on reproductive health. Retrieved from PATH website: https://path.azureedge.net/media/documents/RH_outlook_mh_022016.pdf**

Comment: This commentary argues that menstrual health is a sexual and reproductive health and rights issue, emphasizes the importance of focusing on menstrual health, and provides examples of how menstrual health can be improved. Challenges related to menstrual health include cultural taboos and lack of access to information, products, and an adequate health environment. In defining menstrual health as part of sexual and reproductive health, the author addresses the potential links to infection and high-risk sexual behavior such as transactional sex for sanitary products. The impact of menstrual hygiene management on education and gender-based violence is also discussed and the author advocates for a cross-sectoral response.

3. **Phillips-Howard, P. A., Hennegan, J., Weiss, H. A., Hytti, L., & Sommer, M. (2018). Inclusion of menstrual health in sexual and reproductive health and rights. *The Lancet Child & Adolescent Health*, 2(8), e18.**

Comment: This was written as a reply to the Guttmacher-*Lancet* Commission on sexual and reproductive health and rights. The authors write that the commission included menstruation as a part of reproductive health but did not consider its impact on sexual and reproductive health risks and did not adequately address menstrual health and hygiene. They emphasize that the inclusion of menstrual health within sexual and reproductive health is vital to satisfying menstrual needs on a global scale.

4. **Singh, S. (2018). Inclusion of menstrual health in sexual and reproductive health and rights – Authors' reply. *The Lancet Child & Adolescent Health*, 2(8), e19.**

Comment: This correspondence is in reply to the response to the Guttmacher-*Lancet* Commission on sexual and reproductive health and rights. The author writes that the commission's agenda is aligned with improving the rights of women and girls to effectively manage their menstruation and that they hope to move the sexual and reproductive health field forward. The commission did not originally offer a comprehensive definition of the components of sexual education but in the reply wrote that curricula should include information on menstrual health.

5. **Sommer, M., Caruso, B. A., Sahin, M., Calderon, T., Cavill, S., Mahon, T., & Phillips-Howard, P. A. (2016). A Time for Global Action: Addressing Girls' Menstrual Hygiene Management Needs in Schools. *PLoS Med*, 13(2), e1001962.**

Comment: This article details the landscape of evidence on menstrual hygiene management within schools and the present gaps in research and provides five priorities to guide action. The priorities are: expanding the evidence base on effective interventions; creating global guidelines for MHM in schools; improving MHM advocacy work; having national governments oversee MHM provision in schools; and integrating inclusive MHM into the education sector. The authors mention that progress in improving MHM in schools has mostly been through the WASH sector and that there needs to be further engagement from the education and sexual and reproductive health sectors. Specifically, they encourage the sexual and reproductive health sector to include puberty and menstrual care in their work and emphasize a cross-sectoral response. The five priorities identified to guide action focus on increasing girls' knowledge about menstruation and improving their ability to manage menses at school; these priorities were developed at "MHM in Ten", a conference organized by Columbia University and the United Nations Children's Fund (UNICEF).

6. **Sommer, M., Hirsch, J. S., Nathanson, C., & Parker, R. G. (2015). Comfortably, Safely, and Without Shame: Defining Menstrual Hygiene Management as a Public Health Issue. *Am J Public Health, 105*(7), 1302-1311.**

Abstract: In recent years, the menstrual hygiene management challenges facing schoolgirls in low-income-country contexts have gained global attention. We applied Gusfield's sociological analysis of the culture of public problems to better understand how this relatively newly recognized public health challenge rose to the level of global public health awareness and action. We similarly applied the conceptualization by Dorfman et al. of the role of public health messaging in changing corporate practice to explore the conceptual frames and the news frames that are being used to shape the perceptions of menstrual hygiene management as an issue of social justice within the context of public health. Important lessons were revealed for getting other public health problems onto the global-, national-, and local-level agendas.

7. **Sommer, M., & Sahin, M. (2013). Overcoming the Taboo: Advancing the global agenda for menstrual hygiene management for schoolgirls. *Am J Public Health, 103*(9), 1556–1559.**

Comment: This article describes findings on the experience of schoolgirls with menstrual hygiene management and the difficulties that girls face in managing their menses. There are many gaps in knowledge pertaining to menstruation and inadequate menstrual management can affect girls' participation in school. The authors call for further research into the topic, particularly quantitative studies, in order to develop an effective multi-sectoral response.

8. **Sommer, M., Sutherland, C., & Chandra-Mouli, V. (2015). Putting menarche and girls into the global population health agenda. *Reprod Health, 12*, 24.**

Abstract: Menarche, the onset of menstruation is a fundamental part of a girl's transition from childhood to adolescence. Studies show that girls in many countries experience menarche with insufficient information and support. Girls from around the world report feeling ashamed and afraid. The potential health effects of such experiences include a weakening of girls' sense of self-confidence and competence, which in turn may comprise girls' abilities to assert themselves in different situations, including in relation to their sexuality and sexual and reproductive health. There is an important need for the public health community to assure that girls receive the education and support they need about menstruation, so they are able to feel more confident about their bodies, and navigate preventable health problems – now and in the future. For too long, the global health community has overlooked the window of opportunity presented by menarche. Family planning programs have generally focused their efforts on married couples and HIV programs have focused safer sex promotion on older adolescent girls and boys. Starting the conversation at menarche with girls in early adolescence would fully use this window of opportunity. It would engage young adolescent girls and be a natural first step for later, more comprehensive conversations about sexuality, reproduction and reproductive health. There are a number of initiatives beginning to tackle the provision of puberty

information to girls and boys, but the global health community is overdue to set a global standard for the provision of such guidance.

9. Starrs, A. (2015). A Lancet Commission on sexual and reproductive health and rights: going beyond the Sustainable Development Goals. *The Lancet*, 386(9999), 1111-1112.

Comment: In this article, the author discusses how sexual and reproductive health and rights are addressed within the sustainable development goals. She writes that the sustainable development goals are missing certain elements of sexual and reproductive health and rights and that there is a lack of progress on developing a holistic agenda to advance the field. As a result, the Guttmacher Institute and *The Lancet* have partnered to create the commission on sexual and reproductive health and rights. The commission's goal is to establish a world-wide agenda for sexual and reproductive health and rights and encourage the implementation of policies and programs that further this goal. The commission will provide evidence-based recommendations to move the field forward and was intended to begin work in 2016.

10. Starrs, A. M., Ezeh, A. C., Barker, G., Basu, A., Bertrand, J. T., Blum, R., . . . Ashford, L. S. (2018). Accelerate progress—sexual and reproductive health and rights for all: report of the Guttmacher– Lancet Commission. *The Lancet*, 391(10140), 2642-2692.

Comment: This *Lancet* report details the literature on the sexual and reproductive health and rights agenda and where it is lacking. The authors present a broad definition of sexual and reproductive health and rights and identify the services and information that should be consistently available. In addition to contraceptive access, maternal care, and HIV, the components that they argue should be addressed within sexual and reproductive health and rights are: “care for STIs other than HIV; comprehensive sexuality education; safe abortion care; prevention, detection, and counselling for gender-based violence; prevention, detection, and treatment of infertility and cervical cancer; and counselling and care for sexual health and wellbeing” (p.2643). They also argue that a multi-sectoral response to sexual and reproductive health and rights is essential to advancing the agenda.

Access and Needs

These resources detail challenges related to menstrual health and hygiene management; several address the relation between menstrual health and reproductive health. Access to products and needs are also described within specific contexts, such as in school and humanitarian relief settings.

1. **Hennegan, J., Shannon, A. K., Schwab, K. J., & investigators, P. M. A. (2018). Wealthy, urban, educated. Who is represented in population surveys of women's menstrual hygiene management? *Reprod Health Matters*, 26(52), 1484220.**

Abstract: Inadequate menstrual hygiene presents a barrier to women's dignity and health. Recent attention to this marginalized challenge has resulted in the first national assessments of menstrual practices. Intuitively, surveys require women to have had a recent menses to be eligible. This study seeks to determine if there are demographic differences between women who are eligible and ineligible to answer questions about their menstrual hygiene during these assessments. Secondary analyses were undertaken on nationally or state representative data collected by the Performance Monitoring and Accountability 2020 survey program across eight countries (Burkina Faso, Ethiopia, Ghana, India, Kenya, Niger, Nigeria, and Uganda). Female respondents were included in the study and compared on whether they had a menstrual period within the past three months and thus were eligible to answer questions regarding menstrual practices. On average, 29% of surveyed women across samples were ineligible to be asked menstrual hygiene questions. Higher levels of education, wealth, and urban residence were associated with higher odds of eligibility. Young and unmarried women were also more likely to be eligible. Demographic differences between eligible and ineligible women were consistent across all countries. Wealthy, urban, and educated women are more likely to be eligible to answer survey questions about menstrual hygiene. While population surveys may be representative of menstruating women, proportions of menstrual hygiene practices reported underrepresent the experiences of more vulnerable groups. These groups are likely to have greater struggles with menstrual hygiene when they are menstruating.

2. **Menstrual Hygiene Management. (2018). *Performance Monitoring and Accountability 2020*. Bill & Melinda Gates Institute for Population and Reproductive Health at the Johns Hopkins Bloomberg School of Public Health. Retrieved from PMA 2020 website: <https://www.pma2020.org/mhm-briefs>**

Comment: The Performance Monitoring and Accountability 2020 (PMA2020) project at the Bill & Melinda Gates Institute for Population and Reproductive Health at the Johns Hopkins Bloomberg School of Public Health collects household data to monitor health and development indicators. In some of their surveys, menstrual hygiene management is included as a topic with multiple indicators. In the description of menstrual hygiene management (MHM), the report's authors write that not adequately addressing MHM needs leads to consequences for women's reproductive health. As of July 2018, there are 12 country, state, or province-specific briefs that

provide data on MHM on the PMA 2020 webpage. The indicators summarized on each brief include types of menstrual materials used, disposal of menstrual materials, and percentages of women who report that they have everything they need to manage their menstruation. Full datasets are available for analysis from the PMA2020 project.

- 3. Phillips-Howard, P. A., Otieno, G., Burmen, B., Otieno, F., Odongo, F., Odour, C., . . . Laserson, K. F. (2015). Menstrual Needs and Associations with Sexual and Reproductive Risks in Rural Kenyan Females: A Cross-Sectional Behavioral Survey Linked with HIV Prevalence. *J Womens Health (Larchmt)*, 24(10), 801-811.**

Abstract:

BACKGROUND: Females in low and middle-income countries (LMICs) have difficulty coping with menstrual needs, but few studies have examined the social or health implications of these needs.

METHODS: Responses from 3418 menstruating females aged 13–29 years were extracted from an HIV and behavioral risks cross-sectional survey conducted in rural western Kenya. We examined sanitary products used, provision of products from sexual partners or from transactional sex, and demographic and sexual exposures.

RESULTS: Overall, 75% of females reported using commercial pads and 25% used traditional materials such as cloth or items like paper or tissue, with 10% of girls <15 years old depending on makeshift items. Two-thirds of females with no education relied on traditional items. Having attended secondary school increased the odds of using commercial pads among married (adjusted odds ratios [AOR] 4.8, 95% confidence interval [CI] 3.25–7.12) and single females (AOR 2.17, 95% CI 1.04–4.55). Married females had lower odds of pad use if they reported early (<12 years of age) compared with later (≥ 18 years) sexual debut (64% vs. 78%, AOR 0.45, 95% CI 0.21–0.97). Two-thirds of pad users received them from sexual partners. Receipt was lower among married females if partners were violent (AOR 0.67, 95% CI 0.53–0.85). Receipt among single females was higher if they had two or more sexual partners in the past year (AOR 2.11, 95% CI 1.04–4.29). Prevalence of engaging in sex for money to buy pads was low (1.3%); however, 10% of 15-year-olds reported this, with girls ≤ 15 having significantly higher odds compared with females over 15 (AOR 2.84, 95% CI 0.89–9.11). The odds of having transactional sex for pads was higher among females having two or more partners in the past 12 months (AOR 4.86, 95% CI 2.06–11.43).

CONCLUSIONS: Menstrual needs of impoverished females in rural LMICs settings likely leads to increased physical and sexual harms. Studies are required to strengthen knowledge and to evaluate interventions to reduce these harms.

4. Sebastian, A., Hoffmann, V., & Adelman, S. (2013). Menstrual management in low-income countries: needs and trends. *Waterlines*, 32(2), 135-153.

Abstract: Access to appropriate facilities for menstrual hygiene and management (MHM) is recognized as a neglected need within the sanitation sector globally. However, little is known about the magnitude or trajectory of this need. Further, the particular services and facilities required to meet MHM needs depend on the practices and products employed by women and girls. We use nationally representative data from 58 low and lower-middle income countries to estimate that 800 million women in such countries menstruate regularly. Positive correlations between menstruation and nutritional status, as well as menstruation and household wealth, imply a growing need for menstrual management solutions as poverty declines, but both effects are dwarfed by the impact of declining fertility rates. Data on imports of disposable menstrual products reveal exponential growth in their use in low and especially lower-middle income countries. This trend is likely to continue as incomes grow and markets develop, making ever greater the need for provision of appropriate disposal facilities.

5. Sommer, M., Chandraratna, S., Cavill, S., Mahon, T., & Phillips-Howard, P. (2016). Managing menstruation in the workplace: an overlooked issue in low- and middle-income countries. *Int J Equity Health*, 15, 86.

Abstract: The potential menstrual hygiene management barriers faced by adolescent girls and women in workplace environments in low- and middle-income countries has been under addressed in research, programming and policy. Despite global efforts to reduce poverty among women in such contexts, there has been insufficient attention to the water and sanitation related barriers, specifically in relation to managing monthly menstruation, that may hinder girls' and women's contributions to the workplace, and their health and wellbeing. There is an urgent need to document the specific social and environmental barriers they may be facing in relation to menstrual management, to conduct a costing of the implications of inadequate supportive workplace environments for menstrual hygiene management, and to understand the implications for girls' and women's health and wellbeing. This will provide essential evidence for guiding national policy makers, the private sector, donors and activists focused on advancing girls' and women's rights.

In Emergency Contexts

- Budhathoki, S. S., Bhattachan, M., Castro-Sanchez, E., Sagtani, R. A., Rayamajhi, R. B., Rai, P., & Sharma, G. (2018). Menstrual hygiene management among women and adolescent girls in the aftermath of the earthquake in Nepal. *BMC Womens Health*, 18(1), 33.**

Abstract:

BACKGROUND: Menstrual hygiene management is an essential aspect of hygiene for women and adolescent girls between menarche and menopause. Despite being an important issue concerning women and girls in the menstruating age group menstrual hygiene management is often overlooked in post-disaster responses. Further, there is limited evidence of menstrual hygiene management in humanitarian settings. This study aims to describe the experiences and perceptions of women and adolescent girls on menstrual hygiene management in post-earthquake Nepal.

METHODS: A mixed methods study was carried out among the earthquake affected women and adolescent girls in three villages of Sindhupalchowk district of Nepal. Data was (sic) collected using a semi-structured questionnaire that captured experiences and perceptions of respondents on menstrual hygiene management in the aftermath of the Nepal earthquake. Quantitative data were triangulated with in-depth interview regarding respondent's personal experiences of menstrual hygiene management.

RESULTS: Menstrual hygiene was rated as the sixth highest overall need and perceived as an immediate need by 18.8% of the respondents. There were 42.8% women & girls who menstruated within first week of the earthquake. Reusable sanitary cloth were (sic) used by about 66.7% of the respondents before the earthquake and remained a popular method (76.1%) post-earthquake. None of the respondents reported receiving menstrual adsorbents as relief materials in the first month following the earthquake. Disposable pads (77.8%) were preferred by respondents as they were perceived to be clean and convenient to use. Most respondents (73.5%) felt that reusable sanitary pads were a sustainable choice. Women who were in the age group of 15-34 years (OR=3.14; CI=(1.07-9.20), did not go to school (OR=9.68; CI=2.16-43.33), married (OR=2.99; CI=1.22-7.31) and previously used reusable sanitary cloth (OR=5.82; CI=2.33-14.55) were more likely to use the reusable sanitary cloth.

CONCLUSIONS: In the immediate aftermath of the earthquake, women and girls completely depended on the use of locally available resources as adsorbents during menstruation. Immediate relief activities by humanitarian agencies, lacked menstrual hygiene management activities. Understanding the previous practice and using local resources, the reusable sanitary cloth is a way to address the menstrual hygiene needs in the post-disaster situations in Nepal.

7. VanLeeuwen, C., & Torondel, B. (2018). Improving menstrual hygiene management in emergency contexts: literature review of current perspectives. *Int J Womens Health*, 10, 169-186.

Abstract: Management of menstruation in contexts of humanitarian emergencies can be challenging. A lack of empirical research about effective interventions which improve menstrual hygiene management (MHM) among female populations in humanitarian emergencies and a lack of clarity about which sectors within a humanitarian response should deliver MHM interventions can both be attributable to the lack of clear guidance on design and delivery of culturally appropriate MHM intervention in settings of humanitarian emergencies. The objective of this review was to collate, summarize, and appraise existing peer-reviewed and gray literature that describes the current scenario of MHM in emergency contexts in order to describe the breadth and depth of current policies, guidelines, empirical research, and humanitarian aid activities addressing populations' menstrual needs. A structured-search strategy was conducted for peer-reviewed and gray literature to identify studies, published reports, guidelines, and policy papers related to menstrual response in emergency humanitarian contexts. Of the 51 articles included in the review, 16 were peer-reviewed papers and 35 were gray literature. Most of the literature agreed that hardware interventions should focus on the supply of adequate material (not only absorbent material but also other supportive material) and adequate sanitation facilities, with access to water and private space for washing, changing, drying, and disposing menstrual materials. Software interventions should focus on education in the usage of materials to manage menstruation hygienically and education about the female body's biological processes. There was clear agreement that the needs of the target population should be assessed before designing any intervention. Although there is insight about which factors should be included in an effective menstrual hygiene intervention, there is insufficient empirical evidence to establish which interventions are most effective in humanitarian emergencies and which sectors should be responsible for the coordination and implementation of such. Increased monitoring and evaluation studies of interventions should be completed and publicly shared, in order to feed evidence-based guidelines in the humanitarian sector.

In Schools

- 8. Boosey, R., Prestwich, G., & Deave, T. (2014). Menstrual hygiene management amongst schoolgirls in the Rukungiri district of Uganda and the impact on their education: a cross-sectional study. *Pan Afr Med J*, 19, 253.**

Abstract:

INTRODUCTION: an increasing number of studies have found that girls in low-income settings miss or struggle at school during menstruation if they are unable to manage their menstrual hygiene effectively. This study explores the menstrual hygiene practices and knowledge of girls at rural government primary schools in the Rukungiri district in Uganda and assesses the extent to which poor menstrual hygiene management (MHM) affects their education.

METHODS: a self-administered questionnaire was completed by schoolgirls in six government-run primary schools in the Rukungiri district. Focus groups were held with girls from each school and semi-structured interviews were conducted with headteachers and female teachers from the participating schools. A toilet assessment was also conducted in each school.

RESULTS: one hundred and forty schoolgirls completed the questionnaire. The girls reported a lack of access to adequate resources, facilities and accurate information to manage their menstrual hygiene effectively at school. They reported that, as a result, during menstruation they often struggle at school or miss school. Eighty-six girls (61.7%) reported missing school each month for menstrual-related reasons (mean 1.64, range 0-10, SD. 1.84).

CONCLUSION: it is common for girls who attend government-run primary schools in the Rukungiri district to miss school or struggle in lessons during menstruation because they do not have access to the resources, facilities, or information they need to manage for effective MHM. This is likely to have detrimental effects on their education and future prospects. A large-scale study is needed to explore the extent of this issue.

- 9. Caruso, B. A., Fehr, A., Inden, K., Sahin, M., Ellis, A., Andes, K. L., & Freeman, M. C. (2013). *WASH in Schools Empowers Girls' Education in Freetown, Sierra Leone: An Assessment of Menstrual Hygiene Management in Schools*. UNICEF. Retrieved from: http://www.ungei.org/files/WASH_Sierra_Leone.pdf**

Comment: This study aimed to identify the challenges that accompany menstruation for schoolgirls in Freetown, Sierra Leone. The participants mentioned how dealing with menses had consequences such as missing school. The most prevalent challenge in management of menstruation was menstrual pain. Other identified challenges included shame about menstruation, leaks or odors, little knowledge of menstruation, lack of preparation, and inadequate management of menstrual flow. Reported potential risks for education and health included unintended pregnancy as a result of not understanding the fertility cycle and hindered education due to menstruation. Of those who participated in in-depth interviews, the average age of menarche was 12.8 years old.

- 10. Grant, M. J., Lloyd, C. B., & Mensch, B. S. (2013). Menstruation and school absenteeism: Evidence from rural Malawi. *Comparative Education Review*, 18(9), 230–284.**

Abstract: The provision of toilets and menstrual supplies appears to be a promising strategy to promote adolescent girls' school attendance and performance in less developed countries. In this article, we use the first round of the Malawi Schooling and Adolescent Survey (MSAS) to examine the individual- and school-level factors associated with menstruation-related school absenteeism. Although one-third of female students reported missing at least 1 day of school during their previous menstrual period, our data suggest that menstruation accounts only for a small proportion of all female absenteeism and does not create a gender gap in absenteeism. We find no evidence for school-level variance in menstruation-related absenteeism, suggesting that absenteeism due to menstruation is not sensitive to school environments. Rather, coresidence with a grandmother and spending time on schoolwork at home are associated with lower odds of absence during the last menstrual period.

- 11. Jewitt, S., & Ryley, H. (2014). It's a girl thing: Menstruation, school attendance, spatial mobility and wider gender inequalities in Kenya. *Geoforum*, 56, 137-147.**

Abstract: Recent attention has been drawn to possible linkages between poor sanitation in sub-Saharan African schools and low attendance rates amongst post-pubescent girls. In particular, questions have been raised about the influence of menstruation and access to sanitary products on schoolgirl absenteeism but research on this topic is scarce. Moreover, the few detailed empirical studies that have been conducted in sub-Saharan Africa on this topic have produced contradictory results. These uncertainties coupled with theories of how concepts of pollution and taboo are used to construct or police spatial boundaries (and maintain power relations within society) provide an interesting context for examining everyday geographies of menstruation. Kisumu, Kenya provides the context for the study which utilizes a feminist political ecology framework to investigate cultural and spatial limitations associated with menstruation and puberty. Drawing on schoolgirls' lived experiences, we illustrate how emotional geographies of puberty and menstruation are productive of and help to reproduce gender inequalities in mobility and access to social capital resources (especially education). At the same time, we show how poverty coupled with low levels of sexual and reproductive health and rights education can exacerbate gendered bodily inequalities as girls face an increased risk of sexual exploitation when they reach puberty.

12. Long, J., Caruso, B.A., Lopez, D., Vancraeynest, K., Sahin, M., Andes, K.L., Freeman, M. (2013). *WASH in Schools Empowers Girls' Education in Rural Cochabamba, Bolivia: An assessment of menstrual hygiene management in schools*. UNICEF. Retrieved from: https://www.unicef.org/wash/schools/files/Bolivia_MHM_Booklet_DM_15_Nov_sing_le_0940_Bolivia.pdf

Comment: This study aimed to assess the challenges surrounding menstrual hygiene management among schoolgirls in Cochabamba, Bolivia. The researchers identified five factors that underlie menstrual-related challenges: societal, environmental, interpersonal, personal, and biological. One of the research findings was that at the personal level, many girls lack adequate information on menstruation and how to manage their menses, which can negatively affect their health. In order to improve schoolgirls' experience with menstruation, the researchers advocate for cross-sectoral responses. One of their key recommendations involved equipping girls with the knowledge and skillset to manage menstruation effectively; this included educating girls on menstruation before they get their first period and for students to receive teachings on both reproductive health and water, sanitation, and hygiene training.

13. Mason, L., Nyothach, E., Alexander, K., Odhiambo, F. O., Eleveld, A., Vulule, J., . . . Phillips-Howard, P. A. (2013). 'We keep it secret so no one should know'--a qualitative study to explore young schoolgirls attitudes and experiences with menstruation in rural western Kenya. *PLoS One*, 8(11), e79132.

Abstract:

BACKGROUND: Keeping girls in school offers them protection against early marriage, teen pregnancy, and sexual harms, and enhances social and economic equity. Studies report menstruation exacerbates school-drop out and poor attendance, although evidence is sparse. This study qualitatively examines the menstrual experiences of young adolescent schoolgirls. **METHODS AND FINDINGS:** The study was conducted in Siaya County in rural western Kenya. A sample of 120 girls aged 14–16 years took part in 11 focus group discussions, which were analyzed thematically. The data gathered were supplemented by information from six FGDs with parents and community members. Emergent themes were: lack of preparation for menarche; maturation and sexual vulnerability; menstruation as an illness; secrecy, fear and shame of leaking; coping with inadequate alternatives; paying for pads with sex; and problems with menstrual hygiene. Girls were unprepared and demonstrated poor reproductive knowledge, but devised practical methods to cope with menstrual difficulties, often alone. Parental and school support of menstrual needs is limited, and information sparse or inaccurate. Girls' physical changes prompt boys and adults to target and brand girls as ripe for sexual activity including coercion and marriage. Girls admitted 'others' rather than themselves were absent from school during menstruation, due to physical symptoms or inadequate sanitary protection. They described difficulties engaging in class, due to fear of smelling and leakage, and subsequent teasing. Sanitary pads were valued but resource and time constraints result in prolonged use causing chafing. Improvised alternatives, including rags and grass, were

prone to leak, caused soreness, and were perceived as harmful. Girls reported 'other girls' but not themselves participated in transactional sex to buy pads, and received pads from boyfriends.

CONCLUSIONS: In the absence of parental and school support, girls cope, sometimes alone, with menarche in practical and sometimes hazardous ways. Emotional and physical support mechanisms need to be included within a package of measures to enable adolescent girls to reach their potential.

14. McMahan, S. A., Winch, P. J., Caruso, B. A., Obure, A. F., Ogutu, E. A., Ochari, I. A., & Rheingans, R. D. (2011). 'The girl with her period is the one to hang her head' Reflections on menstrual management among schoolgirls in rural Kenya. *BMC International Health and Human Rights*, 11(1), 7.

Abstract:

BACKGROUND: The onset of menstruation is a landmark event in the life of a young woman. Yet the complications and challenges that can accompany such an event have been understudied, specifically in resource-poor settings. As interventions aim to improve female attendance in schools, it is important to explore how menstruation is perceived and navigated by girls in the school setting. This research conveys rural Kenyan schoolgirls' perceptions and practices related to menstruation.

METHODS: Data were collected at six rural schools in the Nyanza Province of Western Kenya. Using focus group discussions, in-depth interviews, and field notes from observations, researchers collected information from 48 primary schoolgirls and nine teachers. Systematic analysis began with a reading of transcripts and debriefing notes, followed by manual coding of the narratives.

RESULTS: Focus group discussions became opportunities for girls to share thoughts on menstruation, instruct one another on management practices and advise one another on coping mechanisms. Girls expressed fear, shame, distraction and confusion as feelings associated with menstruation. These feelings are largely linked to a sense of embarrassment, concerns about being stigmatized by fellow students and, as teachers explained, a perception that the onset of menstruation signals the advent of a girl's sexual status. Among the many methods for managing their periods, girls most frequently said they folded, bunched up or sewed cloth, including cloth from shirts or dresses, scraps of old cloth, or strips of an old blanket. Cloth was reported to frequently leak and cause chafing, which made school attendance difficult particularly as the day progressed. Attitudes and practices of girls toward menstruation have been arranged into personal, environmental and behavioral factors.

CONCLUSION: Further research on menstrual management options that are practical, sustainable and culturally acceptable must be conducted to inform future programs and policies that aim to empower young girls as they transition into womanhood. Stakeholders working within this and similar contexts must consider systematic mechanisms to explain to young girls what menstruation is and how to manage it. Providing sanitary supplies or guiding girls on how to create supplies serve as critical components for future interventions

15. Nanda, G., Lupee, J., & Tharaldson, J. (2016). *Menstrual Hygiene Management among Schoolgirls in Eastern Province of Zambia Qualitative Research Final Report*. Retrieved from: http://menstrualhygieneday.org/wp-content/uploads/2016/12/USAID_MHM-among-Schoolgirls-in-Eastern-Province-of-Zambia-FINAL508.pdf

Comment: This report is on qualitative research, conducted under the Schools Promoting Learning Achievement through Sanitation and Hygiene (SPLASH) project, to understand menstrual-related challenges for schoolgirls in Zambia. Through focus group discussions and key informant interviews, the researchers identified prevalent issues in relation to menstrual hygiene management. Issues were identified and organized through a socio-ecological model of change at the individual, interpersonal, community, and environmental level. Individual level challenges included menstrual pain, fear at menarche, lack of access to products and knowledge on how to manage menses. Harassment and exclusion were discussed at the interpersonal level and beliefs surrounding menstruation at the community level; lack of access to adequate and private WASH facilities at school were among barriers at the environmental level. The authors conclude by encouraging the progression of menstrual hygiene management programs that address barriers at all levels, which their results show is necessary.

16. Oruko, K., Nyothach, E., Zielinski-Gutierrez, E., Mason, L., Alexander, K., Vulule, J., . . . Phillips-Howard, P. A. (2015). 'He is the one who is providing you with everything so whatever he says is what you do': A Qualitative Study on Factors Affecting Secondary Schoolgirls' Dropout in Rural Western Kenya. *PLoS One*, *10*(12), e0144321.

Abstract: Education is an effective way to improve girls' self-worth, health, and productivity; however there remains a gender gap between girls' and boys' completion of school. The literature around factors influencing girls' decision to stay in school is limited. Seven focus group discussions took place among 79 girls in forms 2 to 4 at secondary schools in rural western Kenya, to examine their views on why girls absent themselves or dropout from school. Data were analyzed thematically. Lack of resources, sexual relationships with boyfriends, and menstrual care problems were reported to lead directly to dropout or school absence. These were tied to girls increased vulnerability to pregnancy, poor performance in school, and punishments, which further increase school absence and risk of dropout. Poverty, unmet essential needs, coercive sexual relationships, and an inequitable school environment collude to counter girls' resolve to complete their schooling. Lack of resources drive girls to have sex with boyfriends or men who provide them with essentials their family cannot afford, such as sanitary pads and transport to school. While these improve quality of their school life, this dynamic increases their exposure to sexual risk, pregnancy, punishment, and dropout. Evaluation of interventions to ameliorate these challenges is warranted, including provision of pocket money to address their needs.

17. Tamiru, S., Mamo, K., Acidria, P., Mushi, R., Ali, C. S., & Ndebele, L. (2015). Towards a sustainable solution for school menstrual hygiene management: cases of Ethiopia, Uganda, South-Sudan, Tanzania, and Zimbabwe. *Waterlines*, 34(1), 92-102.

Abstract: African schoolgirls face considerable challenges as a result of menstruation and its management. Menstruation is seen as secret and regarded as taboo. As a result, girls are not receiving adequate support from home, schools, or the community. They are left to address the challenge on their own, which consequently affects their school performance. Development interventions that deal only with the supply of materials cannot resolve the problem in a sustainable manner. We need to have a comprehensive approach that can improve: knowledge, attitude, and practice of girls, parents, and the community; sanitary materials supply; the policy environment; and the physical infrastructure. The issue of menstrual hygiene management is gaining recognition as part of the development agenda for improving girls' school participation. But there is little research and few practical case studies have been conducted to inform policy and practice. SNV Netherlands Development Organization is addressing menstrual hygiene under its WASH in School program in Asia, Africa, and Latin America. This article highlights baseline survey findings of the current menstrual hygiene management practices in the project areas of Ethiopia, South Sudan, Uganda, Tanzania, and Zimbabwe and recommends the approach piloted.

Cross-Referenced

In Urogenital Tract Infections

Sumpter, C., & Torondel, B. (2013). A Systematic Review of the Health and Social Effects of Menstrual Hygiene Management. *PLoS One*, 8(4), e62004.

In Experience with Puberty and Menarche

Aniebue, U. U., Aniebue, P. N., & Nwankwo, T. O. (2009). The impact of pre-menarcheal training on menstrual practices and hygiene of Nigerian school girls. *The Pan African Medical Journal*, 2, 9.

Chandra-Mouli, V., & Patel, S. V. (2017). Mapping the knowledge and understanding of menarche, menstrual hygiene and menstrual health among adolescent girls in low- and middle-income countries. *Reprod Health*, 14(1), 30.

In Interventions

Montgomery, P., Hennegan, J., Dolan, C., Wu, M., Steinfield, L., & Scott, L. (2016). Menstruation and the Cycle of Poverty: A Cluster Quasi-Randomised Control Trial of Sanitary Pad and Puberty Education Provision in Uganda. *PLoS One*, 11(12), e0166122.

Montgomery, P., Ryus, C. R., Dolan, C. S., Dopson, S., & Scott, L. M. (2012). Sanitary Pad Interventions for Girls' Education in Ghana: A Pilot Study. *PLoS One*, 7(10), e48274.

Oster, E., & Thornton, R. (2009). *Menstruation and education in Nepal*. NBER Working Paper Series. Retrieved from: www.nber.org/papers/w14853.

BIOLOGICAL LINKAGES

Urogenital Tract Infections

Poor menstrual health may heighten the risk of urogenital tract infections and the following resources address this potential link. Several resources also detail the risk that these infections pose to other aspects of sexual and reproductive health, such as risk of HIV acquisition and infertility.

1. **Atashili, J., Poole, C., Ndumbe, P. M., Adimora, A. A., & Smith, J. S. (2008). Bacterial vaginosis and HIV acquisition: A meta-analysis of published studies. *AIDS (London, England)*, 22(12), 1493–1501.**

Abstract:

OBJECTIVES: To assess and summarize the published literature on the extent to which bacterial vaginosis may increase the risk of HIV acquisition. Design: Meta-analysis of published studies.

METHODS: Medline and other electronic databases were systematically searched for eligible publications. The association between bacterial vaginosis and incident HIV was separately analyzed from that between bacterial vaginosis and prevalent HIV. The latter was further analyzed, stratified by bacterial vaginosis diagnostic method, HIV risk profile of the study population, and whether or not adjusted estimates were presented.

RESULTS: Twenty-three eligible publications were identified, including a total of 30,739 women. Bacterial vaginosis was associated with an increased risk of HIV acquisition in HIV-incidence studies (relative risk = 1.6, 95% confidence interval: 1.2, 2.1). All but one of 21 HIV-prevalence studies reported estimates above the null. The latter results were heterogeneous and showed some evidence of funnel plot asymmetry, precluding the estimation of a single summary measure. The association between bacterial vaginosis and HIV in prevalence studies appeared stronger for women without high-risk sexual behavior.

CONCLUSION: Bacterial vaginosis was consistently associated with an increased risk of HIV infection. High bacterial vaginosis prevalence may result in a high number of HIV infections being attributable to bacterial vaginosis. More prospective studies are needed to accurately evaluate the role of bacterial vaginosis in HIV acquisition in low-risk versus high-risk women. Furthermore, randomized clinical trials may be worth considering to determine the effect of bacterial vaginosis control measures on HIV acquisition.

2. **Comparison of female to male and male to female transmission of HIV in 563 stable couples. European Study Group on Heterosexual Transmission of HIV. (1992). *Bmj*, 304(6830), 809-813.**

Abstract:

OBJECTIVE: To identify risk factors for heterosexual transmission of HIV and to compare the efficiency of male to female and female to male transmission.

DESIGN: Cohort study of heterosexual couples. Regular partners of HIV infected subjects were tested and both members of the couples interviewed every six months. HIV prevalence in partners was analyzed according to the characteristics of the couples.

SETTING: Nine European countries.

SUBJECTS: 563 couples comprising 156 female index patients with their 159 male partners and 400 male index patients with their 404 female partners. Partners reporting risk factors other than sexual contacts with the index patient were excluded. Main outcome measures-HIV infection in partners and high risk sexual behavior.

RESULTS: Overall, 19 (12%) male partners and 82 (20%) female partners were infected with HIV, suggesting that male to female transmission is 1.9 (95% confidence interval 1.1 to 3.3) times more effective than female to male transmission. An advanced stage of HIV infection in the index patient (odds ratio 17.6; 4.9 to 62.7) and sexual contacts during menses (3.4; 1.0 to 11.1) increased the risk of female to male transmission and stage of infection (2.7; 1.5 to 4.9), anal sex (5.1; 2.9 to 8.9), and age of the female partner (3.9; 1.2 to 13.0 for age >45 years) increased the risk of male to female transmission. None of the 24 partners who had used condoms systematically since the first sexual contact was infected.

CONCLUSIONS: Several factors which potentiate the risk of transmission through unprotected vaginal intercourse have been identified. Knowledge of these factors could be helpful for counselling patients infected with HIV and their sexual partners.

3. Das, P., Baker, K. K., Dutta, A., Swain, T., Sahoo, S., Das, B. S., . . . Torondel, B. (2015). Menstrual Hygiene Practices, WASH Access and the Risk of Urogenital Infection in Women from Odisha, India. *PLoS One*, 10(6), e0130777.

Abstract: Menstrual hygiene management (MHM) practices vary worldwide and depend on the individual's socioeconomic status, personal preferences, local traditions and beliefs, and access to water and sanitation resources. MHM practices can be particularly unhygienic and inconvenient for girls and women in poorer settings. Little is known about whether unhygienic MHM practices increase a woman's exposure to urogenital infections, such as bacterial vaginosis (BV) and urinary tract infection (UTI). This study aimed to determine the association of MHM practices with urogenital infections, controlling for environmental drivers. A hospital-based case-control study was conducted on 486 women at Odisha, India. Cases and controls were recruited using a syndromic approach. Vaginal swabs were collected from all the participants and tested for BV status using Amsel's criteria. Urine samples were cultured to assess UTI status. Socioeconomic status, clinical symptoms and reproductive history, and MHM and water and sanitation practices were obtained by standardized questionnaire. A total of 486 women were recruited to the study, 228 symptomatic cases and 258 asymptomatic controls. Women who used reusable absorbent pads were more likely to have symptoms of urogenital infection (AdjOR=2.3, 95%CI1.5-3.4) or to be diagnosed with at least one urogenital infection (BV or UTI) (AdjOR=2.8, 95%CI1.7-4.5), than women using disposable pads. Increased wealth and space for personal hygiene in the household were protective for BV (AdjOR=0.5, 95%CI0.3-0.9 and AdjOR=0.6, 95%CI0.3-0.9 respectively). Lower education of the participants was the

only factor associated with UTI after adjusting for all the confounders (AdjOR=3.1, 95%CI1.2-7.9). Interventions that ensure women have access to private facilities with water for MHM and that educate women about safer, low-cost MHM materials could reduce urogenital disease among women. Further studies of the effects of specific practices for managing hygienically reusable pads and studies to explore other pathogenic reproductive tract infections are needed.

4. **Pellati, D., Mylonakis, I., Bertoloni, G., Fiore, C., Andrisani, A., Ambrosini, G., & Armanini, D. (2008). Genital tract infections and infertility. *Eur J Obstet Gynecol Reprod Biol*, 140(1), 3-11.**

Abstract: Infectious agents can impair various important human functions, including reproduction. Bacteria, fungi, viruses and parasites are able to interfere with the reproductive function in both sexes. Infections of male genito-urinary tract account for about 15% of the case of male infertility. Infections can affect different sites of the male reproductive tract, such as the testis, epididymis and male accessory sex glands. Spermatozoa themselves subsequently can be affected by urogenital infections at different levels of their development, maturation and transport. Among the most common microorganisms involved in sexually transmitted infections, interfering with male fertility, there are the *Chlamydia trachomatis* and *Neisseria gonorrhoeae*. Less frequently male infertility is due to non-sexually transmitted epididymo-orchitis, mostly caused by *Escherichia coli*. In female, the first two microorganisms are certainly involved in cervical, tubal, and peritoneal damage, while Herpes simplex cervicitis is less dangerous. The overall importance of cervical involvement is still under discussion. Tubo-peritoneal damage seems to be the foremost manner in which microorganisms interfere with human fertility. *C. trachomatis* is considered the most important cause of tubal lacerations and obstruction, pelvic inflammatory disease (PID) and adhesions. *N. gonorrhoeae*, even though its overall incidence seems to decline, is still to be considered in the same sense, while bacterial vaginosis should not be ignored, as causative agents can produce ascending infections of the female genital tract. The role of infections, particularly co-infections, as causes of the impairment of sperm quality, motility and function needs further investigation. Tropical diseases necessitate monitoring as for their diffusion or re-diffusion in the western world.

5. **Phillips-Howard, P. A., Nyothach, E., ter Kuile, F. O., Omoto, J., Wang, D., Zeh, C., . . . Laserson, K. F. (2016). Menstrual cups and sanitary pads to reduce school attrition, and sexually transmitted and reproductive tract infections: a cluster randomised controlled feasibility study in rural Western Kenya. *BMJ Open*, 6(11).**

Abstract:

OBJECTIVES: Conduct a feasibility study on the effect of menstrual hygiene on schoolgirls' school and health (reproductive/sexual) outcomes.

DESIGN: 3-arm single-site open cluster randomized controlled pilot study. Setting: 30 primary schools in rural western Kenya, within a Health and Demographic Surveillance System.

PARTICIPANTS: Primary schoolgirls 14–16 years, experienced 3 menses, no precluding disability, and resident in the study area.

INTERVENTIONS: 1 insertable menstrual cup, or monthly sanitary pads, against 'usual practice' control. All participants received puberty education preintervention, and hand wash soap during intervention. Schools received hand wash soap. Primary and secondary outcome measures: Primary: school attrition (drop-out, absence); secondary: sexually transmitted infection (STI) (*Trichomonas vaginalis*, *Chlamydia trachomatis*, *Neisseria gonorrhoea*), reproductive tract infection (RTI) (bacterial vaginosis, *Candida albicans*); safety: toxic shock syndrome, vaginal *Staphylococcus aureus*. Results: Of 751 girls enrolled 644 were followed-up for a median of 10.9 months. Cups or pads did not reduce school dropout risk (control=8.0%, cups=11.2%, pads=10.2%). Self-reported absence was rarely reported and not assessable. Prevalence of STIs in the end-of-study survey among controls was 7.7% versus 4.2% in the cups arm (adjusted prevalence ratio (aPR) 0.48, 0.24 to 0.96, $p=0.039$), 4.5% with pads (aPR=0.62; 0.37 to 1.03, $p=0.063$), and 4.3% with cups and pads pooled (aPR=0.54, 0.34 to 0.87, $p=0.012$). RTI prevalence was 21.5%, 28.5% and 26.9% among cup, pad and control arms, 71% of which were bacterial vaginosis, with a prevalence of 14.6%, 19.8% and 20.5%, per arm, respectively. Bacterial vaginosis was less prevalent in the cups (12.9%) compared with pads (20.3%, aPR=0.65, 0.44 to 0.97, $p=0.034$) and control (19.2%, aPR=0.67, 0.43 to 1.04, $p=0.075$) arm girls enrolled for 9 months or longer. No adverse events were identified.

CONCLUSIONS: Provision of menstrual cups and sanitary pads for ~1 school-year was associated with a lower STI risk, and cups with a lower bacterial vaginosis risk, but there was no association with school dropout. A large-scale trial on menstrual cups is warranted.

6. Reichelderfer, P. S., Coombs, R. W., Wright, D. J., Cohn, J., Burns, D. N., Cu-Uvin, S., ... Kovacs, A. A. (2000). Effect of menstrual cycle on HIV-1 levels in the peripheral blood and genital tract. *AIDS*, 14(14), 2101–2107.

Abstract:

OBJECTIVE: To assess the variation in HIV-1 over the menstrual cycle, including RNA levels in the female genital tract, plasma HIV-1-RNA levels, CD4 cell counts, and culturable virus. Design: A prospective analysis of 55 HIV-1-infected women.

METHODS: Blood and genital tract specimens were collected weekly over 8 weeks, spanning two complete menstrual cycles. Applying repeated-measures models that used menses as the reference level, the variation in viral RNA levels was compared in endocervical canal fluid and cells (collected by Sno-strips and cytobrush, respectively) and ectocervicovaginal lavage (CVL) fluid. Repeated-measures models were also used to assess the variation in plasma CD4 cell counts and viral load.

RESULTS: Shedding patterns differed among the three sampling methods, independent of genital tract co-infections. Genital tract HIV-1-RNA levels from CVL fluid and endocervical canal cytobrush specimens were highest during menses and lowest immediately thereafter ($P = 0.001$ and $P = 0.04$). The HIV-1-RNA level in endocervical canal fluid was highest in the week preceding menses ($P = 0.003$). The menstrual cycle had no effect on blood levels of RNA ($P = 0.62$),

culturable virus ($P = 0.34$), or CD4 cell counts ($P = 0.55$). HIV-1-RNA levels were higher in endocervical canal fluid than in peripheral blood plasma during the late luteal phase ($P = 0.03$).
CONCLUSION: HIV-1-RNA levels vary with the menstrual cycle in the female genital tract but not the blood compartment. HIV-1-RNA levels are higher in endocervical canal fluid than in blood plasma. These findings may have important implications for sex-specific pathogenesis, heterosexual transmission, and contraceptive hormone interventions in HIV-1-infected women.

7. Sumpter, C., & Torondel, B. (2013). A Systematic Review of the Health and Social Effects of Menstrual Hygiene Management. *PLoS One*, 8(4), e62004.

Abstract:

BACKGROUND: Differing approaches to menstrual hygiene management (MHM) have been associated with a wide range of health and psycho-social outcomes in lower income settings. This paper systematically collates, summarizes and critically appraises the available evidence. METHODS: Following the PRISMA guidelines a structured search strategy was used to identify articles investigating the effects of MHM on health and psycho-social outcomes. The search was conducted in May 2012 and had no date limit. Data was (sic) extracted and quality of methodology was independently assessed by two researchers. Where no measure of effect was provided, but sufficient data were available to calculate one, this was undertaken. Meta-analysis was conducted where sufficient data were available.

RESULTS: 14 articles were identified which looked at health outcomes, primarily reproductive tract infections (RTI). 11 articles were identified investigating associations between MHM, social restrictions and school attendance. MHM was found to be associated with RTI in 7 papers. Methodologies however varied greatly and overall quality was low. Meta-analysis of a subset of studies found no association between confirmed bacterial vaginosis and MHM (OR: 1.07, 95% CI: 0.52–2.24). No other substantial associations with health outcomes were found. Although there was good evidence that educational interventions can improve MHM practices and reduce social restrictions there was no quantitative evidence that improvements in management methods reduce school absenteeism.

CONCLUSION: The management of menstruation presents significant challenges for women in lower income settings; the effect of poor MHM however remains unclear. It is plausible that MHM can affect the reproductive tract but the specific infections, the strength of effect, and the route of transmission, remain unclear. There is a gap in the evidence for high quality randomized intervention studies which combine hardware and software interventions, in particular for better understanding the nuanced effect improving MHM may have on girls' attendance at school.

8. Villanueva, J. M., Ellerbrock, T. V., Lennox, J. L., Bush, T. J., Wright, T. C., Pratt-Palmore, M., . . . Hart, C. E. (2002). The Menstrual Cycle Does Not Affect Human Immunodeficiency Virus Type 1 Levels in Vaginal Secretions. *The Journal of Infectious Diseases*, 185(2), 170-177.

Abstract: To determine whether the menstrual cycle affects human immunodeficiency virus (HIV) type 1 levels in vaginal secretions, vaginal lavage samples were collected at 7, 14, and 21 days after initiation of menses, to compare virus levels during the follicular, ovulatory, and luteal phases. During 33 menstrual cycles in 25 women, HIV-1 RNA levels in vaginal secretions ranged from ,1000 to 5.3×10^7 copies per lavage, and weekly changes ranged from ,0.5 to 2.5 log₁₀ copies per lavage. HIV-1 RNA levels in vaginal lavage samples from days 7, 14, and 21 were not significantly different. No discernible pattern was found in changes of vaginal virus loads (VVLs) during the menstrual cycle. VVLs were not correlated with plasma estradiol or progesterone levels (P . .05). These results suggest that hormonal changes during the menstrual cycle do not have a significant effect on HIV-1 RNA levels in vaginal secretions.

Cross-Referenced

In Interventions

Juma, J., Nyothach, E., Laserson, K. F., Oduor, C., Arita, L., Ouma, C., . . . Phillips-Howard, P. A. (2017). Examining the safety of menstrual cups among rural primary school girls in western Kenya: observational studies nested in a randomised controlled feasibility study. *BMJ Open*, 7(4), e015429.

MENSTRUAL SEQUELAE AND DISORDERS

These resources provide a description of menstrual sequelae and disorders, their prevalence worldwide, and the challenges they present. These sequelae and disorders include endometriosis, menorrhagia, dysmenorrhea, and anemia. In addition, there are resources on the effectiveness of contraception for the treatment of specific sequelae and a description of the non-contraceptive benefits of certain methods.

Anemia

- 1. Bellizzi, S., & Ali, M. M. (2018). Effect of oral contraception on anemia in 12 low- and middle-income countries. *Contraception, 97*(3), 236-242.**

Abstract:

CONTEXT: In low- and middle-income countries, anemia is a major public health issue in women of reproductive age for a series of factors including iron deficiency.

OBJECTIVE: To estimate prevalence of anemia and to assess the association of low level of hemoglobin versus duration of use of oral contraceptives (OC).

METHODS: Demographic and Health Surveys of 12 countries, conducted between 2005 and 2012, were analyzed. The status of anemia was separately evaluated for nonpregnant women using OC for at least 6 months, 1 year and 2 years, and for women using no method of contraception and/or using nonhormonal contraception.

RESULTS: The total study population comprised 201,720 women, with 40% diagnosed with anemia; around 1 out of 25 women was using oral contraception. The current and continuous use of oral contraception was of benefit against anemia, with the risk for anemia decreasing from odds ratio (OR) 0.68 [95% confidence interval (CI) 0.64–0.73] for use of at least 6 months to OR 0.56 (95% CI 0.52–0.61) for use of at least 1 year and to OR 0.50 (95% CI 0.46–0.54) for use of at least 2 years.

CONCLUSIONS: Findings reinforce evidence of the noncontraceptive benefit of long-term use of OC and provide valuable information for policy makers, family planning staff and clinicians working in low- and middle-income countries in efforts to control anemia.

- 2. Brabin, B. J., Hakimi, M., & Pelletier, D. (2001). An Analysis of Anemia and Pregnancy-Related Maternal Mortality. *The Journal of Nutrition, 131*(2), 604S-615S.**

Abstract: The relationship of anemia as a risk factor for maternal mortality was analyzed by using cross-sectional, longitudinal and case-control studies because randomized trials were not available for analysis. The following six methods of estimation of mortality risk were adopted: 1) the correlation of maternal mortality rates with maternal anemia prevalence derived from national statistics; 2) the proportion of maternal deaths attributable to anemia; 3) the proportion of anemic women who die; 4) population-attributable risk of maternal mortality due to anemia; 5) adolescence as a risk factor for anemia-related mortality; and 6) causes of anemia associated with maternal mortality. The average estimates for all-cause anemia attributable

mortality (both direct and indirect) were 6.37, 7.26 and 3.0% for Africa, Asia and Latin America, respectively. Case fatality rates, mainly for hospital studies, varied from 50%. The relative risk of mortality associated with moderate anemia (hemoglobin 40-80 g/L) was 1.35 [95% confidence interval (CI): 0.92-2.00] and for severe anemia (47 g/L) was 3.51 (95% CI: 2.05–6.00). Population-attributable risk estimates can be defended on the basis of the strong association between severe anemia and maternal mortality but not for mild or moderate anemia. In holoendemic malarious areas with a 5% severe anemia prevalence (hemoglobin ,70 g/L), it was estimated that in primigravidae, there would be 9 severe-malaria anemia-related deaths and 41 nonmalarial anemia-related deaths (mostly nutritional) per 100,000 live births. The iron deficiency component of these is unknown.

- 4. Lowe, R. F., & Prata, N. (2013). Hemoglobin and serum ferritin levels in women using copper-releasing or levonorgestrel-releasing intrauterine devices: a systematic review. *Contraception, 87*(4), 486- 496.**

Abstract:

BACKGROUND: The use of intrauterine devices as a contraceptive method has been steadily growing in developing countries. Anemia in reproductive-age women is a growing concern in those settings.

STUDY DESIGN: A systematic review of studies with measured hemoglobin and serum ferritin at baseline and after 1 year of use of copper intrauterine devices (IUDs) or a levonorgestrel-releasing intrauterine system (LNG IUS) was performed.

RESULTS: Fourteen studies involving copper IUDs in nonanemic women and 4 studies in anemic women and 6 involving the LNG IUS met the criteria for the systematic review. Meta-analyses for hemoglobin changes showed significant decreases for users of copper IUDs and an increase for the LNG IUS, but with limited data. In general, ferritin levels followed the same pattern.

CONCLUSION: Decreases in hemoglobin mean values in copper IUD users were not sufficient to induce anemia in previously nonanemic women. Women who are borderline anemic would likely benefit from using the LNG IUS.

Dysmenorrhea

- 5. Iacovides, S., Avidon, I., & Baker, F. C. (2015). What we know about primary dysmenorrhea today: a critical review. *Hum Reprod Update, 21*(6), 762-778.**

Abstract:

BACKGROUND: Primary dysmenorrhea, or painful menstruation in the absence of pelvic pathology, is a common, and often debilitating, gynecological condition that affects between 45 and 95% of menstruating women. Despite the high prevalence, dysmenorrhea is often poorly treated, and even disregarded, by health professionals, pain researchers, and the women themselves, who may accept it as a normal part of the menstrual cycle. This review reports on

current knowledge, particularly with regards to the impact and consequences of recurrent menstrual pain on pain sensitivity, mood, quality of life and sleep in women with primary dysmenorrhea.

METHODS: Comprehensive literature searches on primary dysmenorrhea were performed using the electronic databases PubMed, Google Scholar and the Cochrane Library. Full-text manuscripts published between the years 1944 and 2015 were reviewed for relevancy and reference lists were cross-checked for additional relevant studies. In combination with the word 'dysmenorrhea' one or more of the following search terms were used to obtain articles published in peer-reviewed journals only: pain, risk factors, etiology, experimental pain, clinical pain, adenomyosis, chronic pain, women, menstrual cycle, hyperalgesia, pain threshold, pain tolerance, pain sensitivity, pain reactivity, pain perception, central sensitization, quality of life, sleep, treatment, non-steroidal anti-inflammatory drugs.

RESULTS: Women with dysmenorrhea, compared with women without dysmenorrhea, have greater sensitivity to experimental pain both within and outside areas of referred menstrual pain. Importantly, the enhanced pain sensitivity is evident even in phases of the menstrual cycle when women are not experiencing menstrual pain, illustrating that long-term differences in pain perception extend outside of the painful menstruation phase. This enhanced pain sensitivity may increase susceptibility to other chronic pain conditions in later life; dysmenorrhea is a risk factor for fibromyalgia. Further, dysmenorrheic pain has an immediate negative impact on quality of life, for up to a few days every month. Women with primary dysmenorrhea have a significantly reduced quality of life, poorer mood and poorer sleep quality during menstruation compared with their pain-free follicular phase, and compared with the menstruation phase of pain-free control women. The prescribed first-line therapy for menstrual pain remains non-steroidal anti-inflammatory drugs, which are effective in relieving daytime and night-time pain.

CONCLUSION: Further study is needed to determine whether effectively blocking dysmenorrheic pain ameliorates risk for the development of chronic pain disorders and to explore whether it is possible to prevent the development—and not just treat—severe dysmenorrheic pain in adolescent girls. In conclusion, we demonstrate the extensive multi-factorial impact of dysmenorrhea and we encourage and direct researchers to necessary future studies.

6. Ju, H., Jones, M., & Mishra, G. (2014). The prevalence and risk factors of dysmenorrhea. *Epidemiol Rev*, 36, 104-113.

Abstract: Dysmenorrhea is a common menstrual complaint with a major impact on women's quality of life, work productivity, and health-care utilization. A comprehensive review was performed on longitudinal or case-control or cross-sectional studies with large community-based samples to accurately determine the prevalence and/or incidence and risk factors of dysmenorrhea. Fifteen primary studies, published between 2002 and 2011, met the inclusion criteria. The prevalence of dysmenorrhea varies between 16% and 91% in women of reproductive age, with severe pain in 2%–29% of the women studied. Women's age, parity, and

use of oral contraceptives were inversely associated with dysmenorrhea, and high stress increased the risk of dysmenorrhea. The effect sizes were generally modest to moderate, with odds ratios varying between 1 and 4. Family history of dysmenorrhea strongly increased its risk, with odds ratios between 3.8 and 20.7. Inconclusive evidence was found for modifiable factors such as cigarette smoking, diet, obesity, depression, and abuse. Dysmenorrhea is a significant symptom for a large proportion of women of reproductive age; however, severe pain limiting daily activities is less common. This review confirms that dysmenorrhea improves with increased age, parity, and use of oral contraceptives and is positively associated with stress and family history of dysmenorrhea.

Endometriosis

7. Brown, J., & Farquhar, C. (2014). Endometriosis: an overview of Cochrane Reviews. *Cochrane Database Syst Rev*(3), CD009590.

Abstract (redacted for length and relevance):

BACKGROUND: This overview reports on interventions for pain relief and for subfertility in premenopausal women with clinically diagnosed endometriosis.

OBJECTIVES: The objective of this overview was to summarize the evidence from Cochrane systematic reviews on treatment options for women with pain or subfertility associated with endometriosis.

METHODS: Published Cochrane systematic reviews reporting pain or fertility outcomes in women with clinically diagnosed endometriosis were eligible for inclusion in the overview. We also identified Cochrane reviews in preparation (protocols and titles) for future inclusion. The reviews, protocols and titles were identified by searching the Cochrane Database of Systematic Reviews and Archie (the Cochrane information management system) in March 2014. Pain-related outcomes of the overview were pain relief, clinical improvement or resolution and pain recurrence. Fertility-related outcomes were live birth, clinical pregnancy, ongoing pregnancy, miscarriage and adverse events. Selection of systematic reviews, data extraction and quality assessment were undertaken in duplicate. Review quality was assessed using the AMSTAR tool. The quality of the evidence for each outcome was assessed using GRADE methods. Review findings were summarized in the text and the data for each outcome were reported in 'Additional tables'.

MAIN RESULTS: Seventeen systematic reviews published in The Cochrane Library were included. All the reviews were high quality. The quality of the evidence for specific comparisons ranged from very low to moderate. Limitations in the evidence included risk of bias in the primary studies, inconsistency between the studies, and imprecision in effect estimates. [...]

AUTHORS' CONCLUSIONS: For women with pain and endometriosis, suppression of menstrual cycles with gonadotrophin-releasing hormone (GnRH) analogues, the levonorgestrel-releasing intrauterine system (LNG-IUD) and danazol were beneficial interventions. Laparoscopic

treatment of endometriosis and excision of endometriomata were also associated with improvements in pain. The evidence on NSAIDs was inconclusive. There was no evidence of benefit with post-surgical medical treatment. In women with endometriosis undergoing assisted reproduction, three months of treatment with GnRH agonist improved pregnancy rates. Excisional surgery improved spontaneous pregnancy rates in the nine to 12 months after surgery compared to ablative surgery. Laparoscopic surgery improved live birth and pregnancy rates compared to diagnostic laparoscopy alone. There was no evidence that medical treatment improved clinical pregnancy rates. Evidence on harms was scanty, but GnRH analogues, danazol and depot progestagens were associated with higher rates than other interventions.

- 8. Cheewadhanaraks, S., Choksuchat, C., Dhanaworavibul, K., & Liabsuetrakul, T. (2012). Postoperative depot medroxyprogesterone acetate versus continuous oral contraceptive pills in the treatment of endometriosis-associated pain: a randomized comparative trial. *Gynecol Obstet Invest*, 74(2), 151-156.**

Abstract:

BACKGROUND/AIM: To evaluate the efficacy and tolerability of postoperative depot medroxyprogesterone acetate (DMPA) versus postoperative continuous oral contraceptive (OC) pills in the treatment of endometriosis-associated pain.

METHODS: After a conservative surgery, 84 patients with symptomatic endometriosis were randomized to receive either intramuscular DMPA (150 mg) every 12 weeks for 24 weeks or continuous OC pills (ethinyl estradiol 0.03 mg and gestodene 0.075 mg) daily for 24 weeks. At weeks 12 and 24 of the treatment phase, patients rated their satisfaction with treatment and reported pain improvement and adverse effects.

RESULTS: There was no significant difference in the percentages of patients who reported satisfaction between the DMPA group and the OC group at weeks 12 and 24 (92.9 vs. 90.5%, and 92.9 vs. 88.1%, respectively). The rates of withdrawal because of persistent pain or side effects in the two groups were similar. Pain scores improved significantly in both groups, but dysmenorrhea scores on a visual analog scale at week 24 were significantly higher in the OC group than in the DMPA group ($p = 0.039$).

CONCLUSION: Both postoperative DMPA and postoperative OC pills for 24 weeks were found to be effective and acceptable options for treating endometriosis-associated pain.

- 9. Macer, M. L., & Taylor, H. S. (2012). Endometriosis and infertility: a review of the pathogenesis and treatment of endometriosis-associated infertility. *Obstet Gynecol Clin North Am*, 39(4), 535-549.**

Comment: This review details the evidence on the pathogenesis of endometriosis, its association with infertility and possible treatments for associated infertility. The exact pathogenesis of endometriosis is not known but the evidence base strongly supports an association with infertility. The authors note that while oral contraceptives are among the medications used to treat pain for endometriosis, they have not been shown to be an effective treatment for endometriosis-related infertility.

10. Nesbitt-Hawes, E. M., & Ledger, W. (2015). Endometriosis and Infertility. *Reproductive Surgery in Assisted Conception*, 29-35.

Abstract: It seems likely that endometriosis has a negative effect on fertility. This may result from reduced frequency of intercourse due to dyspareunia, from anatomical distortion in more severe cases of endometriosis or from more subtle alterations in the intra-ovarian and tubo-peritoneal environments. Medical treatment of endometriosis can waste time, resulting in loss of fertility due to ageing, and does not seem to improve fertility post-treatment. Surgical intervention holds more promise, but may have negative as well as positive impact on fertility. ART remains the mainstay of management of endometriosis-associated infertility, but treatment programs should be individualized and outcomes may be less favorable than seen for age-matched couples with other reasons for need for ART.

11. Tanmahasamut, P., Rattanachaiyanont, M., Angsuwathana, S., Techatraisak, K., Indhavivadhana, S., & Leerasiri, P. (2012). Postoperative levonorgestrel-releasing intrauterine system for pelvic endometriosis-related pain: a randomized controlled trial. *Obstet Gynecol*, 119(3), 519-526.

Abstract:

OBJECTIVES: To estimate the effectiveness of a postoperative levonorgestrel-releasing intrauterine system for relieving pelvic pain in patients with endometriosis.

METHODS: A double-blind randomized controlled trial was conducted in 55 patients with endometriosis and moderate-to-severe dysmenorrhea (visual analog scale, greater than 50 mm) undergoing laparoscopic conservative surgery. After surgery, patients were randomized to a levonorgestrel-releasing intrauterine system (n=28) or expectant management (n=27) group. Primary outcome was the change of dysmenorrhea visual analog scale. Secondary outcomes included changes of pelvic pain and dyspareunia visual analog scale, Short Form-36 score, and adverse effects.

RESULTS: The two groups were comparable in age, body mass index, parity, and baseline pain scores. At 12 months, the levonorgestrel-releasing intrauterine system group had a significantly lower median value of dysmenorrhea and noncyclic pelvic pain score. Compared with the control group, the levonorgestrel-releasing intrauterine system group had greater reduction in dysmenorrhea visual analog scale (-81.0 compared with -50.0 mm, P=.006) and pelvic pain visual analog scale (-48.5 compared with -22.0 mm, P=.038) but a comparable reduction in dyspareunia visual analog scale (-15.0 compared with -19.0 mm, P=.831). Two patients in levonorgestrel-releasing intrauterine system group (7.4%) and nine in the expectant management group (39.1%) had recurrent dysmenorrhea within 1 year postoperatively (P=.014). Number-needed-to-treat to prevent one case with recurrent dysmenorrhea within the first year was three cases. The Short Form-36 scores improved in the levonorgestrel-releasing intrauterine system group but did not change in the expectant management group. There was no serious adverse event during the study period.

CONCLUSION: The levonorgestrel-releasing intrauterine system is effective and well accepted for long-term therapy after conservative surgery for patients with moderate to severe pain related to endometriosis. It can improve the patient's quality of life, including physical and mental health.

- 12. Walch, K., Unfried, G., Huber, J., Kurz, C., van Trotsenburg, M., Pernicka, E., & Wenzl, R. (2009). Implanon® versus medroxyprogesterone acetate: effects on pain scores in patients with symptomatic endometriosis - a pilot study. *Contraception*, 79(1), 29–34.**

Abstract:

BACKGROUND: Implanon® has been reported to be effective in the treatment of dysmenorrhea. We compared the therapeutic efficacies of depot medroxyprogesterone acetate (DMPA) and Implanon® with regard to pain relief in women with endometriosis.

STUDY DESIGN: In a clinical research center at a university hospital, 41 patients with dysmenorrhea, nonmenstrual pelvic pain and dyspareunia associated with histologically proven endometriosis were included in an open, prospective, randomized, controlled clinical trial. Twenty-one women were assigned by computer-generated randomization to receive Implanon®, and 20 women to receive DMPA. As main outcome measures of this pilot study, we evaluated pain improvement quantified according to visual analog scale score, side effects, vaginal bleeding patterns, withdrawal rate and overall degree of satisfaction.

RESULTS: During a follow-up period of 1 year, we ascertained a clear improvement in pain intensity for both treatment options. After 6 months, the average decrease in pain was 68% in the Implanon® group and 53% in the DMPA group. The side-effects profile and the overall degree of satisfaction after study termination were comparable for both treatment options.

CONCLUSION: Concerning pain relief, the therapeutic efficacy of the contraceptive implant Implanon® is not inferior to that of DMPA in symptomatic endometriosis.

- 13. Zorbas, K. A., Economopoulos, K. P., & Vlahos, N. F. (2015). Continuous versus cyclic oral contraceptives for the treatment of endometriosis: a systematic review. *Arch Gynecol Obstet*, 292(1), 37-43.**

Abstract:

PURPOSE: Recurrence of endometriosis after conservative surgery has been observed in 40–50 % of patients within the first 5 years. A variety of regimens such as combined oral contraceptives, GnRH agonists, danazol, and progestins have been used postoperatively to reduce recurrence rates. Oral contraceptives (oCP) have been used either in a cyclic or in a continuous (no pill-free interval) fashion. The purpose of this article was to summarize the existing evidence on the efficacy and patient compliance for the use of oCP in a continuous versus cyclic fashion following conservative surgery for endometriosis.

METHODS: A systematic search of Medline identified four eligible studies. Studies were considered eligible, if they have evaluated oCP therapy, either in a cyclic or continuous regimen, after conservative surgery for endometriosis. Specifically, studies (1) reporting on women with endometriosis who were treated postoperatively with both continuous oCP and cyclic oCP, (2)

written in English, (3) with minimum 6 months duration of medical treatment, and (4) with minimum 12 months duration of follow-up were considered eligible for our systematic review. Outcome measures of these eligible studies were tabulated and then analyzed cumulatively. A purely descriptive approach was adopted concerning all variables.

RESULTS: Postoperative use of continuous oCP was associated with a reduction in the recurrence rate of dysmenorrhea, delay in the presentation of dysmenorrhea, reduction in nonspecific pelvic pain, and reduction in the recurrence rate for endometrioma.

CONCLUSIONS: Use of OCP in a continuous fashion following conservative surgery for endometriosis is more beneficial to cyclic use.

Menorrhagia

14. Duckitt, K., & Collins, S. (2012). Menorrhagia. *BMJ Clinical Evidence*, 2012, 0805.

Abstract:

INTRODUCTION: Menorrhagia limits normal activities, and causes anaemia in two-thirds of women with objective menorrhagia (loss of 80 mL blood per cycle). Prostaglandin disorders may be associated with idiopathic menorrhagia, and with heavy bleeding due to fibroids, adenomyosis, or use of intrauterine devices (IUDs). Fibroids have been found in 10% of women with menorrhagia overall, and in 40% of women with severe menorrhagia; but half of women having a hysterectomy for menorrhagia are found to have a normal uterus.

METHODS AND OUTCOMES: We conducted a systematic review and aimed to answer the following clinical questions: What are the effects of medical treatments for menorrhagia? What are the effects of surgical treatments for menorrhagia? What are the effects of endometrial thinning before endometrial destruction in treating menorrhagia? We searched: Medline, Embase, The Cochrane Library, and other important databases up to June 2011 (Clinical Evidence reviews are updated periodically; please check our website for the most up-to-date version of this review). We included harms alerts from relevant organizations, such as the US Food and Drug Administration (FDA) and the UK Medicines and Healthcare products Regulatory Agency (MHRA).

RESULTS: We found 39 systematic reviews, RCTs, or observational studies that met our inclusion criteria. We performed a GRADE evaluation of the quality of evidence for interventions.

CONCLUSIONS: In this systematic review we present information relating to the effectiveness and safety of the following medical interventions: combined pill, danazol, etamsylate, gonadorelin analogues, intrauterine progesterone, non-steroidal anti-inflammatory drugs (NSAIDs), progestogens, and the following surgical interventions: dilatation and curettage, endometrial destruction, and hysterectomy.

15. Fraser, I. S., Mansour, D., Breyman, C., Hoffman, C., Mezzacasa, A., & Petraglia, F. (2015). Prevalence of heavy menstrual bleeding and experiences of affected women in a European patient survey. *Int J Gynaecol Obstet*, 128(3), 196-200.

Abstract:

OBJECTIVE: To examine the prevalence and impact of heavy menstrual bleeding (HMB) among women in Europe, and their experience of HMB assessment and management.

METHODS: An internet-based survey was conducted among women (aged 18-57 years) in five European countries between January and February 2012. The prevalence of HMB among the general population was determined in a short survey, and women who had been diagnosed with HMB were then asked to complete an extended survey about their diagnosis and symptoms.

RESULTS: Overall, 4506 women responded, of whom 1225 (27.2%) had experienced two or more predefined HMB symptoms within the previous year. Of these women, 564 (46.0%) had never consulted a physician. Among 330 women who completed the detailed survey, 208 (63.0%) had ever been diagnosed with iron deficiency or iron-deficiency anemia. Symptoms associated with iron deficiency were used to help confirm a diagnosis in 83 (39.9%) women. Only 152 (46.1%) of the 330 patients with confirmed HMB had received prescription medication for iron deficiency.

CONCLUSION: Many women affected by HMB do not seek medical help, and few of those who do consult physicians report that they have received appropriate treatment. HMB continues to be underdiagnosed and poorly treated.

16. Kaunitz, A. M., Bissonnette, F., Monteiro, I., Lukkari-Lax, E., Desanctis, Y., & Jensen, J. (2012). Levonorgestrel-releasing intrauterine system for heavy menstrual bleeding improves hemoglobin and ferritin levels. *Contraception*, 86(5), 452-457.

Abstract:

BACKGROUND: We compared the effects of the levonorgestrel-releasing intrauterine system (LNG-IUS) with cyclic oral medroxyprogesterone acetate (MPA) on hemoglobin and serum ferritin levels in women with heavy menstrual bleeding (HMB).

STUDY DESIGN: This was a multicenter, randomized study assessing the efficacy of the LNG-IUS and oral MPA (10 mg/day for 10 days) in women with confirmed HMB over 6 cycles of treatment. We previously reported that treatment with the LNG-IUS resulted in greater menstrual blood loss reduction than MPA. In this analysis, hemoglobin and serum ferritin levels were assessed at baseline, Cycle 3, and at Cycle 6, and the relative improvement on treatment was subjectively rated by investigators and women.

RESULTS: One hundred and sixty-five women were randomized (82 LNG-IUS/83 MPA). Increases in median hemoglobin levels from baseline to Cycle 6 (7.5% vs. 1.9%; $p < .001$) and median serum ferritin levels (68.8% vs. 14.3%; $p < .001$) were greater in the LNG-IUS group than in the oral MPA group. Baseline median hemoglobin and ferritin levels were 12.4 g/dL and 19.0 mcg/L with the LNG-IUS and 12.2 g/dL and 19.0 mcg/L with oral MPA, respectively. At Cycle 6, the

corresponding medians were 13.4 g/dL and 34.0 mcg/L with the LNG-IUS and 12.6 g/dL and 21.0 mcg/L with oral MPA. At Cycle 6, the proportion of women who rated their bleeding as 'improved' was higher with the LNG-IUS than with oral MPA, both according to investigator assessment (93.6% vs. 61.0%) and self-assessment (93.6% vs. 67.1%).

CONCLUSIONS: Women treated with the LNG-IUS had greater increases in median hemoglobin and serum ferritin levels, and higher rates of subjective improvement than women treated with oral MPA.

Impact of Contraception on Menstrual Sequelae and Disorders

17. Bahamondes, L., Valeria Bahamondes, M., & Shulman, L. P. (2015). Non-contraceptive benefits of hormonal and intrauterine reversible contraceptive methods. *Hum Reprod Update*, 21(5), 640- 651.

Abstract:

BACKGROUND: Most contraceptive methods present benefits beyond contraception; however, despite a large body of evidence, many healthcare professionals (HCPs), users and potential users are unaware of those benefits. This review evaluates the evidence for non-contraceptive benefits of hormonal and non-hormonal contraceptive methods.

METHODS: We searched the medical publications in PubMed, POPLINE, CENTRAL, EMBASE and LILACS for relevant articles, on non-contraceptive benefits of the use of hormonal and intrauterine reversible contraceptive methods, which were published in English between 1980 and July 2014. Articles were identified using the following search terms: 'contraceptive methods', 'benefits', 'cancer', 'anaemia', 'heavy menstrual bleeding (HMB)', 'endometrial hyperplasia', 'endometriosis' and 'leiomyoma'.

RESULTS: We identified, through the literature search, evidence that some combined oral contraceptives have benefits in controlling HMB and anaemia, reducing the rate of endometrial, ovarian and colorectal cancer and ectopic pregnancy as well as alleviating symptoms of premenstrual dysphoric disorder. Furthermore, the use of the levonorgestrel-releasing intrauterine system also controls HMB and anaemia and endometrial hyperplasia and cancer, reduces rates of endometrial polyps in users of tamoxifen and alleviates pain associated with endometriosis and adenomyosis. Depot medroxyprogesterone acetate controls crises of pain associated with sickle cell disease and endometriosis. Users of the etonogestrel-releasing contraceptive implant have the benefits of a reduction of pain associated with endometriosis, and users of the copper intrauterine device have reduced rates of endometrial and cervical cancer.

CONCLUSIONS: Despite the high contraceptive effectiveness of many hormonal and intrauterine reversible contraceptive methods, many HCPs, users and potential users are concerned mainly about side effects and safety of both hormonal and non-hormonal contraceptive methods, and there is scarce information about the many benefits that these methods offer beyond contraception.

18. Bayer, L. L., & Hillard, P. J. (2013). Use of levonorgestrel intrauterine system for medical indications in adolescents. *J Adolesc Health, 52(4 Suppl)*, S54-58.

Abstract: The levonorgestrel intrauterine system (LNG-IUS) is an underused contraceptive method in adolescent populations. In addition to being a highly effective, reversible, long-acting contraception, the LNG-IUS has many noncontraceptive health benefits including reduced menstrual bleeding, decreased dysmenorrhea and pelvic pain related to endometriosis, and menstruation suppression in teens with physical or developmental disabilities. The LNG-IUS can also provide endometrial protection in teens with chronic anovulation, and may be used to treat endometrial hyperplasia and cancer. This review examines the evidence supporting the use of the LNG-IUS in adolescents for these noncontraceptive benefits.

19. Harlow, S. D., & Campbell, O. M. R. (2004). Epidemiology of menstrual disorders in developing countries: a systematic review. *BJOG: An International Journal of Obstetrics & Gynaecology, 111(1)*, 6-16.

Comment: This systematic review reports on the prevalence of menstrual disorders among women of reproductive age from studies conducted between 1970 and 2002 in developing countries. Menstrual pain was prevalent among 25-50% of adult women and among 75% of adolescent women; 5-20% of women reported pain that hindered their usual activity. The review purports that reproductive health care modules could benefit from incorporating information about menstrual disorders and contraception may have a potentially beneficial effect on menstrual disorders.

20. Hubacher, D., & Grimes, D. A. (2002). Noncontraceptive Health Benefits of Intrauterine Devices: A Systematic Review. *Obstetrical & Gynecological Survey, 57(2)*, 120-128.

Abstract: Most women and their clinicians are unaware that IUDs confer important noncontraceptive health benefits. This review summarizes the evidence from published articles on this topic. We conducted a series of systematic literature searches to identify articles on the noncontraceptive health benefits of IUD use. We reviewed the potentially pertinent ones for content, grouped them according to type of IUD, and evaluated them using the U.S. Preventive Services Task Force rating system. Over 500 titles were identified and several hundred abstracts were reviewed. Use of nonhormonal IUDs (plastic and copper) was associated with a decrease in endometrial cancer. The levonorgestrel intrauterine system can treat a variety of gynecological disorders, including menorrhagia and anemia. The levonorgestrel system has also been used successfully as part of hormone replacement therapy, as adjuvant therapy with tamoxifen, and as an alternative to hysterectomy for women with bleeding problems. Like oral contraceptives, intrauterine contraceptives confer important noncontraceptive health benefits.

21. Lin, K., & Barnhart, K. (2007). The clinical rationale for menses-free contraception. *J Womens Health (Larchmt)*, 16(8), 1171-1180.

Abstract: The impact of monthly menstruation may range from a minor inconvenience for some women to a major health concern for those who suffer from menstrual disorders and health conditions that are aggravated during their menstrual cycle. Oral contraceptives (OCs) have been used safely in continuous regimens for the treatment of menstrual disorders in some women and for others who choose to extend their 28-day menstrual cycle to accommodate major life events. There is no physiological requirement for the monthly hormone withdrawal bleed that is experienced by women taking cyclic OCs or for a menstrual period in women who do not desire to (or cannot) become pregnant. Thus, the use of continuous or extended-cycle OC regimens that eliminate the menstrual cycle represents a viable and attractive option for many women. The availability of more choices for menstrual suppression, such as continuous use of OCs, will improve the quality of life for many women who suffer from menstrual-related disorders and provide greater convenience for women with busy and active lifestyles.

Frequency and Acceptability of Contraceptive-Induced Bleeding Changes

Response to bleeding changes may vary widely and the following resources provide evidence on the acceptability of contraceptive-induced menstrual bleeding changes and the frequency of these changes.

1. **Belsey, E. M., Peregoudov, S., & Task Force on Long-Acting Systemic Agents for Fertility, R. (1988). Determinants of menstrual bleeding patterns among women using natural and hormonal methods of contraception I. Regional variations. *Contraception*, 38(2), 227-242.**

Abstract: Records of the occurrence of vaginal bleeding were obtained from women using either a natural method of contraception or one of four types of hormonal contraceptive. The relationships between their bleeding patterns and a number of demographic variables were examined, with the aim of identifying subgroups of women who, if they used a particular hormonal method of contraception, would be likely to suffer more or less disruption to their bleeding pattern than the 'norm'. Within contraceptive method, bleeding patterns were more closely related to the woman's geographical region of residence than to any other factor. Some of the differences between regions were consistent across contraceptive methods. European women tended to have more bleeding/spotting days than women in other regions; Latin American women had relatively short episodes and long bleeding-free intervals, whether they were using the ovulation method, combined pills or a vaginal ring. Other differences were method-specific. Women using combined pills in India or Pakistan had fewer spotting episodes than women using the same method elsewhere; those using progestogen-only pills had more. Regional variations in bleeding patterns were particularly marked among women using DMPA, and increased over time: by their fourth injection interval, 25% of European women had amenorrhea, as compared with 72% of subjects in North Africa. These findings need to be confirmed by carefully controlled studies of menstrual bleeding patterns and their acceptability in various ethnic groups. The results would be valuable in counselling new contraceptive acceptors, and could eventually guide the choice of methods for introduction into national family planning programs.

2. **Fiala, C., Chabbert-Buffet, N., Häusler, G., Jamin, C., Lete, I., Lobo, P., . . . Pintiaux, A. (2017). Women's preferences for menstrual bleeding frequency in 12 European countries: the Inconvenience Due to Women's Monthly Bleeding (ISY) survey. *The European Journal of Contraception & Reproductive Health Care*, 22(4), 268-273.**

Abstract:

OBJECTIVES: Our aim was to assess the level of inconvenience associated with menstrual bleeding and determine how many women across 12 European countries would prefer a bleeding frequency of less than once a month and what would motivate their choice.

METHODS: A 15-min quantitative online survey was conducted in two waves among 5728 women aged between 18 and 45 years, with an equal distribution of women using a combined

hormonal contraceptive (CHC group, n = 2739) and women using a non-hormonal contraceptive or no contraceptive (non-HC group, n = 2989). The first wave was carried out in Austria, Belgium, France, Italy, Poland and Spain, in February 2015, and the results have been published. The second wave was conducted in the Czech Republic, Germany, Hungary, Portugal, Latvia and the Netherlands, between August and September 2015. Results: The menstrual period was significantly longer (5.0 versus 4.6 days) and heavier (15 versus 7%) in non-HC users than in CHC users ($p < .0001$). Given the choice, ~60% of women would like less frequent menstrual bleeding. There was heterogeneity in the preference across countries. Sexuality, social life, work and sporting activities were key factors affecting women's preference. CONCLUSION: The majority of women in the 12 European countries would prefer to reduce the frequency of menstrual periods. Quality of life was the main factor affecting their preference.

- 3. Glasier, A. F., Smith, K. B., Van der Spuy, Z. M., Ho, P. C., Cheng, L., Dada, K., ... Baird, D. T. (2003). Amenorrhea associated with contraception - An international study on acceptability. *Contraception, 67*(1), 1–8.**

Abstract: Surveys undertaken in the 1970s and 1980s suggested that amenorrhea was unacceptable to most women, especially in developing countries. More recent research suggests that increasing numbers of women in the developed world prefer to menstruate less often. In a questionnaire survey of 1001 women attending family-planning clinics and 290 contraceptive providers in China, South Africa, Nigeria and Scotland, only among black women in Africa did the majority like having periods. In all other groups, most women disliked periods, which were "inconvenient" and associated with menstrual problems. Given the choice, the majority of Nigerian women would prefer to bleed monthly. Elsewhere, women would opt to bleed only once every 3 months, or not at all. In all except the Chinese centers, the majority of women would be willing to try a contraceptive which induced amenorrhea. Providers tended to overestimate the importance of regular menstruation to their clients. This is an important observation for scientists and funding agencies involved in developing new methods of contraception.

- 4. Polis, C. B., Hussain, R., & Berry, A. (2018). There might be blood: a scoping review on women's responses to contraceptive-induced menstrual bleeding changes. *Reprod Health, 15*(1), 114.**

Abstract:

INTRODUCTION: Concern about side effects and health issues are common reasons for contraceptive non-use or discontinuation. Contraceptive-induced menstrual bleeding changes (CIMBCs) are linked to these concerns. Research on women's responses to CIMBCs has not been mapped or summarized in a systematic scoping review.

METHODS: We conducted a systematic scoping review of data on women's responses to CIMBCs in peer-reviewed, English-language publications in the last 15 years. Investigator dyads abstracted information from relevant studies on pre-specified and emergent themes using a

standardized form. We held an expert consultation to obtain critical input. We provide recommendations for researchers, contraceptive counselors, and product developers.

RESULTS: We identified 100 relevant studies. All world regions were represented (except Antarctica), including Africa (11%), the Americas (32%), Asia (7%), Europe (20%), and Oceania (6%). We summarize findings pertinent to five thematic areas: women’s responses to contraceptive-induced non-standard bleeding patterns; CIMBCs influence on non-use, dissatisfaction or discontinuation; conceptual linkages between CIMBCs and health; women’s responses to menstrual suppression; and other emergent themes. Women’s preferences for non-monthly bleeding patterns ranged widely, though amenorrhea appears most acceptable in the Americas and Europe. Multiple studies reported CIMBCs as top reasons for contraceptive dissatisfaction and discontinuation; others suggested disruption of regular bleeding patterns was associated with non-use. CIMBCs in some contexts were perceived as linked with a wide range of health concerns; e.g., some women perceived amenorrhea to cause a buildup of “dirty” or “blocked” blood, in turn perceived as causing blood clots, fibroids, emotional disturbances, weight gain, infertility, or death. Multiple studies addressed how CIMBCs (or menstruation) impacted daily activities, including participation in domestic, work, school, sports, or religious life; sexual or emotional relationships; and other domains.

Conclusions: Substantial variability exists around how women respond to CIMBCs; these responses are shaped by individual and social influences. Despite variation in responses across contexts and sub-populations, CIMBCs can impact multiple aspects of women’s lives. Women’s responses to CIMBCs should be recognized as a key issue in contraceptive research, counseling, and product development, but may be underappreciated, despite likely – and potentially substantial – impacts on contraceptive discontinuation and unmet need for modern contraception.

5. **Castle, S. & Askew, I. (2015). *Contraceptive Discontinuation: Reasons, Challenges, and Solutions*. Population Council & FP2020. Retrieved from: <http://www.familyplanning2020.org/microsite/contraceptive-discontinuation>**

Comment: In this review of the evidence base on contraceptive discontinuation, the authors propose a theory of change to limit unnecessary discontinuation. They report that method-induced side effects, including bleeding changes such as amenorrhea, are one of the main reasons for discontinuation. Interventions to address these concerns include allowing women to talk about their side effects, engaging male partners, ensuring confidentiality, addressing misconceptions, and counselling women who are amenorrheic. Other reasons emerge from problems within the health system and service and sociocultural environment. Their theory of change involves evidence-based pathways for interventions to address these components.

6. Szarewski, A., von Stenglin, A., & Rybowski, S. (2012). Women's attitudes towards monthly bleeding: results of a global population-based survey. *Eur J Contracept Reprod Health Care*, 17(4), 270-283.

Abstract:

OBJECTIVE: Monthly bleeding can be uncomfortable and inconvenient. Fifty years after the introduction of the pill, one wonders whether women still want to bleed every month.

METHODS: Cross-national online survey of women aged 15–49 years (N = 4039) who were currently using, had used or would consider using a hormonal contraceptive. The survey was conducted in eight countries across Europe, North America and Latin America to assess attitudes towards monthly bleeding.

RESULTS: Almost one-third of women reported that bleeding had a severe negative impact on their daily life, particularly with respect to sexual life and sports activities. Approximately 60% of women would, at least sometimes, like to postpone their bleeding and 50% wished they had the flexibility to determine when their menstrual bleeding starts. Overall, 34% of women would change the frequency of their bleeding to once every two or three months.

CONCLUSIONS: Past, current or future users of hormonal contraception reported that bleeding has a severe negative impact on daily life. Given the choice, most women surveyed would reduce the frequency of their bleeding.

SOCIOLOGICAL LINKAGES

Experience with Puberty and Menarche

These resources relate to experiences with menarche and puberty and the impact of this on future reproductive health. The literature also provides evidence on the importance of puberty education.

1. **Aniebue, U. U., Aniebue, P. N., & Nwankwo, T. O. (2009). The impact of pre-menarcheal training on menstrual practices and hygiene of Nigerian school girls. *The Pan African Medical Journal, 2, 9.***

Abstract:

BACKGROUND: The menstrual practices of adolescents derive largely from health issues associated with their adjustment to reproductive life. The objective of the study was to assess the effect of pre-menarcheal training on the menstrual and hygiene practices of Nigerian school girls.

METHODS: A cross-sectional questionnaire-based survey of randomly selected post-menarcheal school girls using a pre-tested, semi-structured questionnaire was done.

RESULTS: The mean age of the school girls was 14.9 ± 1.7 years. Pre-menarcheal training was given to 273 (55.2%) of them. Mothers (74.7%) were the more common source of information. Inappropriate experience of menarche, adverse effect of menstruation on schooling and social life and the use of unhygienic menstrual absorbents were common in girls who had no pre-menarcheal training than those who did.

CONCLUSION: Lack of timely information results in inappropriate menstrual experiences and poor menstrual hygiene practices. Ways to promote menstrual education and hygiene practices are suggested.

2. **Chandra-Mouli, V., & Patel, S. V. (2017). Mapping the knowledge and understanding of menarche, menstrual hygiene and menstrual health among adolescent girls in low- and middle-income countries. *Reprod Health, 14(1), 30.***

Abstract:

BACKGROUND: Menstruation is a natural physiological process that requires proper management. Unlike other normal bodily processes, menstruation is linked with religious and cultural meanings that can affect the perceptions of young girls as well as the ways in which the adults in the communities around them respond to their needs.

OBJECTIVES: This review aims to answer the following questions: (1) how knowledgeable are adolescent girls in low- and middle-income countries about menstruation and how prepared are they for reaching menarche, (2) who are their sources of information regarding menstruation, (3) how well do the adults around them respond to their information needs, (4) what negative health and social effects do adolescents experience as a result of menstruation,

and (5) how do adolescents respond when they experience these negative effects and what practices do they develop as a result?

METHODS: Using a structured search strategy, articles that investigate young girls' preparedness for menarche, knowledge of menstruation and practices surrounding menstrual hygiene in LMIC were identified. A total of 81 studies published in peer-reviewed journals between the years 2000 and 2015 that describe the experiences of adolescent girls from 25 different countries were included.

RESULTS: Adolescent girls in LMIC are often uninformed and unprepared for menarche. Information is primarily obtained from mothers and other female family members who are not necessarily well equipped to fill gaps in girls' knowledge. Exclusion and shame lead to misconceptions and unhygienic practices during menstruation. Rather than seek medical consultation, girls tend to miss school, self-medicate and refrain from social interaction. Also problematic is that relatives and teachers are often not prepared to respond to the needs of girls.

CONCLUSION: LMIC must recognize that lack of preparation, knowledge and poor practices surrounding menstruation are key impediments not only to girls' education, but also to self-confidence and personal development. In addition to investment in private latrines with clean water for girls in both schools and communities, countries must consider how to improve the provision of knowledge and understanding and how to better respond to the needs of adolescent girls.

3. Patton, G. C., & Viner, R. (2007). Pubertal transitions in health. *The Lancet*, 369(9567), 1130-1139.

Summary: Puberty is accompanied by physical, psychological, and emotional changes adapted to ensure reproductive and parenting success. Human puberty stands out in the animal world for its association with brain maturation and physical growth. Its effects on health and wellbeing are profound and paradoxical. On the one hand, physical maturation propels an individual into adolescence with peaks in strength, speed, and fitness. Clinicians have viewed puberty as a point of maturing out of childhood-onset conditions. However, puberty's relevance for health has shifted with a modern rise in psychosocial disorders of young people. It marks a transition in risks for depression and other mental disorders, psychosomatic syndromes, substance misuse, and antisocial behaviors. Recent secular trends in these psychosocial disorders coincide with a growing mismatch between biological and social maturation, and the emergence of more dominant youth cultures.

Cross-Referenced

In Access and Needs

Jewitt, S., & Ryley, H. (2014). It's a girl thing: Menstruation, school attendance, spatial mobility and wider gender inequalities in Kenya. *Geoforum*, 56, 137-147.

McMahon, S. A., Winch, P. J., Caruso, B. A., Obure, A. F., Ogutu, E. A., Ochari, I. A., & Rheingans, R. D. (2011). 'The girl with her period is the one to hang her head' Reflections on menstrual management among schoolgirls in rural Kenya. *BMC International Health and Human Rights*, 11(1), 7.

Nanda, G., Lupee, J., & Tharaldson, J. (2016). *Menstrual Hygiene Management among Schoolgirls in Eastern Province of Zambia Qualitative Research Final Report*. Retrieved from: http://menstrualhygieneday.org/wp-content/uploads/2016/12/USAID_MHM-among-Schoolgirls-in-Eastern-Province-of-Zambia-FINAL508.pdf

Oruko, K., Nyothach, E., Zielinski-Gutierrez, E., Mason, L., Alexander, K., Vulule, J., . . . Phillips-Howard, P. A. (2015). 'He is the one who is providing you with everything so whatever he says is what you do': A Qualitative Study on Factors Affecting Secondary Schoolgirls' Dropout in Rural Western Kenya. *PLoS One*, 10(12), e0144321.

In Interventions

Fakhri, M., Hamzehgardeshi, Z., Hajikhani Golchin, N. A., & Komili, A. (2012). Promoting menstrual health among Persian adolescent girls from low socioeconomic backgrounds: a quasi-experimental study. *BMC Public Health*, 12(1), 193.

Sommer, M. (2011). An Early Window of Opportunity for Promoting Girls' Health: Policy Implications of the Girl's Puberty Book Project in Tanzania. *International Electronic Journal of Health Education*, 14, 77-92.

Empowerment

These articles examine empowerment within reproductive health and menstrual health. They provide a description of the relation between the two domains in relation to empowerment. This section also includes resources on gender-based violence, particularly in the context of water, sanitation, and hygiene.

1. Prata, N., Fraser, A., Huchko, M. J., Gipson, J. D., Withers, M., Lewis, S., ... Upadhyay, U. D. (2017). **Women's Empowerment and Family Planning: A Review of the Literature.** *Journal of Biosocial Science*, 49(6), 713–743.

Summary: This paper reviews the literature examining the relationship between women's empowerment and contraceptive use, unmet need for contraception and related family planning topics in developing countries. Searches were conducted using PubMed, Popline and Web of Science search engines in May 2013 to examine literature published between January 1990 and December 2012. Among the 46 articles included in the review, the majority were conducted in South Asia (n=24). Household decision-making (n=21) and mobility (n=17) were the most commonly examined domains of women's empowerment. Findings show that the relationship between empowerment and family planning is complex, with mixed positive and null associations. Consistently positive associations between empowerment and family planning outcomes were found for most family planning outcomes but those investigations represented fewer than two-fifths of the analyses. Current use of contraception was the most commonly studied family planning outcome, examined in more than half the analyses, but reviewed articles showed inconsistent findings. This review provides the first critical synthesis of the literature and assesses existing evidence between women's empowerment and family planning use.

2. Schooler, D., Ward, L. M., Merriwether, A., & Caruthers, A. S. (2005). **Cycles of shame: Menstrual shame, body shame, and sexual decision-making.** *Journal of Sex Research*, 42(4), 324–334.

Summary: Although numerous factors have been implicated in women's sexual decision-making, less attention has been focused on how their feelings about their bodies and reproductive functions affect these processes. Recent findings link menstrual shame to lower levels of sexual activity and higher levels of sexual risk; however, the mechanisms behind these relations remain unexplored. Accordingly, this study investigates the contributions of menstrual shame and global body shame to sexual decision-making among 199 undergraduate women. Using structural equation modeling, we evaluated a mediated model, whereby menstrual shame is indirectly associated with sexual decision-making via body shame. As expected, women who reported feeling more comfort about menstruation also reported more body comfort and, in turn, more sexual assertiveness, more sexual experience, and less sexual risk.

- 3. Sommer, M., Ferron, S., Cavill, S., & House, S. (2014). Violence, gender and WASH: spurring action on a complex, under-documented and sensitive topic. *Environment and Urbanization*, 27(1), 105-116.**

Abstract: The global community of water, sanitation and hygiene (WASH) researchers, practitioners and policy makers has to date inadequately addressed the challenge of vulnerability to violence in relation to access to water and sanitation in development and humanitarian emergency contexts. Reasons may include the lack of valid and reliable documentation of girls', boys', women's, and men's experiences of violence while accessing water and/or sanitation facilities; the sensitivity of the topic, with secrecy around individuals' experiences of violence and their sanitation needs further hindering the collection of reliable data; the complexity of understanding the gendered dimensions of vulnerability to violence, with girls and women at least anecdotally reported to be more likely to experience violence in relation to WASH; and the likelihood that many WASH practitioners lack training in gender and violence, affecting their ability to deliver adequate programming and evaluation. In an effort to encourage increased action and learning on the intersection of gender, violence and WASH, a review of the existing evidence and practice was conducted. Findings indicate the need for more systematic, reliable, and ethically conducted monitoring and learning on this topic to build a more solid evidence base, while also refining key principles for improved policy and programming.

- 4. Westeneng, J., & D'Exelle, B. (2017). Reproductive Health and Bodily Integrity in Tanzania. *Studies in Family Planning*, 48(4), 323–341.**

Abstract: Several policy initiatives support the empowerment of women to improve their reproductive health. Little is known, however, about the inverse effect that reproductive health might have on women's empowerment. Women are pressured to conform to their reproductive role, and an inability to do so might affect their empowerment, including control over their own body. Using a panel dataset of 504 married women in Northern Tanzania, we find that women who experienced a pregnancy loss show more tolerant views of partner violence and that child mortality lowers their perceived control over the sexual relationship with their spouse. The number of living children did not affect bodily integrity. These results confirm that women's bodily integrity is partly dependent on the ability to fulfill their reproductive role. They strengthen the case for policies and programs that improve women's reproductive health and underline the importance of counselling after pregnancy or child loss.

Cross-Referenced

In Access and Needs:

Caruso, B. A., Fehr, A., Inden, K., Sahin, M., Ellis, A., Andes, K. L., & Freeman, M. C. (2013). WASH in Schools Empowers Girls' Education in Freetown, Sierra Leone: An Assessment of Menstrual Hygiene Management in Schools, 40.

Long, J., Caruso, B.A., Lopez, D., Vancraeynest, K., Sahin, M., Andes, K.L., Freeman, M. (2013). WASH in Schools Empowers Girls' Education in Rural Cochabamba, Bolivia: An assessment of menstrual hygiene management in schools'. United Nations Children's Fund, 1–4.

Phillips-Howard, P. A., Otieno, G., Burmen, B., Otieno, F., Odongo, F., Odour, C., . . . Laserson, K. F. (2015). Menstrual Needs and Associations with Sexual and Reproductive Risks in Rural Kenyan Females: A Cross-Sectional Behavioral Survey Linked with HIV Prevalence. *J Womens Health (Larchmt)*, 24(10), 801-811.

INTERVENTIONS

These resources provide examples of interventions that address menstrual health and hygiene management and the impact of those programs. Outcomes measured include school dropout rates, physical health, and psycho-social development. Several of the interventions address both menstrual and reproductive health.

- 1. Averbach, S., Sahin-Hodoglugil, N., Musara, P., Chipato, T., & van der Straten, A. (2009). Duet® for menstrual protection: a feasibility study in Zimbabwe. *Contraception, 79*(6), 463–468.**

Abstract:

BACKGROUND: Managing menses is a challenge for women in developing countries. Duet® is a cervical barrier being developed for contraception and STI prevention. We explored the hypothetical acceptability of using Duet as a menstrual cup, among Zimbabwean women.

STUDY DESIGN: A survey and focus group discussions (FGD) were conducted with 43 women aged 18–45 years to gain information about their menstrual practices and attitudes regarding the use of Duet for menstrual protection.

RESULTS: All 43 women reported that if Duet were available, they would “definitely” try it, and that it was “very important” that Duet is low cost and easy to clean; 86% reported that using it would make a difference in their lives. FGD findings highlighted unhygienic practices due to the lack of affordable options for menstrual management and a genuine interest in Duet, including its potential use for multiple purposes (contraception, disease prevention and menstrual protection).

CONCLUSIONS: Accessing affordable and hygienic menstrual protection was a problem for these Zimbabwean women. Duet appeared acceptable and it would be feasible to conduct a user-acceptability study of Duet as a menstrual cup in Zimbabwe.

- 2. Dongre, A. R., Deshmukh, P. R., & Garg, B. S. (2007). The Effect of Community-Based Health Education Intervention on Management of Menstrual Hygiene among Rural Indian Adolescent Girls. *World Health & Population, 9*(3), 48-54.**

Abstract:

OBJECTIVE: To study the effect of a community-based health education intervention on awareness and behavior change of rural adolescent girls regarding their management of menstrual hygiene.

MATERIALS AND METHOD: A participatory-action study was undertaken in Primary Health Centres in 23 villages in Anji, in the Wardha district of Maharashtra state. Study subjects were unmarried rural adolescent girls (12–19 years). We conducted a needs assessment for health messages with this target audience, using a triangulated research design of quantitative (survey) and qualitative (focus group discussions) methods. Program for Appropriate Technology for Health (PATH) guidelines were used to develop a pre-tested, handmade flip book containing needs-based key messages about the management of menstrual hygiene. The

messages were delivered at monthly meetings of village-based groups of adolescent girls, called Kishori Panchayat. After 3 years, the effect of the messages was assessed using a combination of quantitative (survey) and qualitative (trend analysis) methods.

RESULTS: After 3 years, significantly more adolescent girls (55%) were aware of menstruation before its initiation compared with baseline (35%). The practice of using ready-made pads increased significantly from 5% to 25% and reuse of cloth declined from 85% to 57%. The trend analysis showed that adolescent girls perceived a positive change in their behavior and level of awareness.

CONCLUSION: The present community health education intervention strategy could bring significant changes in the awareness and behavior of rural adolescent girls regarding management of their menstrual hygiene.

3. Fakhri, M., Hamzehgardeshi, Z., Hajikhani Golchin, N. A., & Komili, A. (2012). Promoting menstrual health among Persian adolescent girls from low socioeconomic backgrounds: a quasi-experimental study. *BMC Public Health*, 12(1), 193.

Abstract:

BACKGROUND: Research in the past decade has revealed average to poor menstrual health among many Iranian girls. The present study investigated the effectiveness of a health promotion project on improving menstrual health in adolescent girls in Iran.

METHODS: A quasi-experimental study was conducted to evaluate the effectiveness of the health intervention program. A total of 698 students (study participants and controls) in several schools in Mazandaran province, Iran were included. The project comprised 10 two-hour educational sessions. Educational topics included the significance of adolescence, physical and emotional changes during adolescence, pubertal and menstruation health and premenstrual syndrome. A self-administered questionnaire measuring demographic characteristics, behaviors during menstruation, menstrual patterns, sources of information about menstruation and personal health data was administered. The questionnaire was administered to all participating students after the experimental group received the training.

RESULTS: Among the most significant results was the impact of educational sessions on bathing and genital hygiene. A total of 61.6% in the experimental group compared with 49.3% in the control group engaged in usual bathing during menstruation ($p = 0.002$). Individual health status was significantly statistically correlated with menstrual health. Attitude towards menstruation was also significantly related to menstrual health.

CONCLUSIONS: The present study confirms that educational interventions, such as the health promotion project in this study, can be quite effective in promoting menstrual health.

4. Hennegan, J., & Montgomery, P. (2016). Do Menstrual Hygiene Management Interventions Improve Education and Psychosocial Outcomes for Women and Girls in Low and Middle-Income Countries? A Systematic Review. *PLoS One*, 11(2), e0146985.

Abstract:

BACKGROUND: Unhygienic and ineffective menstrual hygiene management has been documented across low resource contexts and linked to negative consequences for women and girls.

OBJECTIVES: To summarize and critically appraise evidence for the effectiveness of menstruation management interventions in improving women and girls' education, work and psychosocial wellbeing in low and middle-income countries. **Methods:** Structured systematic searches were conducted in peer-reviewed and grey literature to identify studies evaluating education and resource provision interventions for menstruation management. Individual and cluster randomized controlled trials were eligible for inclusion, as were non-randomized controlled trials. Study characteristics, outcomes and risk of bias were extracted using a piloted form. Risk of bias was independently assessed by two researchers.

RESULTS: Eight studies described in ten citations were eligible for inclusion. Studies were highly heterogeneous in design and context. Six included assessment of education-only interventions, and three provided assessment of the provision of different types of sanitary products (menstrual cups, disposable sanitary pads, and reusable sanitary pads). A moderate but non-significant standardized mean difference was found for the two studies assessing the impact of sanitary pad provision on school attendance: 0.49 (95%CI -0.13, 1.11). Included studies were heterogeneous with considerable risk of bias. Trials of education interventions reported positive impacts on menstrual knowledge and practices, however, many studies failed to assess other relevant outcomes. No trials assessed or reported harms.

CONCLUSIONS: There is insufficient evidence to establish the effectiveness of menstruation management interventions, although current results are promising. Eight trials have been conducted, but a high risk of bias was found and clinical heterogeneity precluded synthesis of most results. Whilst trials provided some indication of positive results, further research is needed to establish the role of menstruation hygiene management in education performance, employment and other psychosocial outcomes. This review provides a concise summary of present trials and highlights improvements for future work.

5. Juma, J., Nyothach, E., Laserson, K. F., Oduor, C., Arita, L., Ouma, C., . . . Phillips-Howard, P. A. (2017). Examining the safety of menstrual cups among rural primary school girls in western Kenya: observational studies nested in a randomised controlled feasibility study. *BMJ Open*, 7(4), e015429.

Abstract:

OBJECTIVE: Examine the safety of menstrual cups against sanitary pads and usual practice in Kenyan schoolgirls.

DESIGN: Observational studies nested in a cluster randomized controlled feasibility study.

SETTING: 30 primary schools in a health and demographic surveillance system in rural western Kenya.

PARTICIPANTS: Menstruating primary schoolgirls aged 14–16 years participating in a menstrual feasibility study.

INTERVENTIONS: Insertable menstrual cup, monthly sanitary pads or 'usual practice' (controls). Outcome measures *Staphylococcus aureus* vaginal colonization, *Escherichia coli* growth on sampled used cups, toxic shock syndrome or other adverse health outcomes.

RESULTS: Among 604 eligible girls tested, no adverse event or TSS was detected over a median 10.9 months follow-up. *S. aureus* prevalence was 10.8%, with no significant difference over intervention time or between groups. Of 65 *S. aureus* positives at first test, 49 girls were retested and 10 (20.4%) remained positive. Of these, two (20%) sample isolates tested positive for toxic shock syndrome toxin-1; both girls were provided pads and were clinically healthy. Seven per cent of cups required replacements for loss, damage, dropping in a latrine or a poor fit. Of 30 used cups processed for *E. coli* growth, 13 (37.1%, 95% CI 21.1% to 53.1%) had growth. *E. coli* growth was greatest in newer compared with established users (53% vs 22.2%, $p=0.12$).

CONCLUSIONS: Among this feasibility sample, no evidence emerged to indicate menstrual cups are hazardous or cause health harms among rural Kenyan schoolgirls, but large-scale trials and post-marketing surveillance should continue to evaluate cup safety.

6. Mbizvo, M. T., Kasule, J., Gupta, V., Rusakaniko, S., Kinoti, S. N., Mpanju-Shumbushu, W., . . . Padayachy, J. (1997). Effects of a randomized health education intervention on aspects of reproductive health knowledge and reported behaviour among adolescents in Zimbabwe. *Social Science & Medicine*, 44(5), 573-577.

Abstract: Unwanted teenage pregnancy and the attendant morbidity and mortality necessitate an understanding of the factors influencing adolescent sexuality and the implementation of programs designed to improve their knowledge and reproductive behavior. A randomized controlled study on reproductive health knowledge and behavior was undertaken among adolescent pupils drawn from a multi-stage random cluster sample. A self-administered questionnaire was used to assess aspects of reproductive health knowledge and behavior at baseline followed by a health education intervention, except for control schools. Results are based on 1689 responses made up of 1159 intervention and 530 control respondents. There was a significant increase in correct knowledge about aspects of menstruation in intervention as compared with control schools [odds ratio (OR) = 4.5, 95% confidence interval (CI) = 3.4–6.1]. Significantly, (OR = 2.0, 95%CI = 1.1–3.9) more pupils from intervention than control schools scored correctly on practice relating to menstruation. Pupils from intervention schools were more likely ($P < 0.001$) to know that a boy experiencing wet dreams could make a girl pregnant and that a girl could get pregnant at her first sexual intercourse (OR = 1.4, 95%CI = 1.1–1.9). Knowledge of family planning was low in both groups at baseline but was high at five months follow-up in the intervention schools. The findings point to the need for early school-based

reproductive health education programs, incorporating correct information on reproductive biology and the subsequent prevention of reproductive ill health.

- 7. Montgomery, P., Hennegan, J., Dolan, C., Wu, M., Steinfield, L., & Scott, L. (2016). Menstruation and the Cycle of Poverty: A Cluster Quasi-Randomised Control Trial of Sanitary Pad and Puberty Education Provision in Uganda. *PLoS One*, 11(12), e0166122.**

Abstract:

BACKGROUND: Poor menstrual knowledge and access to sanitary products have been proposed as barriers to menstrual health and school attendance. In response, interventions targeting these needs have seen increasing implementation in public and private sectors. However, there has been limited assessment of their effectiveness.

OBJECTIVES: Assess the impact of providing reusable sanitary pads and puberty education on girls' school attendance and psychosocial wellbeing outcomes.

METHODS: A cluster quasi-randomised controlled trial was conducted across 8 schools, including 1124 girls, in rural Uganda. Schools were allocated to one of four conditions: the provision of puberty education alone; reusable sanitary pads alone; puberty education and reusable sanitary pads; and a control (no intervention). The primary outcome was school attendance. Secondary outcomes reflected psychosocial wellbeing.

RESULTS: At follow-up, school attendance had worsened for girls across all conditions. Per-protocol analysis revealed that this decline was significantly greater for those in the control condition $d = 0.52$ (95%CI 0.26–0.77), with those in control schools having a 17.1% (95%CI: 8.7–25.5) greater drop in attendance than those in any intervention school. There were no differences between the intervention conditions. High rates of school drop-out and transfer meant the trial suffered from substantial participant drop-out. Intention-to-treat analyses using two different imputation strategies were consistent with the main results, with mean differences of 5.2% attendance in best-case and 24.5% in worst-case imputations. Results were robust to adjustments for clustering. There was no impact of the interventions on girls' self-reported shame or insecurity during menstruation.

CONCLUSION: Results of the trial support the hypothesized positive impact of providing sanitary pads or puberty education for girls' school attendance in a developing country context. Findings must be interpreted with caution in light of poor participant retention, intervention fidelity, and the attendance measures used

- 8. Montgomery, P., Ryus, C. R., Dolan, C. S., Dopson, S., & Scott, L. M. (2012). Sanitary Pad Interventions for Girls' Education in Ghana: A Pilot Study. *PLoS One*, 7(10), e48274.**

Abstract:

BACKGROUND: Increased education of girls in developing contexts is associated with a number of important positive health, social, and economic outcomes for a community. The event of menarche tends to coincide with girls' transitions from primary to secondary education and may constitute a barrier for continued school attendance and performance. Following the MRC

Framework for Complex Interventions, a pilot controlled study was conducted in Ghana to assess the role of sanitary pads in girls' education.

METHODS: A sample of 120 schoolgirls between the ages of 12 and 18 from four villages in Ghana participated in a nonrandomized trial of sanitary pad provision with education. The trial had three levels of treatment: provision of pads with puberty education; puberty education alone; or control (no pads or education). The primary outcome was school attendance.

RESULTS: After 3 months, providing pads with education significantly improved attendance among participants, (λ 0.824, $F=3.760$, $p=.001$). After 5 months, puberty education alone improved attendance to a similar level ($M=91.26$, $SD=7.82$) as sites where pads were provided with puberty education (Rural $M=89.74$, $SD=9.34$; Periurban $M=90.54$, $SD=17.37$), all of which were higher than control ($M=84.48$, $SD=12.39$). The total improvement through pads with education intervention after 5 months was a 9% increase in attendance. After 3 months, providing pads with education significantly improved attendance among participants. The changes in attendance at the end of the trial, after 5 months, were found to be significant by site over time. With puberty education alone resulting in a similar attendance level.

CONCLUSION: This pilot study demonstrated promising results of a low-cost, rapid-return intervention for girls' education in a developing context. Given the considerable development needs of poorer countries and the potential of young women there, these results suggest that a large-scale cluster randomized trial is warranted.

9. Oster, E., & Thornton, R. (2009). *Menstruation and education in Nepal*. NBER Working Paper Series. Retrieved from: <http://www.nber.org/papers/w14853>.

Abstract: This paper presents the results from a randomized evaluation that distributed menstrual cups (menstrual sanitary products) to adolescent girls in rural Nepal. Girls in the study were randomly allocated a menstrual cup for use during their monthly period and were followed for fifteen months to measure the effects of having modern sanitary products on schooling. While girls were 3 percentage points less likely to attend school on days of their period, we find no significant effect of being allocated a menstrual cup on school attendance. There were also no effects on test scores, self-reported measures of self-esteem or gynecological health. These results suggest that policy claims that barriers to girls' schooling and activities during menstrual periods are due to lack of modern sanitary protection may not be warranted. On the other hand, sanitary products are quickly and widely adopted by girls and are convenient in other ways, unrelated to short-term schooling gains.

10. Sommer, M. (2011). *An Early Window of Opportunity for Promoting Girls' Health: Policy Implications of the Girl's Puberty Book Project in Tanzania*. *International Electronic Journal of Health Education*, 14, 77–92.

Abstract: The onset of puberty, and specifically menstruation, is an opportune moment for reaching girls as they transition into adolescence and young womanhood. Despite the importance of this transitional period, the reproductive health community has tended to overlook the onset of menstruation and early puberty in global, national and local policy and

practice in low-income countries. This paper will describe one response to this gap in attention, the Tanzania girl's puberty book project, which was developed through participatory research conducted with Tanzanian girls in 2006-2007. An initial pilot distribution and evaluation of the girl's book was followed by sustained efforts with local stakeholders that led to the girl's puberty book being integrated into government level policy in education and WASH in schools, and over 140,000 copies being disseminated. The Tanzania girl's puberty book project has implications for girls' health and education policy across low-income countries, and is being adapted for Ghana, with plans for developing an Ethiopia book in 2012.

Cross-Referenced

In Urogenital Tract Infections

Phillips-Howard, P. A., Nyothach, E., ter Kuile, F. O., Omoto, J., Wang, D., Zeh, C., . . . Laserson, K. F. (2016). Menstrual cups and sanitary pads to reduce school attrition, and sexually transmitted and reproductive tract infections: a cluster randomised controlled feasibility study in rural Western Kenya. *BMJ Open*, *6*(11).