

Anna Bezruki, My Catarina von Euler-Chelpin and Siri Tellier

Science Research Practicum

13 May 2016

## Does Menstruation Keep Girls out of School?

### Abstract

#### **Introduction**

Approximately 25 percent of the world's population menstruates, yet many women and girls have inadequate menstrual management (MM), which has been implicated by the World Economic Forum and UNESCO in school absenteeism (WoMena 2016; UNESCO 2014; WEF 2015). Adequate MM is defined as the use of clean menstrual management products and access to soap, water, and the facilities necessary to clean the body and dispose of used menstrual management products; it involves education, access to health care, affordable products, and positive social norms (UNESCO 2016). A recent uptick in attention to the topic of MM has led to interest in the evidence for the effects of inadequate MM, particularly whether it is negatively affecting school attendance.

#### **Methods**

Two overlapping systematic reviews on the effect of menstruation on school attendance and performance, and of the effect of MM intervention programs on school attendance and performance, were conducted.

## **Results**

Twenty-nine studies addressing the effects of inadequate MM on school attendance and/or performance and eight articles addressing the effect of MM intervention programs on school attendance and/or performance were identified for inclusion. All studies show that inadequate MM has a negative effect on school attendance and performance, but are conflicting on the magnitude of the effect, with very heterogeneous data. The studies demonstrate that there are multiple, interrelated causes of absences during menstruation, including cultural and religious restrictions, shame and embarrassment, inadequate sanitation facilities, pain and discomfort, and (lack of) adequate menstrual management products. The data is clear that menstruation does have a negative effect on concentration and/or participation in school, with all eleven studies that examined the issue reporting a negative effect. Studies analyzing the effectiveness of programmatic interventions are suggestive that WaSH, education, and menstrual management products can improve attendance rates (at least in the short term), but given the paucity of data, it is still too early to draw conclusions about intervention efficacy.

## **Discussion and Conclusion**

The studies in this review used different metrics and many were not wholly transparent about methodology (e.g., what questions girls were asked and how those questions were asked), making it difficult to make comparisons or draw conclusions. Despite these limitations and significant heterogeneity in the data, it appears that some girls are missing school because of menstruation and, when they do attend, they are experiencing reduced concentration and/or are

participating less in class.<sup>1</sup> The fact that, even with very different methodology, all studies detect absences during menstruation, suggests that the problem is real. Further quality research is necessary to determine the magnitude of the absenteeism problem, and to determine the efficacy of WaSH, education, and menstrual product interventions.

## Introduction

More than 800 million women and girls worldwide are menstruating on any given day (Schechtman 2015). Adequate menstrual management (MM) is recognized as being critical for the fulfillment of women's human rights – of human dignity and health (UNHRHC 2014). The Chief of the UN Human Rights Office Economic and Social Issues Section, Jyoti Sanghera has said that “stigma around menstruation and menstrual hygiene is a violation of several human rights, most importantly of the right to human dignity” (UNHRHC 2014).

Women and girls have adequate MM when they “are using a clean menstrual management material to absorb or collect blood that can be changed in privacy as often as necessary for the duration of the menstruation period, using soap and water for washing the body as required, and having access to facilities to dispose of used menstrual management materials” (Sommer and Sahin 2013). However, as a UNESCO booklet notes, this definition does not include all that is needed for the behavior to be practiced; the report argues that adequate menstrual management also requires “accurate and timely knowledge,” “informed and comfortable professionals,” “available, safe, and affordable materials,” “referral and access to health services,” and “positive social norms” (UNESCO 2014). Many women face multiple barriers to adequate MM, including

---

<sup>1</sup> Girls may miss school because of menstruation itself or because of inadequate menstrual management. However, determining what proportion of absences are due to menstruation itself would appear only possible after adequate menstrual management (and underlying social norms, health care access, and knowledge) is achieved.

stigma, shame and access only to inadequate menstrual products (MP), such as cloths, cotton, sponges, leaves, dung, or animal hides (UNESCO 2014).

Until recently, menstruation – and the potential effects that poor menstrual management (MM) can have on the health, educational attainment, and the overall achievement of girls and women – received little public attention. The first Menstrual Hygiene Day was celebrated in 2014 by a group of NGOs, including Save the Children, PATH, and WaterAid (“Menstrual Hygiene Day”) to raise awareness about menstrual management.

Behind the anecdotes and a frequently-cited UNICEF statistic that 1 in 10 African girls miss school every month during their periods (UNESCO 2014), there is also increasing awareness that the evidence on what effects poor MM is having is weak, and the same is true for the effect of programmes initiated to address the issue.

MM has an effect on many aspects of women’s and girls’ lives, but here we will concentrate on educational attainment. Determining the efficacy of programs to improve MM can be split into two considerations. First, it is necessary to determine whether poor MM is significantly affecting girls’ educational attainment. Second, it is necessary to determine whether the proposed interventions are a remedy.

### Research Questions

**Question I:** Does poor menstrual management (MM) negatively affect the attendance or performance of schoolgirls in low- and middle-income countries (LMICs)? If so, to what extent?

**Question II:** Have MM programmatic interventions had a measurable effect on school attendance or performance for schoolgirls in LMICs?

## Methods

**Question I:** To determine to what extent a lack of access to adequate MM affects school absenteeism or educational attainment by schoolgirls in LMICs, we undertook a systematic review of the literature.

Our search strategy was chosen to identify published studies on MM and associated outcomes relating to educational attainment. The searches were conducted in February 2016 using PubMed, Google Scholar, and ProQuest. We imposed a date limit from 2005 to the time of the search. In addition, two main reports, UNESCO's *Puberty Education and Menstrual Hygiene Management* booklet and WaterAid's *Menstrual hygiene matters: a resource for improving menstrual hygiene around the world* were hand-searched for additional references. See Appendix 1 for the search terms used.

*Inclusion Criteria:* To be included, papers were required to be primary sources, peer-reviewed or theses, written or translated into English, use quantitative methods, focused on MM and school absenteeism or educational attainment in LMICs, and be focused on schoolgirls in primary or secondary school (not university-level) who had started menstruating.

Papers were initially screened by analyzing their titles and abstracts to see if they met the inclusion criteria. If papers could not be clearly eliminated through this initial screen, the full text of the article was obtained. After preparing the list of abstracts, as many papers in full text as possible were obtained and examined to ensure that the papers still met the inclusion criteria.

Two independent reviewers examined the articles.

Given the small number of resultant studies, a small number of reports that are neither theses nor peer-reviewed were also included. Twenty-nine papers were included in the review (see Table 1).

**Question II.** To determine whether any programmatic interventions intended to improve MM in LMICs have had any measurable effect on school attendance or educational attainment, we undertook a systematic review of the literature.

Our search strategy was chosen to identify published studies detailing what effect, if any, that programmatic interventions for MM had on educational attainment.

The searches were conducted in English in February 2016 using PubMed and Google Scholar. We imposed a date limit of 2005 to the search date. In addition, two main reports, UNESCO's booklet on *Puberty Education & Menstrual Hygiene Management*, and WaterAid's *Menstrual hygiene matters: a resource for improving menstrual hygiene around the world*, were hand-searched for additional references. Search terms were based on the list above, and expanded to include terms to limit the search to LMICs. See Appendix 1 for the search terms used.

**Inclusion Criteria:** To be included, papers were required to be written or translated into English, focused on MM in LMICs, be original peer-reviewed primary research (or theses) on whether school attendance or educational attainment was improved by programmatic interventions in MHM, use quantitative methods, and focused on schoolgirls in primary or secondary school (not university-level) who had started menstruating. Papers were to include before/after analysis or comparison groups (i.e., to look at baseline and endpoint after an intervention).

Papers were initially screened by analyzing their titles and abstracts to see if they met the inclusion criteria. If papers could not be clearly eliminated through this initial screen, the full text

of the article was obtained. After preparing the list of abstracts, as many papers in full text as possible were obtained and examined to ensure that the papers still met the inclusion criteria. Only those papers that could be found in full text were included in the review. Two independent reviewers examined the articles.

### Results Question I

Twenty-nine studies were identified in this manner, including two systematic literature reviews (see Table 1).

The studies included in this review were conducted in fifteen countries, including eight lower-income countries (Ethiopia, Malawi, Nepal, Sierra Leone, South Sudan, Tanzania, Uganda, and Zimbabwe), six lower-middle-income countries (Cameroon, Ghana, Egypt, India, Kenya, and Senegal), and one upper-middle-income country (Malaysia) (World Bank 2013).

#### **1. Absenteeism**

All studies found that some girls were missing school during menstruation. However, the studies were conflicting on the magnitude of the problem. While most of the studies report that more than 10 percent of schoolgirls are absent for reasons relating to menstruation, there is a broad range of results. Three studies report that 1-10 percent of schoolgirls are absent for reasons relating to menstruation (Thakre et al. 2011; UN Women and WSSCC 2015; WaterAid 2009). Similarly, Oster and Thornton (2010) found that while a statistically significant percentage of girls missed school during menstruation, the average amount of school missed was extremely small (amounting to less than one full day per school term per girl). In contrast, ten studies report that 10-25 percent of girls are absent for reasons for relating to menstruation (Crofts 2010; El-Gilany, Badawi, and El-Fedaway 2005; Guya, Mayo, and Kimwaga 2014; Khan 2012;

NestBuilders International 2012; Pillitteri 2012; Rani, Sharma, and Singh 2015; Wanja 2014; Wong 2011; Scott et al. 2009) and three report that between 25-50 percent are absent (Grant, Lloyd, and Mensch 2013; Tamiru et al. 2014 and 2015; Zegeye, Megabiaw, and Mulu 2009). Seven studies report even higher numbers, with 50-75 percent of schoolgirls absent due to menstruation (UN Women and WSSCC 2014; Boosey, Prestwich, and Deave 2014; Gultie, Hailue, and Kimwaga 2014; Jothy and Kalaiselv 2012; Konapur and Nagaraj 2014; Tegegne and Sisay 2014; Wilson, Reeve, and Pitt 2014), and one reports that more than 75 percent of girls are absent (Scott et al. 2009).

## **2. Reasons for absences during menstruation**

The studies suggest that there are multiple, interrelated causes of absences for girls during menstruation, including the direct (menstrual restrictions) and indirect effects of stigma, shame and embarrassment, lack of education about menstrual management, inadequate school sanitation facilities, inadequate menstrual products (MP), and physical discomfort and pain. These contributing factors have varying effects between the studies, but all are implicated. These reasons are also clearly related – shame and embarrassment would seem more likely to occur if one bleeds through clothing, which is more likely in schools that have inadequate sanitation facilities and for girls who are using rags, bark, or toilet paper than disposable manufactured MP or menstrual cups.

*Cultural and religious restrictions* do not appear, based on the studies in this review, to be a substantial reason for school absences. For example, Thakre et al. (2011) found that 5.17 percent of girls reported being prevented from attending school during menstruation. Similarly, a 2009 report by WaterAid found that 3.4 percent of girls included not being allowed to go to school as a restriction placed on them during menstruation. Even though Jothy and Kalaiselv (2012) found



that 31.4 percent of schoolgirls attributed their menstruation-related absences to cultural restrictions, many more blamed other factors: 89 percent attributed it to a lack of water supply for cleaning and 73.3 percent to pain and discomfort. Similarly, Khan (2012) found that, of the approximately 10 percent of girls who did not attend school, 60 percent did not because of dysmenorrhea versus 25.1 percent who were prevented from doing so by their parents because of impurity beliefs.

However, *shame and embarrassment* still play an indirect role in absences during menstruation. In India, when asked for reasons for absenteeism during menstruation, 53.4 percent of girls reported shame as a reason (Jothy and Kalaiselv 2012). Many of the reasons that girls cite for missing school – including a lack of privacy for changing and fear of bleeding through clothing – are related to the shame and embarrassment that result from public knowledge of their menstrual status. When girls in Uganda who reported missing school during menstruation were asked, 63.8 percent implicated a lack of privacy for changing MP at school and 59.4 percent expressed a fear of bleeding through their clothing (Boosey, Prestwich, and Deave 2014).

*Inadequate sanitation facilities* figured high in girls' reported reasons for missing school. Sanitation facilities in schools are inadequate if they lack (clean) toilets, lack privacy for changing MP (e.g., do not have locking doors), lack water and/or soap for cleaning, and/or if they lack a place to (privately) dispose of MP. Jothy and Kalaiselv (2012) found that for 89 percent of girls a lack of water supply for cleaning contributed to missing school, and a lack of privacy for cleaning and washing contributed to absences for 49.7 percent of girls. In other words, an inability to clean prevented the most girls from attending school, followed by an inability to do so privately. In addition, when teachers were questioned, 90 percent thought that school sanitary conditions affected whether girls dropped of school (Mwangolo 2015). However,

Grant, Lloyd, and Mensch (2013) found that toilet availability, cleanliness, and water availability was not significantly associated with school absences, although they did find that student perception of cleanliness was associated with absenteeism.

*Pain* is also cited as a cause of absences. Jothy and Kalaiselv (2012) found that 73.3 percent of schoolgirls who missed school during menstruation list pain as a reason for the absence. Boosey, Prestwich, and Deave (2014) report that 55.1 percent of schoolgirls cite discomfort relating to bloating and tiredness and 51.4 percent cite pain as reasons for missing school during menstruation. However, the relative importance of pain versus other variables is not clear. In a WaterAid report, while 85 percent of girls reported uncomfortable physical symptoms during menstruation, pain/discomfort was only mentioned as a reason for school absences by 16.2 percent of girls reporting absences, following a lack of privacy for cleaning, a lack of a disposal system for MP, and a lack of water supply for cleaning (WaterAid 2009).

*Menstrual products – or the lack thereof* – are also a factor in absences. Tegegne and Sisay (2014) found that those who did not use disposable MP were 5.37 times more likely to be absent from school than their counterparts who did. The majority of teachers think the availability of sanitary pads affects girls' performance in school, with 71.4 percent believing it does so to a "very great extent" (Njue and Muthaa 2015). High sanitary pad usage is correlated with high attendance in some studies: in a study in Cameroon, where 84.7 percent of schoolgirls used manufactured sanitary pads, 95.9 percent of girls report attending school during menstruation (UN Women and WSSCC 2015). Admittedly, not all of the studies show this correlation. For example, in Nepal there is only a 3.4 percent reported absence rate despite the fact that only 32.8 percent of girls in the study used disposable sanitary pads (the rest used old or new cloth pieces) (WaterAid 2009). However, since the study in Nepal asked girls what restrictions were practiced

during menstruation (WaterAid 2009), of which school attendance was one possible option, this study may not have captured if absences were occurring because of lack of sanitary pads (or for other reasons).

Similarly, Wanja (2014) reports high rates of school attendance during menstruation (80 percent) as well as high ratings of the school sanitation facilities, with 65.7 percent of girls rating their school sanitation facilities as “very good,” an additional 22.9 percent rating them as “good,” and 75.7 percent of girls perceiving the facilities as private (Wanja 2014). In addition, at least one third of the students had access to analgesics (27.1 percent of girls reported using analgesics during menstruation and 44.2 percent of teachers reported offering analgesics to menstruating girls) (Wanja 2014). It is possible that these students had lower absences because of (at least what were perceived as) adequate sanitation facilities and access to analgesics.

When girls were asked what type of interventions they wanted to see, the highest-ranking items were the provision of soap (21 percent), free MP (16 percent), handwashing facilities (13 percent), locking toilet doors (10 percent), and painkillers (10 percent) – revealing the complex combination of inadequate MP, inadequate places to change MP at school, and the challenges of managing the discomfort of menstruation (Guya, Mayo, and Kimwaga, 2014). (It is noteworthy that in this study, 97.3 percent of girls used disposable sanitary pads as their only MP during their last menstrual cycle; results may be different in areas where adequate MP are less common.)

### **3. Reduced Concentration/Participation**

All eleven studies which examined whether girls participate less in class and/or experience reduced concentration during menstruation found that there was a negative relationship between

menstruation and class concentration and/or participation (El-Gilany, Badawi, and El-Fedaway 2005; Gultie, Lloyd, and Mensch 2013; Boosey, Prestwich, and Deave 2014; Tegegne and Sisay 2014; Jothy and Kalaiselv 2012; Konapur and Nagaraj 2014; NestBuilders International 2012; Tamiru et al. 2014 and 2015; Wanja 2014; Wong 2011; WaterAid 2009). In all the cases where reduced concentration or participation was quantified in terms of percent of girls reporting a negative effect, at least 24 percent of girls reported reduced concentration or participation (El-Gilany, Badawi, and El-Fedaway 2005; Gultie, Hailu, and Workineh 2014; Tegegne and Sisay 2014; Konapur and Nagaraj 2014; NestBuilders International 2012; Tamiru et al. 2014 and 2015; Wanja 2014; Wong 2011). Konapur and Nagaraj (2014) report that nearly 70 percent of girls (N = 464) found it difficult to concentrate in class during menstruation. Similarly, Wanja (2014) found that nearly 68.6 percent of girls reported that menstrual discomfort prevented them from fully participating in school activities. Nearly 60 percent of girls surveyed by Tegegne and Sisay (2014) believed that menstruation had negatively affected their academic performance. In Sierra Leone, 26.8 percent of girls “strongly agreed” with the question, “You don’t like to stand up in class when on your period?” (NestBuilders International 2012) and in India, girls expressed reduced concentration out of fear that boys would be able to discern their menstrual status (Jothy and Kalaiselv 2012). Tegegne and Sisay (2014) report that focus group discussions revealed that girls “didn’t stand in front of students to answer questions or to write on the board fearing the sudden leakage of blood.”

## Results Question II

The review identified eight articles for inclusion (see Table 3). The studies were conducted in four countries: one low-income country (Nepal) (Oster and Thornton 2010), two lower-middle-income countries (Ghana and Kenya) (Scott et al. 2009; Montgomery et al. 2012; Wilson, Reeve,

and Pitt 2014; and Freeman et al. 2012) and one upper-middle-income country (South Africa) (Appollis 2014) (World Bank 2013).

This study was undertaken before the publication of the Hennegan and Montgomery systematic review in February 2016, which investigated whether MM interventions improved educational and psychosocial outcomes for girls and women in LMICs. It is perhaps noteworthy that, despite using a much shorter and more condensed list of search terms than Hennegan and Montgomery (2016), much the same articles were found. It is not clear what the reasons for this may be, except perhaps that there is little research on this topic. This review contains three studies that were included in the Hennegan and Montgomery (2016) review (Oster and Thornton 2010; Scott et al. 2009; and Wilson, Reeve, and Pitt 2014). Four studies included in Hennegan and Montgomery (2016) were excluded because they concentrated on psychosocial outcomes of MM interventions, rather than educational/attendance outcomes (Abedian et al. 2011; Djalalinia 2012; Fetozy 2007; and Mbizvo 1997). Fakhri et al. (2012) was excluded because it did not report quantitative attendance data.

Despite asking slightly different questions and having slightly different sources, we come to similar conclusions as Hennegan and Montgomery (2016); namely, that there is currently not enough evidence to determine the efficacy of MM interventions on educational attainment. Of the six primary research articles, one study found no effect of menstrual product intervention (Oster and Thornton 2010), one found an increase in attendance with the provision of pads (Wilson, Reeve, and Pitt 2014), two found an increase in attendance both with provision of pads and with provision of pads and education (Scott et al. 200 and Montgomery et al. 2012), one found a short-lived increase in attendance with the provision of pads and education (Appollis 2014), and one found an association between WaSH interventions and increased attendance for

girls (Freeman et al. 2012). The studies had short follow-up times (none followed participants for more than one year after intervention), and as Hennegan and Montgomery (2016) also found, many contain risks of bias and fail to consider negative outcomes of programmatic interventions.

## Discussion

### *Question I*

#### **1. Heterogeneous study design**

There could be multiple reasons that the studies report such different rates of menstruation-related absences, including regional differences in the effects of poor MM on school attendance. One substantial reason for the mixed results may be the fact that there is a great deal of heterogeneity in the study design.

The study designs and questions asked vary greatly between the studies. Regarding school absences during menstruation, the question(s) that girls were asked varied considerably between studies, from how many days girls missed during their last period (Grant, Lloyd, and Mensch 2013) to whether they rarely, sometimes, often, or always go to school during menstruation (UN Women and WSSCC 2014) to whether they had ever been absent from school because of menstruation (Nestbuilders 2012) to whether they were not allowed to go to school during menstruation (Thakre et al., 2011) (see Table 2). This makes meaningful comparison of the results difficult. For example, it is unclear how generalizable the results of Oster and Thornton (2010) are, given the researchers base their estimate of less than one school day missed per girl per 180-day school term on girls menstruating for 8 percent of school days. If girls are menstruating for five days out of every twenty-eight, one would expect this number to be closer to 18 percent. The authors do not provide any suggestions for why the number of menstruating

days is so low (Oster and Thornton 2010), but understanding that would be necessary before generalizing this result.

By taking the differential study designs into consideration, hypotheses can be generated to explain the variations in absenteeism data. Contrary to what might be expected, it is not the case that only studies asking if girls had ever missed school, rather than if girls missed school every month, had the highest rates of absenteeism. Of the six studies reporting a 50-70 percent absence rate, two (Boosey, Prestwich, and Deave 2014 and Tegegne and Sisay 2014) reported a rate in that range on a monthly basis. Boosey, Prestwich, and Deave (2014) found that, out of 173 girls in southwest Uganda, 61.7 percent missed at least one day each month due to menstruation. Tegegne and Sisay (2014) found that, out of 595 girls in northeast Ethiopia, 51.4 percent reported missing between one and four days of school during their last menstrual period. Furthermore, the fact that the question asked does not include frequency does not mean that the frequency is low. While the 2014 UN Women and WSSCC report found that fewer than half of girls said they always attended school during menstruation, it also found that those absences are not infrequent: 36 percent of girls reported that they rarely attended school during menstruation. Four of the studies asked some variation on whether not going to school was a restriction practiced during menstruation and was often included in a list of other common cultural restrictions practiced during menstruation, such as not participating in certain religious functions or preparing or handling certain foods (Jothy and Kalaiselv 2012; Nestbuilders International 2012; Thakre et al. 2011; WaterAid 2009). Three of these four studies report some of the lowest rates of menstruation-related absences. Of the three studies in this review with 10 percent or fewer girls reporting absences, two asked girls about restrictions practiced during menstruation (Thakre et al. 2011 and WaterAid 2009). By phrasing the question as a restriction that was

practiced, girls may not have reported absences due to other reasons, such as pain, a lack of adequate sanitation facilities, or lack of MP availability. Therefore, it is possible that the total number of menstruation-related absences may be higher than the responses elicited by these narrow questions suggest.

Making analysis even more complex is the fact that most of the studies (eighteen out of twenty-six studies)<sup>2</sup> do not include the exact question(s) that the girls were asked. Only six out of twenty-six studies provide the precise question(s) (Crofts 2010; Grant, Lloyd, and Mensch 2013; Oster and Thornton 2010; Scott et al. 2009; UN Women and WSSCC 2014; UN Women and WSSCC 2015; Wanja 2014) (two others provide the precise question asked teachers about how many girls they thought missed school because of menstruation (Mwangolo 2015; Njue and Muthaa 2015)).

Additionally, the results of Grant, Lloyd, and Mensch (2013) demonstrate that who is doing the asking can affect the answers provided by the schoolgirls. In a face-to-face interview, only 14 girls out of over 700 said they had missed school because of their menstrual period since the start of the school year. In contrast, when asked via a computer system, approximately 32 percent of the girls said they had missed at least one day of school because of menstruation since the last time they had their menstrual period. Crofts (2010) similarly demonstrated how setting could affect girls' responses. In this study, girls were interviewed in small groups (Crofts 2010). In these groups, 14 percent of girls reported being absent at some point during their last menstrual period, but when girls were asked what percentage of girls they thought missed school with

---

<sup>2</sup> Jasper, Le, and Bartram (2012) and Sumpter and Torondel (2013) are not included in this count because, as systematic reviews, no questions were directly posed to schoolgirls. In addition, Tamiru et al. (2014) and Tamiru et al. (2015) are consistently considered in this review as one study because the articles report on the same studies.



every menstrual cycle, the average number given was 34 percent (Crofts 2010), suggesting that the group setting prevented girls from honestly reporting their own absences.

Fewer than half of the studies used self-administered questionnaires of some sort (Zegeye, Megabiaw, and Mulu 2009; Wilson, Reeve, and Pitt 2014; WaterAid 2009; Wanja 2014; UN Women and WSSCC 2014; Tegegne and Sisay 2014; Oster and Thornton 2010; Guya, Mayo, and Kimwaga 2014; Gultie, Hailu, and Workineh 2014; Grant, Lloyd, and Mensch 2010; El-Gilany, Badawi, and El-Fedaway 2005; Boosey, Prestwich, and Deave 2014) (it was unclear what method five of the studies used) (see Table 2). Given that the answers can vary depending on the data collection method (Grant, Lloyd and Mensch 2013; Crofts 2010), it would be problematic to compare studies using different methods.

When looking at the four studies that used some form of self-administered questionnaires and asked how many days of school were missed per month (or in the last month) because of menstruation (Boosey, Prestwich, and Deave 2014; Gultie, Hailu, and Workineh 2014; Tegegne and Sisay 2014), three reported rates of absences each month between 50 and 75 percent and one reported that approximately 32 percent of girls who missed at least one day of school since their last menstrual period (Grant, Lloyd, and Mensch 2013). Admittedly, the conflicting results do not completely disappear when only studies asking similar questions and using the same collection method are compared. For example, the 2014 UN Women and WSSCC report asked girls via self-administered questionnaire whether they went to school during menstruation, with the option to answer that they always, often, sometimes, or rarely attended; more than half of girls reported missing school at least sometimes. In contrast, Wanja (2014) found that only 14.3 percent of girls missed school when asked whether they attended school during menstruation via a self-administered questionnaire. However, since the questions asked are only similar – and not

identical (it is possible that the option to answer sometimes or often, as in the UN Women and WSSCC report (2014) elicited more affirmative responses than the binary yes or no option in the Wanja (2014) study) – it is impossible to rule out heterogeneous study design as explanation for the conflicting results.

Additionally, most of the studies do not try to measure overall absenteeism in addition to menstruation-specific absences, so it is difficult to determine the magnitude of menstruation-related absences versus other causes of school absences. Pillitteri (2012), however, found that menstruation-related absences accounted for more absences than malaria-related absences (85 days versus 81 days in that term).

## **2. Absence is not the only metric that should be considered when considering problems with educational attainment**

Studies suggest that absenteeism may be a limited metric for ascertaining the effect of poor MM on girls' educational attainment. Several studies note the problems with gathering absence data, given the lack of consistent record-keeping in many schools, the inherent problems with self-reported absence data, including the tendency of girls to not report honestly the reason for missing school (telling teachers it is because of sickness rather than menstruation) (Pillitteri 2012) and the fact that absenteeism data does not capture girls who showed up to school, but then went home early or missed a class in the middle of the day. One study in Cameroon found that while only 4.1 percent of girls reported absences during menstruation, 11.9 percent of girls reported leaving school early during menstruation, and 16.1 percent reported missing a lesson during menstruation (UN Women and WSSCC 2014). Additionally, the fact that all studies which looked at concentration and/or participation found that menstruation has a negative effect (El-Gilany, Badawi, and El-Fedaway 2005; Gultie, Lloyd, and Mensch 2013; Boosey, Prestwich,

and Deave 2014; Tegegne and Sisay 2014; Jothy and Kalaiselv 2012; Konapur and Nagaraj 2014; NestBuilders International 2012; Tamiru et al. 2014 and 2015; Wanja 2014; Wong 2011; WaterAid 2009) suggests that this is another metric which should be considered. While the magnitude of this decrease in concentration (i.e., how much their concentration or participation is reduced during menstruation) is not measured by these studies (nor is it clear what indicator would effectively, easily, and reliably measure a decrease in concentration or reduced participation), these findings suggest that menstruation is affecting the ability of these girls to be fully engaged in their education.

### *Question II.*

Despite the lack of consensus in these studies, there are a few findings that merit additional attention and suggest avenues for future research.

Scott et al. (2009) showed that, before being provided with adequate MP, 81 percent of girls in a rural environment reported bleeding through their clothing. After receiving pads, none of the girls reported bleeding through clothing. This suggests that adequate MP would reduce the chances of bleeding through clothing, and may in turn reduce the risk of absenteeism associated with girls fearing that they will bleed through their clothing. However, the same study found a reduction in bleeding through clothing even in the group that just received education and not pads (Scott et al. 2009). The study did not investigate possible causes of this, such as independent purchasing of adequate MP after receiving menstruation education; this could be an area for further research.

Two of the studies examined the effects of providing MM education versus providing MP and MM education. In Scott et al. (2009), both treatment groups – receiving puberty education or pads and puberty education – experienced a similar, significant decline in absences after

intervention. Montgomery et al. (2012) found that, after five months, providing education alone produced a similar significant increase in attendance levels as providing pads and education. The researchers theorized that opening up “discussion of this taboo subject” may have “fostered improved peer and other relations making the school environment more supportive” allowing education to be as effective as pads and education (Montgomery et al. 2012).

Additionally, the results of Freeman et al. (2012) suggest that WaSH interventions could have a substantial effect on schoolgirls’ attendance. Freeman et al. (2012) did not look specifically at the issue of menstruation; instead, it examined (via a cluster-randomized trial) whether WaSH interventions improved school attendance rates for all children. The researchers found that water treatment, hygiene promotion, and provision of sanitation facilities had no effect on the attendance of boys, but led to an estimated reduced absence of 6.8 days per year for girls (Freeman et al. 2012).

### *Question I and Question II*

Most of the studies in this review, with a few notable exceptions (e.g., Oster and Thornton 2010), conclude that poor MM is a problem that is negatively and meaningfully affecting girls’ abilities to attend and succeed in school. The exact magnitude of the problem remains unclear, as does the best way to address it. What the existing research makes clear is the need for additional, comparable research; research that asks the right questions (how much and how often school is being missed by girls), and asks it in a way that is more likely to gain truthful responses (self-administered questionnaires instead of interviews).

Three studies demonstrate that MM education has an effect on absenteeism. However, the long-term efficacy of these interventions has not been established. Appollis (2014) found that a three-session educational intervention combined with the long-term provision of pads was associated

with an increase in school attendance for the school year in which the intervention was implemented, but that school attendance decreased the following year, despite the continuing provision of MMP. The reasons for this drop are unclear, and longer follow-up was not conducted (Appollis 2014).

In addition, it appears that education has a role to play in increasing school attendance. Not only do some studies suggest that education is as effective as WaSH and MP interventions (Scott et al. 2009; Montgomery et al. 2012), but Boosey, Prestwich, and Deave (2014) also report that girls expressed a desire for additional education about menstruation and MM. Multiple studies reported extremely limited knowledge about menstruation, including Tegegne and Sisay (2014), Tamiru et al. (2014 and 2015), Khan (2012), Jothy and Kalaiselv (2012), suggesting that there are knowledge gaps for education to address.

Additional research is needed into how MM affects many other aspects of girls' and women's lives as well, beyond educational attainment. Some limited studies and anecdotal evidence suggest that poor MM causes women in LMICs to miss work (HERProject Bangladesh 2010) and the use of unsanitary MMP may have health consequences: Sumpter and Torondel (2013) report that existing research into MMP and urinary tract infection is "weak and contradictory." In some regions, the start of menstruation may signal marriageability (UN Women and WSSCC 2014; UN Women and WSSCC 2015).

This study has several limitations. It only included English-language papers. No studies included in this review were conducted in Central or South America, likely because of the search restriction to articles in English. Additionally, given the time constraints on the review, it was not possible to find full-texts of five articles (they were not accessible via Bryn Mawr College or Københavns Universitet), preventing them from being assessed according to the

inclusion/exclusion criteria (see Appendix 2 for a list of these texts). In addition, while many of the studies acknowledge quality issues (including risk of bias), examining the relative quality of the studies was outside the scope of this review, but is an important consideration, particularly given that several of the studies in this review were not peer-reviewed.

## Conclusion

Despite what appears to be a recent uptick in interest into what role MM may play in the educational achievement of girls in low- and middle-income countries (20 out of the 29 studies for Question I. were published in or after 2012), it is still difficult to draw firm conclusions. Most of the studies in this review show, in varying degrees, that poor MM has a negative impact on school attendance and on school participation and concentration, and some show a positive effect from interventions, especially those combining MP with education. However, there is considerable heterogeneity in the methods used in the studies, making comparisons, let alone pooling of the data, nearly impossible. The fact that the one study that has been cited as having the most rigorous methodology (Oster and Thornton 2010) shows little effect of MP intervention should not necessarily be taken as an overarching conclusion, given some of the limitations in its design and questions about its generalizability to other contexts. The handful of systematic reviews that have been done on related topics have addressed some limitations of some of the studies in this review, but we think our study is the first to focus on the extreme heterogeneity of the data in terms of quantifying the effect of MM on school attendance.

Given the heterogeneity of the data, we think the conclusion should not be one of caution in dealing with MM and MP provision, but that there is a need for further research to determine the magnitude of the effect of MM on educational attainment and how to fix it. There should be high-quality studies that attempt to control for the many variables at play, including varying

access to factors that can affect absenteeism (adequate sanitation facilities, MP, and education), and that attempt to address the multiple challenges of such research, including the limitations of absences as an indicator of educational attainment and the difficulty of getting accurate reporting of school absences due to menstruation. These studies should include an explicit description of methodology, including the precise formulation of research questions and the interview approach, and with an explanation of why a particular approach was chosen. Girls should not miss school because of inadequate MM. Determining how many are missing school, why, and how to prevent that will require high-quality studies that are designed to try to, as Gertrude, a Ugandan schoolteacher, explained to one of the researchers, “Listen to them slowly.”

Table 1

Author(s), Year	Purpose of the Study	Setting and Sample	Methodology	Key Findings re: school attendance and MHM	Study Type
<b>Boosey, Prestwich, and Deave, 2014</b>	To assess the menstrual hygiene practices and knowledge of girls in Rukungiri district in Uganda. To assess the extent to which poor MHM affects their education.	Rukungiri District, south-west Uganda between March-April 2013. 173 girls from six primary schools completed the questionnaire; final sample size of 140. All girls were between the ages of 13-16 and had begun menstruation. All girls were behind in their studies, remaining in primary school despite being of age to attend secondary school. One focus group per school, consisting of six to nine girls in each school.	Mixed research methods. Quantitative self-administered pre-tested questionnaire. Focus groups with students and semi-structured interviews with head teachers and teachers. A toilet assessment.	A majority of students (61.7%) reported missing school at least one day per month for menstruation-related issues. The reasons for absenteeism include lack of privacy to change (63.8%), fear of staining (59.4%), bloating and tiredness discomfort (55.1%) and pain (51.4%). Focus group participants also noted difficulty concentrating in class and fears about participation during menstruation.	peer-reviewed journal article
<b>Crofts, 2010.</b>	To determine to what extent low-cost sanitary pads are a solution to menstrual hygiene problems for schoolgirls in Uganda.	Uganda. 134 schoolgirls in secondary school, aged 13 to 20, participated in focus group activities. Three categories of schoolgirls - those who had been targeted for interventions by Afripads, those targeted for intervention by Makapads, and those who had	Mixed methods. Questionnaires, interviews, focus group activities, and observations.	14% of girls admitted to have been absent from school during their last period. However, 91% of respondents reported knowing of girls who were often absent with each menstrual cycle. Furthermore, when 92 participants were asked to estimate the percentage of schoolgirls who	master's thesis



		not been targeted for interventions by either.		miss one or more day of school each month due to menstruation, the average of their responses was 30.4% (caveat - large range given). Researchers point out the inconsistency of these two numbers and note that number is likely lower than expected as well because approximately half the students in the study were boarders. 71% of girls report the reason for staying home was because of physical discomfort.	
<b>El-Gilany, Badawi, and El-Fedaway, 2005</b>	To examine the prevalence, determinants, impact, and treatment practices of dysmenorrhea in girls in secondary schools in urban and rural areas in Egypt.	Mansoura district, Egypt, November 2001-April 2002. 694 female students (14-18 years old) in urban and rural, general and technical secondary schools were selected for the study; 664 participated.	Quantitative. Cross-sectional survey. Self-administered questionnaire.	74.6% of students were identified as having dysmenorrhea; 20.3% of these students miss school, 24.4% report a negative affect on concentration in class, and 21.5% report a negative effect on homework tasks. Those with more severe symptoms were more likely to report negative effects. Reasons for absence not reported.	peer-reviewed journal article

<p><b>Grant, Lloyd, and Mensch, 2013</b></p>	<p>To examine factors associated with menstruation-related school absenteeism in Malawi</p>	<p>Machinga and Balaka (rural) districts, southern Malawi, 2007. 1,675 adolescents enrolled in 59 randomly-selected coed primary schools, between the ages of 14-16 in 2007 were evaluated; the final analytic sample was 717 female students who had begun menstruating and had complete data.</p>	<p>Quantitative. School-based longitudinal survey. Some questions asked in a face-to-face interview, other, more sensitive questions asked using an Audio-Computer Assisted Survey Instrument. Cleanliness of toilets and availability of water and privacy was also evaluated.</p>	<p>General absenteeism among both girls and boys is high, with ~20 percent of all students reporting having been absent on the last school day before the interview. In the face-to-face interview, only 2.4% of female students reported missing school on the last school day because of menstruation. However, via the computer system, ~32% of girls who had begun menstruating reported missing at least one day of school since their last menstrual period. Students primarily reported missing school due to physical symptoms (87%), primarily heavy bleeding (~50%). School toilet availability, cleanliness, and water availability was not significantly associated with school absences. However, students perception about privacy was associated with absenteeism.</p>	<p>peer-reviewed journal article</p>
--	---	---	---	---	--------------------------------------

				Students who had to travel further were more likely to be absent.	
<b>Gultie, Hailu, and Workineh, 2014</b>	To assess the age of menarche and knowledge of adolescents about menstrual hygiene management in Amhara Province, Ethiopia	Mehalmeda secondary school, Mehalmeda town, Amhara Province, Ethiopia. 492 female students in grades 9, 10, 11, and 12 during 2012/13 academic year.	Quantitative. Cross-sectional study. Multistage sampling technique, with a pretested and structured questionnaire.	Nearly 70% of respondents felt uncomfortable in school during menstruation, primarily because of a lack of a privacy to change (39.2%) and a lack of water (19.1%). 51.2% missed school during menstruation, with 25.4% absent only one day per cycle. Reasons for missing school during menstruation were lack of privacy for changing (13%), discomfort (10.6%), and fear of leakage (9.5%). 40.9% reported that menstruation interfered with school performance.	peer-reviewed journal article
<b>Guya, Mayo, and Kimwaga, 2014.</b>	To determine the state of MHM among schoolgirls in secondary schools in Kinondoni and Bagamoyo district in Tanzania.	Kinondoni and Bagamoyo district, Tanzania, March-July 2013. 12 secondary schools, private and public, selected via stratified random sampling. 149 schools girls surveyed; of these, 84 included in the focus group	Mixed methods. Self-administered questionnaires, focus group discussions, semi-structured interviews, and a guide checklist for evaluation.	24.8% of girls reported being absent from school or classrooms at least once because of the lack of MHM facilities. Focus group participants listed lack of privacy, absence of soap in toilets, lack of water, lack of doors on toilets, and lack of disposal bins for absences	peer-reviewed journal article

		discussions. Girls selected by systematic random sampling. All girls in all grades in secondary school included, except those who had not begun menstruation. 23 school leadership officials included in semi-structured in-depth interviews.		during menstruation. Girls were also asked in the focus groups to create lists of priorities for improvement of MHM in schools. The five highest-ranking items listed were provision of soap in schools (21%), free pads (16%), handwashing facilities (13%), and locking toilet doors (10%) and painkillers (10%). (97.3% of girls surveyed used disposable sanitary pads as their only MHP during their last menstrual cycle in school.)	
<b>Jasper, Le, and Bartram, 2012</b>	To determine what effect water and sanitation inadequacies had on the academic environment	N/A	Systematic literature review	Girls experience discomfort in school due to issues related to menstruation and insufficient school water and sanitation facilities	peer-reviewed journal article
<b>Jothy and Kalaiselv, 2012</b>	To assess the knowledge and practices of MHM among adolescent schoolgirls.	Rural areas of Cuddalore district, Tamilnadu, India. 330 girls, aged 11-19 years, from five public secondary schools in the villages of C.Mutlur (120), Keerapalayam (64), Kodipallam (27), Kavrapattu	Mixed methods. Interviews.	58.0% reported ever being absent due to menstruation. The study also reports that "many" girls reported being physically present in school, but having reduced concentration, particularly out of concerns that boys would realize they	peer-reviewed journal article

		(59), and Thandavarayan Cholagan Pettai (60). Selected using proportionate random sampling.		were menstruating. When asked why they were absent from school during menstruation, 89.0% reported a lack of water supply for cleaning, 73.3% because of pain/discomfort, 53.4% because of shame, 49.7% because of lack of privacy for cleaning/washing, 31.4% because of sociocultural beliefs, and 25.6% because of fear of accidental leakage. Only 31.5% girls used sanitary pads, compared with 59.3% which used either used or new cloth pieces.	
<b>Khan, 2012</b>	To determine the MHM practices of adolescent females.	Nagara, Karnataka, India. 199 adolescent girls between the ages of 10-19 years old. Four villages were randomly selected; within those villages, all adolescent girls who had reached menarche, were found within the villages, and consented were included in the study.	Quantitative. Community-based cross-sectional observational study.	When asked whether they attended school during menstruation, 88.94% said yes, 10.05% said no, and 1.00% said not on the first day. Of the 10% of the girls who did not attend school, 60% did not because of dysmenorrhea; 25.1% because they were prevented from doing so by their parents (because of impurity concerns), and 15%	peer-reviewed journal article

				because the girls felt guilt/shame.	
<b>Konapur and Nagaraj, 2014</b>	To assess the frequency and effects of dysmenorrhea and PMS on school attendance and daily activities of adolescent girls and their treatment seeking patterns.	Bangalore, South India, June 2012 - December 2012. 464 girls in 8th, 9th, and 10th standards in the four public high schools in the rural field practice area of Kempegowda Institute of Medical Sciences were evaluated; 304 were included in the study.	Quantitative. Descriptive study.	60.2% of girls were found to have dysmenorrhea. 65.13% of all study subjects (not just those with dysmenorrhea) reported missing school during menstruation and 68.42% reported difficulty concentrating during menstruation.	peer-reviewed journal article
<b>Mwangolo, 2015.</b>	To evaluate the efficacy of Kenyan government interventions on schoolgirl dropout rates in public primary schools, including the provision of sanitary pads.	Malindi Sub-County, Kilifi County, Kenya. 14 headteachers were selected via purposive sampling. 159 teachers and 207 schoolgirls were selected via random sampling. 14 headteachers, 120 teachers, and 185 pupils responded (response rate of 83.95%).	Mixed methods, including questionnaires with open- and closed-ended questions, and interviews.	90% of teachers thought that school sanitary conditions affected whether girls stayed in school or not.	master's thesis
<b>NestBuilders International, 2012.</b>	To carry out a baseline study on the state of WASH in schools in six districts in Sierra Leone.	The districts of Bombali, Kenema, Moyamba, Port Loko, Pujehun, and Tonkolili, Sierra Leone, March 19 - June 22, 2012. 285 primary public and private schools. 319	Mixed methods, including individual structured interviews with school children and focus group discussions with students. Students selected via systematic	21.3% schoolgirls reported that they didn't attend school during menstruation [this appears to be part of the approximately half of the schoolgirls who reported practicing some restriction during	report

		<p>schoolgirls (9-19) who had started menstruation were interviewed regarding menstruation; focus groups and interviews with teachers were also conducted.</p>	<p>sampling with probability-proportional-to-size.</p>	<p>menstruation]. 10% of 319 girls reported ever having been absent due to menstruation. The mean number of days missed by these girls in the three months prior to being interviewed was 4.2 days. 48.4% of girls who reported missing school because of menstruation cited pain/discomfort as the reason, followed by fear of leakage (38.7%), shame (32.3%), a heavy flow (29.0%), lack of water supply (25.8%), a lack of privacy for cleaning (25.8%), and a lack of MHP disposal (16.1%). Only 6.9% of girls reported water available in a private place for girls to wash; 1.9% reported sanitation facilities available for them to change; and 1.6% reported the availability of MHP at school. Similar data reported in head teacher interviews. 26.8% of girls "strongly agreed" with the question, "You don't like to stand</p>	
--	--	--	--	---	--

				up in class when on your period?" (33.4% strongly disagreed).	
<b>Njue and Muthaa, 2015</b>	To determine the effects of the availability of sanitation facilities and MHP on participation of girls in public primary schools.	Garissa County, Kenya. 704 respondents: 640 schoolgirls (in class 7), 32 head teachers, and 32 teachers.	Descriptive survey. Questionnaires, focus group discussions, and observation schedule.	All of the head teachers claimed that sanitary pads were available in schools; however, only 56.3% of the teachers said the same. Head teachers thought that the presence of sanitary pads affected girls' self-confidence to a "very great extent" and 72.4% reported that the availability of sanitary pads affected concentration of girls in class to a "very great extent." Additionally, 62.1% of respondents report that a lack of sanitary pads affects girls' performance in school, and 71.4% thought it had affected girls' class attendance to a "very great extent".	peer-reviewed journal article
<b>Oster and Thornton, 2010.</b>	To determine the effect of the provision of menstrual cups on school attendance.	Chitwan District, Nepal, November 2006-January 2008. 198 girls in seventh and eighth grades in four schools.	Randomized evaluation. Questionnaires. Time diaries and menstrual calendars collected at end of each month.	The probability that on any given day without menstruation a girl would attend school was found to be 85.7%; on days with menstruation, that probability fell to 83.0%. If the	peer-reviewed journal article



				average girl has her period on 8% of school days, then the average girl misses 0.35 days of school in a 180 day school year.	
<b>Pillitteri, 2012.</b>	To determine the state of MHM among schoolgirls, with a particular focus on girl's needs and experiences, in Malawi.	Greater Lilongwe area, Malawi. Seven secondary schools in the capital region, including urban, peri-urban, and rural schools and a mix of boarding and day schools. 134 girls were selected for inclusion; 104 questionnaires were completed. Seven participatory workshops, with a total of 40 girls between the ages of 14 and 21.	Mixed methods. Questionnaire, semi-structured interviews, observations, and participatory group workshops.	More than half of girls missed one or two hours of school when they were menstruating. 15% were absent for more than three days during menstruation. Based on the days of missed school reported by schoolgirls, 104 girls had missed school for menstruation-related issues, adding up to 85 total days missed in that term. In comparison, malaria had been responsible for 81 missed days. Group discussions revealed that girls told teachers the reason for absence was sickness (rather than specifying menstruation).	briefing note summarizing master's thesis
<b>Rani, Sharma, and Singh, 2015</b>	To estimate the prevalence, impact of, and practices and perceptions regarding dysmenorrhea on life among adolescent girls in	Rural, urban, and slum areas of Chandigarh, India. Multi-stage stratified sampling, 300 post-menarche girls aged 11-18.	Quantitative questionnaire.	61.33% of girls were identified as having dysmenorrhea; 24.45% of such girls reported that menstruation interfered with going to	peer-reviewed journal article

	urban, rural, and slum areas of Chandigarh, India			school/work. The girls reported that they missed school primarily because of a lack of privacy, water supply, and waste disposal. Physical discomfort was a lesser reason for absenteeism.	
<b>Scott et al., 2009</b>	To determine whether providing sanitary pads to schoolgirls had an effect on educational attainment.	Initial baseline study in Accra, Western, Central, Upper East, and Ashante regions of Ghana in urban, periurban, and rural locations. Pilot test in four Ghanaian sites; 183 girls age 12 and older.	Two studies. Initial baseline study. Pilot test with three intervention arms and a control arm. Sites were chosen based on whether they were "economically deprived." Girls self-reported attendance data, which was compared with the teacher's attendance records and with interviews with the schoolgirls.	Before intervention, in response to the question: "Does menstruation ever cause you to miss school?," 95.2% of girls in the rural village and 20.2% of girls in the periurban villages said yes. In the rural village, 81% of girls reported that they had bled through their clothes in the previous menstrual cycle; this number was between 39 percent and 60 percent in the other sites (most in rural area did not have any experience with sanitary pads, using cloth rags instead).	report
<b>Sumpter and Torondel, 2013</b>	To critically appraise the available evidence on the effects of MHM on health and psychosocial outcomes.	N/A	Systematic literature review. Meta-analysis where sufficient data was available.	"There is very little high quality evidence associating school attendance or drop-out with menstrual management." The researchers were unable to conclude	peer-reviewed journal article

				that "the current evidence indicates improved MHM improves attendance at school."	
<b>Tamiru et al., 2014</b>	To determine baseline school menstrual hygiene management in Girls in Control programme countries	18 primary and secondary schools in 6 woredas in Ethiopia; 49 primary and secondary schools in 6 counties in Eastern Equatoria State in South Sudan; 32 schools in 8 districts in Tanzania; 140 schools in Uganda in 2012 and 604 schools in Uganda in 2014; 203 schools in Masvingo District in Zimbabwe in 2012	Varied by individual country studies, which were independently conducted. Methodologies used included structured interviews, semi-structured interviews, in-depth interviews, semi-structured in-depth interviews, key informant interviews, observation with checklists, and focus group discussions	High (above 40%) rates of reported absences and lack of concentration/poor performance from schoolgirls. Teachers and other adults also report that most girls miss school due to menstruation.	report
<b>Tamiru et al., 2015.</b>	To determine baseline school menstruation hygiene management in the project areas of SNV Netherlands Development Organization in Ethiopia, South Sudan, Uganda, Tanzania, and Zimbabwe.	Ethiopia, South Sudan, Tanzania, and Zimbabwe in January-June 2014. Study conducted in 2014 by SNV and IRC in 2012 used for Ugandan data.	Mixed methods. Questionnaires, structured interviews, semi-structured interviews, in-depth interviews, key informant interviews, and focus group interviews.	49% of girls interviewed reported missing 4 school days each month due to menstruation. 92% of Tanzanian girls reported reduced concentration during menstruation.	peer-reviewed journal article
<b>Tegegne and Sisay, 2014</b>	To examine knowledge about menstruation, determinants of menstrual	Habru, North Wollo zone, Northeast Ethiopia. 595 randomly	Mixed research methodology, quantitative and qualitative. A cross-sectional,	A majority of students (54.51%) reported missing school during their last menstrual	peer-reviewed journal article

	<p>hygiene management, and its influence on school-attendance in Northeast Ethiopia.</p>	<p>selected adolescent schoolgirls. The in-depth interviews consisted of five girls who had dropped out of school and four female teachers. The focus groups consisted of schoolgirls.</p>	<p>self-administered, pre-tested, and close-ended survey four focus groups, and nine in-depth interviews</p>	<p>period (absences ranging from 1-4 days), and 20.2% of students reported missing exams when exams coincided with menstruation. A majority of students (57.80%) believed that menstruation had affected their academic performance. Reasons cited for absenteeism included lack of menstrual hygiene materials, pain, and fear of embarrassment. Those who didn't use disposable MHP were 5.37 times more likely to be absent from school than their peers. Girls living in urban areas were significantly less likely to miss school than their rural counterparts.</p>	
<p><b>Thakre et al., 2011</b></p>	<p>To assess the knowledge and practices of MHM among rural and urban adolescent schoolgirls.</p>	<p>Saoner, Nagpur District, India (within the field practice area of the Rural Health Unit and Training Centre) between January-March 2011. 387 schoolgirls in the 8th and 9th standards (12 years old to less than or equal to</p>	<p>Quantitative. Community-based cross-sectional study. Pre-designed, pre-tested, and structured questionnaire collected via personal interview.</p>	<p>When asked whether they practiced any restrictions during menstruation, including household work, touching stored food, touching family members, playing outside, or attending school, 5.17% of girls reported not being</p>	<p>peer-reviewed journal article</p>

		16 years old), purposively selected.		allowed to go to school during menstruation. There was not a statistically significant different between the number of rural and urban girls prevented from attending school.	
<b>UN Women and WSSCC, 2014</b>	To determine the beliefs, knowledge, and practices linked to menstruation in the Louga region of Senegal	Louga, Linguère, and Kébémér departments, Senegal. 616 respondents, women and girls aged 13 to 65. 359 participants in the focus group sessions and face-to-face interviews.	Qualitative and quantitative: survey, focus group discussions, and key informant interviews	Of approximately 490 girls, approximately 200 report rarely attending school during menstruation; fewer than half of all girls say that they always attend school during menstruation.	report
<b>UN Women and WSSCC, 2015</b>	To determine the beliefs, knowledge, and practices linked to menstruation in Kye-Ossi and Bamoungoum, Cameroon	Kye-Ossi and Bamoungoum, Cameroon. 445 general subjects and 515 school subjects, randomly selected from the RGPH III sampling frame. Students were identified by school site. Six focus groups were organized, 3 in each locale, and more than 10 key informants were interviewed.	Mixed research methodology, quantitative and qualitative. Survey, focus groups, and key informant interviews.	Vast majority of girls (95.9%) attend school during menstruation. However, 12% report leaving school early because of menstruation, 16.1% report missing a lesson because of menstruation, and 25.5% report participating less in lessons during menstruation.	report
<b>Wanja, 2014.</b>	To determine MHM practices and beliefs on girls' participation in school activities.	Kathanjuri zone in Runyenjes sub-county, Embu County, Kenya. 100 girls in classes 6-8	Descriptive survey design. Pre-tested questionnaires and focus group discussions with	80% of girls report going to school on period days; 14.3% say they miss school and 5.7% "Don't know." 40%	master's thesis

		<p>(primary school, all between 10-16 years of age) and 87 teachers, selected using stratified random sampling, with simple random sampling used to pick specific girls.</p>	<p>girls and teachers.</p>	<p>of girls report finding it easy to participate in class during their periods. Reasons for not participating in school activities during menstruation included concerns that boys would mock them (15.7%), because they "feel shy" (11.4%), and because they are uncomfortable (7.1%). When asked how many days they missed school during the term, 57.1% reported not missing any school; most girls who had missed school had missed one day. 68.6% of girls reported that menstrual discomfort prevented them from fully participating in school activities. 27.1% of girls reported using painkillers to help ease discomfort (44.2% of teachers reported offering painkillers to menstruating girls). 65.7% of school sanitation facilities were reported by the girls to be "very</p>	
--	--	--	----------------------------	---	--

				good," with an additional 22.9% rating them as good, and 75.7% stating that the sanitation facilities were private. ANOVA analysis done as well, looking at multiple variables, including the influence of a lack of sanitary towels on school participation.	
<b>WaterAid, 2009.</b>	To determine MHM practices and knowledges, and their implications, among adolescent schoolgirls in rural and urban areas in Nepal.	Dhading, Morang, Lalitpur, and Kathmandu districts, Nepal. Purposive selection. 204 adolescent schoolgirls between the ages of 10 and 16 in four public secondary schools. 47 girls participated in the focus groups, with each focus group containing 9-13 girls. In-depth interviews were carried out with five girls who were chosen because of problems they had experienced relating to menstruation.	Mixed methods descriptive cross-sectional study. Pre-tested, self-administered, structured, and close-ended questionnaires, focus group discussions, and semi-structured in-depth interviews.	85% of girls report experiencing "some kind of abnormal physical condition" during their last menstrual period, including abdominal pain (85%), excessive bleeding, and breast pain. The focus groups reported using medical interventions, including painkillers, to deal with the discomfort. When asked about restrictions that are placed on them during menstruation, only 3.4% report not going to school. However, 53% report ever being absent due to menstruation. Girls in the focus groups reported that, while they were	report

				present in school, their performance suffered due to poor concentration during menstruation. When asked why they missed school during menstruation, 41.4% reported a lack of privacy for cleaning/washing, 28.2% reported a lack of a disposal system for MHP, and 22.7% reported a lack of water supply for cleaning. 16.2% mentioned pain/discomfort.	
<b>Wilson, Reeve, and Pitt, 2014</b>	To evaluate MP as an effective approach to MP in Kenya.	Nyanza province, Kenya. 302 post-menarche schoolgirls in 10 non-urban primary and secondary schools were chosen to participate.	Partial-preference, parallel group, cluster-randomized control pilot study. Baseline questionnaire given to all participants, whether in treatment or control arm. Follow-up questionnaires to track absenteeism and, for the intervention arm, and use of the reusable pad.	17.3% of girls report missing school more than once or twice due to menstruation; 35.5% of girls report missing school once or twice due to menstruation. [Not clear if this is in the last school term or ever.]	peer-reviewed journal article
<b>Wong, 2011</b>	To assess the prevalence of dysmenorrhea, its impact, and	Pasir Mas and Rantau Panjang (rural districts of), Kelantan,	Quantitative. Cross-sectional, questionnaire.	76.0% of girls reported dysmenorrhea; 59.9% of such girls	peer-reviewed journal article



	treatment-seeking behavior of rural adolescent girls in Malaysia.	Malaysia, February 2009-April 2009. 1295 adolescent schoolgirls (13-19 years old) from 16 public schools.		reported that their class concentration was negatively affected by menstruation. 18.1% said that dysmenorrhea is a frequent cause of school absenteeism and 16.0% associated dysmenorrhea with low grades. Higher rates of school absenteeism among urban girls.	
<b>Zegeye, Megabiaw, and Mulu, 2009</b>	To determine the age at menarche, patterns of menstruation, and magnitude of common menstrual disorders among secondary school girls in Ethiopia.	Dabat and Kola Diba, northwest Ethiopia, between April and May 2007. Each study area contained one high school. 622 9th and 10th grade female students (between the ages of 14.5 and 19.5 years) completed the questionnaire; 612 were included in the final analysis.	Quantitative, self-administered, pre-tested questionnaire.	72% of girls were found to have dysmenorrhea, with 48% of girls with dysmenorrhea reporting school absences. Those with more severe symptoms reported higher rates of absence. Reasons for school absence not delineated.	peer-reviewed journal article

Table 2

<b>Author(s), Year</b>	<b>Question Asked Regarding School Absence</b>	<b>How the Question was asked/Who asked it</b>	<b>Setting of Questions</b>	<b>Key Findings re: school attendance</b>
<b>Boosey, Prestwich, and Deave, 2014</b>	Unclear. Reports the number of days in a month girls missed due to menstruation.	Anonymous, self-	Private classroom. Girls sat a seat apart from each,	61.7% reported missing at least one day of

		administered questionnaire	were prohibited from talking to each other while filling it out. Female researchers and translator. No male students or teachers present while the questionnaire was being completed, during the focus group discussions, or during the interviews with female teachers.	school in a month due to menstruation.
<b>Crofts, 2010.</b>	"When you last had you [sic] MP during term time, did you take any time off school?" Possible answers were No, Yes-Few Hours, 1 day, 2 days, 3 days, 4+ days. 2. "I have heard a rumour that often girls are absent from class during their MPs. Is this true?" Possible answers: No, Explain. Yes, followed by "What is the main reason why girls are absent? (with possible answers, including other). 3. "In one month, please estimate what percentage of menstruating girls miss one or more days of school."	Questionnaires, with open- and closed-ended questions.	Focus group activities; small groups chosen to reduce embarrassment. Focus groups occurred in private locations at the school. Questionnaires were answered orally in small groups.	14% report being absent during their last menstrual cycle, when girls were asked what percentage of girls they thought missed school with every menstrual cycle, the average number given was 34%.
<b>El-Gilany, Badawi, and El-Fedaway, 2005</b>	Unclear. Reports activities that girls report as being limited by dysmenorrhea, including homework tasks, concentration in class, and school attendance.	Anonymous, self-administered open-ended questionnaire.	Classroom. Female investigator.	24.4% report that concentration in class is limited, 21.5% report that ability to complete homework tasks is limited, and 20.3% report that school attendance is limited.
<b>Grant, Lloyd, and Mensch, 2013</b>	Asked "whether they were absent on the last school day before the day of the interview." If they reported an absence, they were asked	Questionnaire. Questions regarding absences were asked by	At school.	In the face-to-face interview, only 2.4 percent of female students reported missing school on the

	<p>why (without a list of possible answers provided). Also asked how many days they attended school over the previous two weeks of school. Girls who reported to the ACASI system that they had begun menstruating, were asked if "they had ever missed school because of their menstrual period" and, if so, "how many days they missed the last time they had their period."</p>	<p>research assistants of the same gender. Questions specifically relating to menstruation were asked via an Audio Computer Assisted Survey Instrument</p>		<p>last school day because of menstruation. However, via the computer system, ~32% of girls who had begun menstruating reported missing at least one day of school since their last menstrual period.</p>
<p><b>Gultie, Hailu, and Workineh, 2014</b></p>	<p>Asks whether girls feel comfortable in school while menstruating (and, if yes, the reason for being uncomfortable), whether they were absent from school, and whether menstruation interfered with school performance. Unclear if the girls were asked if they had ever been absent from school, if they were absent from school during their last menstrual cycle, or something else. [exact phrasing not reported]</p>	<p>Self-administered questionnaire.</p>	<p>not reported</p>	<p>69.3% report feeling uncomfortable in school during menstruation; 51.2% report being absent from school; and 40.9% report that menstruation interferes with school performance.</p>
<p><b>Guya, Mayo, and Kimwaga, 2014.</b></p>	<p>Unclear. Reports percentage of girls "absent from school or classrooms at least once because of lack of any of the MHM facilities at their schools." [exact phrasing not reported]</p>	<p>Self-administered closed-ended questionnaire.</p>	<p>In classrooms, offices, or under the tree. Male students or teachers were not present. Female researchers informed students about the questionnaire.</p>	<p>24.8% of girls reported being absent from school or classrooms at least once because of the lack of MHM facilities.</p>
<p><b>Jasper, Le, and Bartram, 2012</b></p>	<p>N/A</p>	<p>N/A</p>	<p>N/A</p>	<p>Girls experience discomfort in school due to issues related to menstruation and insufficient school water and sanitation facilities</p>

<b>Jothy and Kalaiselv, 2012</b>	Unclear. Lists "do not go to school" as part of a list of "restrictions practiced during menstruation". [exact phrasing not reported]	Interview.	At school.	58.0% of girls "mentioned being ever absent due to menstruation."
<b>Khan, 2012</b>	Unclear. Reports percentage of girls who were absent during menstruation by "yes," "no," and "not on first day." [exact phrasing not reported]	Interview using structured questionnaire.	In individual homes.	88.94% of girls attend school during menstruation, with 10.05% not attending, and 1.00% not attending on the first day alone.
<b>Konapur and Nagaraj, 2014</b>	Unclear. Reports activities that girls said were or were not affected by menstruation, including attending school. [exact phrasing not reported]	Interview.	At school.	65.13% of all study subjects (not just those with dysmenorrhea) reported missing school during menstruation. (69.2% of those with dysmenorrhea reported missing school.)
<b>Mwangolo, 2015.</b>	"The schools sanitary conditions influences completion of girl child?" Respondents could check "yes" or "no" and were asked to explain if they answered affirmatively.	Questionnaire, with open- and close-ended questions, administered by researcher. Interviews with head teachers.	At school.	90% of teachers thought that school sanitary conditions affected whether girls stayed in school or not.
<b>NestBuilders International, 2012.</b>	Asked whether girls had ever been absent from school because of menstruation. Girls were also asked about whether they practice some form of restriction during menstruation, of which not attending school was one option. [exact phrasing not reported]	Individual interviews, using questionnaire.	At school.	10% of 319 girls reported ever having been absent due to menstruation. 21.3% schoolgirls reported that they didn't attend school during menstruation [this appears to be part of the approximately half of the schoolgirls who reported practicing some restriction during menstruation].
<b>Njue and Muthaa, 2015</b>	Asked the extent to which sanitary pads influence girls' enrollment in school - to a "very great extent," a "great extent," "no opinion," a	Questionnaire, unclear if self-administered.	At school.	62.1% of respondents report that a lack of sanitary pads affects girls' performance in school, and 71.4%

	"small extent," or to "no extent." Also asked what the influence of availability of sanitary pads was on class attendance, with the same response options.			thought it had affected girls' class attendance to a "very great extent". 62.1% of head teachers thought sanitary pad availability affected enrollment in school to a "very great extent."
<b>Oster and Thornton, 2010</b>	Girls filled out menstrual calendars, as well as time diaries covering the first six days of each month, which were compared to school attendance data.	Self-administered menstrual calendar and time diaries	N/A	The probability that on any given day without menstruation that a girl would attend school was found to be 85.7%; on days with menstruation, that probability fell to 83.0%. If the average girl has period on 8% of school days, then the average girl misses 0.35 days of school in a 180-day school year.
<b>Pillitteri, 2012.</b>	Reports how much schooling time was missed during menstruation with response options of "never," "1-2 hours," "3-5 hours," "1 day," "2 days," and "more than 3 days." [exact phrasing not reported]	Questionnaire and participatory group workshop.	At school.	More than half of girls missed one or two hours of school when they were menstruating. 15% were absent for more than three days during menstruation. Based on the days of missed school reported by schoolgirls, 104 girls had missed school for menstruation-related issues, adding up to 85 total days missed in that term.
<b>Rani, Sharma, and Singh, 2015</b>	Reports percentage of girls for whom "dysmenorrhea interfered with going to school/office" [exact phrasing not reported].	Questionnaire, unclear if self-administered.	In individual homes.	61.33% of girls were identified as having dysmenorrhea; 24.45% of such girls reported that menstruation interfered with going to school/work.
<b>Scott et al., 2009</b>	Asked girls, "Does menstruation ever cause you to miss school?"	Semi-structured interview.	At school.	Before intervention, in response to the question: "Does

				menstruation ever cause you to miss school?," 95.2% of girls in the rural village and 20.2% of girls in the periurban villages said yes. In the rural village, 81% of girls reported that they had bled through their clothes in the previous menstrual cycle; this number was between 39 percent and 60 percent in the other sites (most in rural area did not have any experience with sanitary pads, using cloth rags instead).
<b>Tamiru et al., 2014</b>	Unclear. Reports percent of girls who reported missing school during their period and the average number of days missed per month by girls reporting absences.	Structured and semi-structured interviews, in-depth interviews, and focus groups. Not clear which method used for absence-related questions.	At school.	In Ethiopia, 50.3% of girls (N = 650) reported missing school during menstruation, and 85% of these girls reported missing an average of 1-3 days per month (15% missed more than four days). In South Sudan, girls missed an average of four days each month. In Tanzania, 48% of girls reported absences. In Uganda (2012 study), 54% reported missing 1-3 days per month (and 77% of teachers estimated that girls 2-3 days per month) due to menstruation. The Ugandan study from 2012 further estimated that over 57% of girls missed 11% of learning time. In Uganda (2014), 30.13% of girls reported missing school due to menstruation. In

				Zimbabwe, more than 62% of girls missed school for up to 2 days per month; 28% missed 2-4 days, and 10% missed 4 or more days each month due to menstruation.
<b>Tamiru et al., 2015.</b>	Unclear. Reports that most girls "prefer to stay home" rather than go to school during menstruation. Reports percentage of schoolgirls who miss 4 days each month due to menstruation.	Structured and semi-structured interviews, in-depth interviews, and focus groups. Not clear which method used for absence-related questions.	At school.	52 percent of girls "prefer to stay home" during menstruation. 49% of girls interviewed reported missing 4 school days each month due to menstruation.
<b>Tegegne and Sisay, 2014</b>	Unclear. Reports the percent of girls who were absent from school between one and four days during their last menstrual period.	Self-administered closed-ended questionnaire.	At school.	A majority of students (54.51%) reported missing school during their last menstrual period (absences ranging from 1-4 days), and 20.2% of students reported missing exams when exams coincided with menstruation.
<b>Thakre et al., 2011</b>	Asked girls whether restrictions were practiced during menstruation, of which not being allowed to go to school was once option. [exact phrasing not reported]	Interview using structured questionnaire.	At school.	5.17% of girls reported not being allowed to go to school during menstruation.
<b>UN Women and WSSCC, 2014</b>	Girls were shown the statement "I go to school" during menstruation and were given the option of responding "every time," "often," "sometimes," or "rarely."	Questionnaire administered via an application on tablet computers and individual interviews with female-only researchers.	In individual homes. Additionally, focus group sessions and face to face interviews conducted in a MHM lab in a tent located in a public square in Louga.	36% report rarely going to school during menstruation and fewer than half of all girls say that they always attend school during menstruation.

<b>UN Women and WSSCC, 2015</b>	Girls were asked whether they generally go to school during menstruation. They were also asked "Has it ever happened that you have not been able to complete a day at school because of your period?" and "Have you ever had to miss a lesson due to your period?" Those that answered affirmatively were asked to say how many times in the course of school year preceding the survey.	Questionnaire.	At school.	Vast majority of girls (95.9%) attend school during menstruation. Approximately 12% reported going home early because of menstruation; this occurred an average of 3 times per girl in the course of the preceding school year. 16% reported missing a lesson due to menstruation.
<b>Wanja, 2014.</b>	Girls were asked, "Do you attend school when you are on your periods?" with the option to answer "yes" or "no" and provide an explanation for their response. They were also asked, "How many days have you missed school this term?" and "What was the reason for missing school?"	Self-administered questionnaire.	At school.	80% of girls report going to school on period days; 14.3% say they miss school and 5.7% "Don't know."
<b>WaterAid, 2009.</b>	Asked girls whether restrictions were practiced during menstruation, of which not going to school was one option. Reports percent of girls who "mentioned being ever absent due to menstruation" [exact phrasing not reported]	Self-administered questionnaire. However, researchers note that many student needed help understanding the questionnaire, which was in a language many students were not fully fluent in.	In classroom, where male students and teachers were not present. Female researchers provided the questionnaires.	When asked about restrictions that are placed on them during menstruation, only 3.4% report not going to school. However, 53% report ever being absent due to menstruation.
<b>Wilson, Reeve, and Pitt, 2014</b>	Unclear. Reports percent of girls reporting missing some school because of menstruation.	Self-administered questionnaire.	At school.	17.3% of girls report missing school more than once or twice due to menstruation; 35.5% of girls report missing school once or twice due to menstruation.



				[Not clear if this is in the last school term or ever.]
<b>Wong, 2011</b>	Asked girls whether "dysmenorrhea is frequently a cause of school absenteeism." [exact wording not reported]	Questionnaire, unclear if self-administered.	At school.	18.1% said that dysmenorrhea is frequently a cause of school absenteeism.
<b>Zegeye, Megabiaw, and Mulu, 2009</b>	Asked girls with dysmenorrhea about whether they were absent from school during menstruation. [exact wording not reported]	Self-administered questionnaire.	In classrooms, where male students were not present.	72% of girls were found to have dysmenorrhea, with 48% of girls with dysmenorrhea reporting school absences.

Table 3

<b>Author(s), Year.</b>	<b>Purpose of the Study</b>	<b>Setting and Sample</b>	<b>Methodology</b>	<b>Intervention</b>	<b>Key Findings re: school attendance and MHM</b>
<b>Appollis, 2014</b>	To conduct an outcomes evaluation of two of the aims of the Always Keeping Girls in School programme - a reduction in monthly absenteeism rates and an improvement in school performance. Specifically, to determine whether participants in the program experienced a decrease in absences, how great the effect	One school in KwaZulu-Natal, South Africa, purposefully selected. 502 schoolgirls, all program participants. Boys in same grade and school selected to form a non-equivalent comparison group.	"Quasi-experimental," a time series design, using a non-equivalent experimental and comparison group. Monthly absenteeism data collected from January 2012-August 2014 (before and after intervention). End of term results for December 2012, December 2013, and June 2014 were collected.	Three educational sessions (each at least one hour long), one involving puberty education, one identifying hopes and dreams for the future, and one storytelling activity allowing girls to share experiences. Regular provision of sanitary pads (continuing after the year of the educational sessions).	Attendance rates increased in the year of the implementation of the program, surpassing baseline data. The average days absent per month for all girls in the baseline year was 29.7; in the implementation year, the average was 8.3 days per month for the experimental group. However, the

	was, and how long the effects of the intervention lasted.				year after the program had been implemented, the average absenteeism rate increased above the initial baseline (to 31.2 days) and above the non-equivalent comparison group's rate for that year (except in February). The experimental group performed better on exams during the year of implementation than the baseline year and for the non-equivalent comparison group during the implementation year.
<b>Birdthistle, Dickson, Freeman, and Javidi, 2011.</b>	To determine whether the provision of separate toilets for girls at school has an effect on primary and secondary school enrolment, attendance, and/or completion.	N/A	Systematic review	N/A	There has not been sufficient research to determine whether separate-sex toilets has an impact on educational or health outcomes. Identify possibility that separate toilets are important

					for menstrual hygiene management, but note that direct evidence is lacking.
<b>Freeman et al., 2012.</b>	To determine the effect of school-based WaSH on student absences	Nyando/Kisumu East, Rachuonyo and Suba districts, Nyanza province, Kenya 2007-2008. 135 public primary schools, out of 198 eligible schools that exceeded the GoK standard for pupil-to-latrines ratio and had a water source within 1 km.	Cluster-randomized trial; WaSH interventions with two-year follow-up. Structured interviews.	3 arms - hygiene promotion and water treatment; hygiene promotion, water treatment, and sanitation (provision of latrines); and the control. All students dewormed after the baseline.	The water treatment and hygiene promotion arm had no effect on the attendance of boys, but led to a 58% reduction in the odds of absence for girls (OR 0.42, CI 0.21-0.85). Similar results for the other treatment arm, with no significant difference between the two. Based on these numbers, authors estimate a reduced absence for each girl by 6.1 days per year for water treatment and hygiene and 6.8 days for water treatment, hygiene, and sanitation. No significant impact on test scores or enrollment.

<b>Hennegan and Montgomery, 2016</b>	To determine whether MHM interventions improve education and psychosocial outcomes for women and girls in low- and middle-income countries.	N/A	Systematic review	N/A	Current evidence is insufficient to establish the efficacy of MHM interventions. Found that "high risk of bias and clinical heterogeneity precluded synthesis of most results."
<b>Montgomery et al., 2012.</b>	To determine the effect of puberty education and the availability of sanitary pads or puberty education alone on school attendance.	Four sites in Ghana. 120 primary and junior secondary schoolgirls, 12-18 years of age, who were post-menarche. All eligible girls at each site were included.	Non-randomized trial. 200 individuals from the subject groups (girls, parents, and parents) participated in semi-structured individual interviews, focus groups, and small community meetings.	Three levels of treatment: provision of pads (and underwear) with puberty education; puberty education alone; control.	In the pads and education group, attendance increased by approximately 6 days per 65-day term (9% of a school year). After five months, the education-only group's results improved to similar levels. Both treatment groups showed significantly higher attendance levels than the control, despite negligible differences at baseline. Rural areas benefited the same as the periurban area.
<b>Oster and Thornton, 2010.</b>	To determine the effect of the	Chitwan District, Nepal,	Randomized evaluation.	Provision of a menstrual cup	Low rate of menstruation-

	provision of menstrual cups on school attendance.	November 2006-January 2008. 198 girls in seventh and eighth grades in four schools.	Questionnaires. Time diaries and menstrual calendars collected at end of each month.	and instructions on its use to experimental group; control group.	related absences at baseline: attendance probability declines from 85.7% on days without menstruation to 83.0% on days with menstruation. A girl is likely to miss 0.35 days in a 180-day school year due to menstruation. In the experimental arm, at six months follow-up, there was 60% adoption of the menstrual cup. No significant increase in attendance in the treatment arm.
<b>Scott et al., 2009</b>	To determine whether providing sanitary pads to schoolgirls had an effect on educational attainment.	Initial baseline study in Accra, Western, Central, Upper East, and Ashante regions of Ghana in urban, periurban, and rural locations. Pilot test in four Ghanaian sites; 183 girls age 12 and older.	Two studies. Initial baseline study. Pilot test with three intervention arms and a control arm. Sites were chosen based on whether they were "economically deprived." Girls self-reported attendance data, which was compared with	Pilot test had two treatment villages, where pads and puberty education were provided; one treatment village where only education was given; and one control village where no intervention was provided.	Before intervention, in response to the question: "Does menstruation ever cause you to miss school?," 95.2% of girls in the rural village and 20.2% of girls in the periurban villages said yes. In the

			<p>the teacher's attendance records and with interviews with the schoolgirls.</p>	<p>rural village, 81% of girls reported that they had bled through their clothes in the previous menstrual cycle; this number was between 39% and 60% in the other sites (most in rural area did not have any experience with sanitary pads, using cloth rags instead). Both treatment groups experienced a significant decrease in school absences after intervention - the rate of absences was cut by roughly half. 98.4% of girls receiving pads reported that they were better able to concentrate in school. The rates of bleeding through clothing dropped in all treatment groups, including those</p>
--	--	--	---	--

					just receiving education.
<b>Wilson, Reeve, and Pitt, 2014.</b>	To evaluate MHP and an effective approach to MHP in Kenya.	Nyanza province, Kenya. 302 post-menarche schoolgirls in 10 non-urban primary and secondary schools were chosen to participate.	Partial-preference, parallel group, cluster randomized control pilot study. Baseline questionnaire given to all participants, whether in treatment or control arm. Follow-up questionnaires to track absenteeism and, for the intervention arm, about the reusable pad.	Training program on the creation of reusable MHPs that could be locally sourced and produced. Included instructions for creation, use, and maintenance. Did not include general puberty or menstrual health education.	17.3% of girls report missing school more than once or twice due to menstruation; 35.5% of girls report missing school once or twice due to menstruation. [Not clear if this is in the last school term or ever.] All schools in the intervention arm saw either no change or an increase in attendance; all schools in the control group either saw no change or a decrease in attendance. There was a mean difference of 1.46 school days missed over a one-month period comparing the two groups - equivalent to a 68.8% reduction in absenteeism. The difference in days missed between the intervention and control

					<p>groups was close to the 95% significant level. In terms of uptake of the pads, 15.38% of girls in the intervention arm admitted to never using the pads. Reasons cited for not doing so included that they hadn't finished making it, that they didn't have sufficient materials to make it, and that it was difficult to walk with. However, 92.3% rated the pads as adequate or comfortable.</p>
--	--	--	--	--	---



## Appendix 1

**How searches were concluded:** Searches were concluded after all hits had been analyzed.

### PubMed Search, 2/2/16: menstrual hygiene management

("menstruation"[MeSH Terms] OR "menstruation"[All Fields] OR "menstrual"[All Fields]) AND ("hygiene"[MeSH Terms] OR "hygiene"[All Fields]) AND ("organization and administration"[MeSH Terms] OR ("organization"[All Fields] AND "administration"[All Fields]) OR "organization and administration"[All Fields] OR "management"[All Fields] OR "disease management"[MeSH Terms] OR ("disease"[All Fields] AND "management"[All Fields]) OR "disease management"[All Fields])

This returned 89 hits, 4 of which were met the criteria for Question I.

Question I:

- Rani, Alka, Manoj Kumar Sharma, and Amarjeet Singh. "Practices and Perceptions of Adolescent Girls Regarding the Impact of Dysmenorrhea on Their Routine Life: A Comparative Study in the Urban, Rural, and Slum Areas of Chandigarh." *International Journal of Adolescent Medicine and Health* (2015). DeGruyter.
- Boosey, Robyn, Georgina Prestwich, and Toity Deave. "Menstrual Hygiene Management amongst Schoolgirls in the Rukungiri District of Uganda and the Impact on Their Education: A Cross-Sectional Study." *The Pan African Medical Journal* 19 (2014). *PubMed Central*.
- Gultie, Teklemariam, Desta Hailu, and Yinager Workineh. "Age of Menarche and Knowledge about Menstrual Hygiene Management among Adolescent School Girls in

Amhara Province, Ethiopia: Implication to Health Care Workers & School Teachers.”  
*PLoS ONE* 9.9 (2014). *PubMed Central*.

- Tegegne, Teketo Kassaw, and Mitike Molla Sisay. “Menstrual Hygiene Management and School Absenteeism among Female Adolescent Students in Northeast Ethiopia.”  
*BMC Public Health* 14 (2014). *PubMed Central*.

### **PubMed Search, 2/2/16, menstrual hygiene developing**

("menstruation"[MeSH Terms] OR "menstruation"[All Fields] OR "menstrual"[All Fields])  
AND ("hygiene"[MeSH Terms] OR "hygiene"[All Fields]) AND developing[All Fields]

This returned 59 hits, one of which was newly-identified for further evaluation for Question II., and one of which was a repeat of an article already identified for further evaluation for Question I. (Tegegne and Sisay 2014).

### **Question II:**

- Montgomery, Paul et al. “Sanitary Pad Interventions for Girls’ Education in Ghana: A Pilot Study.” *PLoS ONE* 7.10 (2012). *PubMed Central*.

### **Google Scholar Search, 2/16/16: menstruation school attendance, --period**

Restricted by date range (2005-2016), sorted by relevance, excluding citations and patents from search results.

This returned 731 results, nine of which were identified for Question I., three for Question II., and one repeat of a title that had already been identified for Question II (Montgomery et al. 2012).

#### Question I

- El-Gilany, A-H., K. Badawi, and S. El-Fedawy. “Epidemiology of Dysmenorrhoea among Adolescent Students in Mansoura, Egypt.” *Eastern Mediterrean Health Journal* 11.1/2 (2005): 155–163.
- Grant, Monica J., Cynthia B. Lloyd, and Barbara S. Mensch. “Menstruation and School Absenteeism: Evidence from Rural Malawi.” *Comparative education review* 57.2 (2013): 260–284. *PubMed Central*.
- Jasper, Christian, Thanh-Tam Le, and Jamie Bartram. “Water and Sanitation in Schools: A Systematic Review of the Health and Educational Outcomes.” *International Journal of Environmental Research and Public Health* 9.8 (2012): 2772–2787. [www.mdpi.com](http://www.mdpi.com).
- Khan, Asif. “Perceptions and Practices about Menstrual Hygiene among Adolescent Girls in a Rural Area - A Cross-Sectional Study.” *International Journal of Health Sciences and Research* 2 (2012): 29–34.
- Konapur, Kavita, and Chitra Nagaraj. “Dysmenorrhoea and Premenstrual Syndrome: Frequency and Effect on Daily Activities of Adolescent Girls in Rural Areas of Bangalore.” *International Journal of Medical Science and Public Health* 3.10 (2014): 1225. *CrossRef*.

- Njue, Eunice Kagendo, and George M. Muthaa. “Influence of Availability of Sanitary Facilities on the Participation of the Girl-Child in Public Primary Schools in Garissa County, Kenya.” *Open Journal of Social Sciences* 03.08 (2015): 162–169. *CrossRef*.
- Sommer, Marni, and Nana Mokoah Ackatia-Armah. “The Gendered Nature of Schooling in Ghana: Hurdles to Girls Menstrual Management in School.” *JENdA: A Journal of Culture and African Women Studies* 0.20 (2012).  
*www.africaknowledgeproject.org*.
- Wong, Li Ping. “Attitudes towards Dysmenorrhoea, Impact and Treatment Seeking among Adolescent Girls: A Rural School-Based Survey.” *Australian Journal of Rural Health* 19.4 (2011): 218–223. *Wiley Online Library*.
- Zegeye, Desalegn Tegabu, Berihun Megabiaw, and Abay Mulu. “Age at Menarche and the Menstrual Pattern of Secondary School Adolescents in Northwest Ethiopia.” *BMC Women’s Health* 9 (2009): 29. *BioMed Central*.

## Question II

- Hennegan, Julie, and Paul Montgomery. “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 (2016): e0146985. *PLoS Journals*.
- Oster, Emily, and Rebecca Thornton. “Menstruation, Sanitary Products and School Attendance: Evidence from a Randomized Evaluation.” *American Economic Journal: Applied Economics* (2010).

**ProQuest Search, 2/19/16: menstrual hygiene school attendance**

Restricted to peer-reviewed articles and those published in scholarly journals, with publication dates between 2005 and 2015 (the option to include 2016 was not available in the ProQuest database).

This returned 87 hits, one of which had already been identified as being relevant by a previous search (Grant, Lloyd, and Mensch 2013).

**ProQuest Search, 2/19/16: menstrual hygiene management school attendance**

Restricted to peer-reviewed articles and those published in scholarly journals, with publication dates between 2005 and 2015 (the option to include 2016 was not available in the ProQuest database).

This returned 76 results, none of which met the inclusion criteria.

**Google Scholar Search, 2/22/16: “menstrual hygiene management” school attendance performance**

Restricted from 2005-2016 and excluding citations and patents.

This returned 91 results, two of which met the inclusion/exclusion criteria for Question I, one for Question II, and five articles that had been identified in prior searches.

Question I:

- Guya, Ezra, Aloyce W. Mayo, and Richard Kimwaga. “Menstrual Hygiene Management in Secondary Schools in Tanzania.” *International Journal of Science and Technology* 3.1 (2014): 27–40.

- Jothy, K., and S. Kalaiselvi. “Is Menstrual Hygiene Management an Issue for the Rural Adolescent School Girls?” *Elixir Social Science* 44 (2012): 7223–7228.

Question II:

- Freeman, Matthew C. et al. “Assessing the Impact of a School-Based Water Treatment, Hygiene and Sanitation Programme on Pupil Absence in Nyanza Province, Kenya: A Cluster-Randomized Trial.” *Tropical Medicine & International Health* 17.3 (2012): 380–391. *Wiley Online Library*.

**Google Scholar Search, 2/23/2016: sanitary pad school attendance developing –period – periods**

Restricted from 2005-2016, excluding patents and citations.

This returned 391 results, one of which was included for Question I.

- Mwangolo, Samson Beja. “Influence of Kenya Government Interventions on Girlchild Dropout in Public Primary Schools in Malindi Subcounty, Kilifi County, Kenya.” Thesis. University of Nairobi, 2015. *erepository.uonbi.ac.ke*.

[Appendix 2](#)

*Unable to access full texts via København Universitet or Bryn Mawr College*

Sommer, Marni, and Nana Mokoah Ackatia-Armah. "The Gendered Nature of Schooling in Ghana: Hurdles to Girls Menstrual Management in School." *JENdA: A Journal of Culture and African Women Studies* 0.20 (2012). [www.africaknowledgeproject.org](http://www.africaknowledgeproject.org).

Neginhal, V. S. Knowledge. "Attitude and Practices of Menstrual Hygiene Among Secondary School Girls in Semi Urban Area, Belgaum District – A Cross Sectional Study." Master of Public Health Thesis. KLE University, 2010.

Sommer, Marni, Marianne Kjellén, and Chibesa Pensulo. "Girls' and Women's Unmet Needs for Menstrual Hygiene Management (MHM): The Interactions between MHM and Sanitation Systems in Low-Income Countries." *Journal of Water Sanitation and Hygiene for Development* 3.3 (2013): 283–297. [washdev.iwaponline.com](http://washdev.iwaponline.com).

Ministry of Education and Ministry of Public Health, Islamic Republic of Afghanistan  
*Assessment of Knowledge, Attitude and Practice of Menstrual health and Hygiene in Girls schools in Afghanistan.* (2010).

Sommer M. *Intersections between girls' education and public health in Tanzania.* DrPH in Sociomedical Sciences. Mailman School of Public Health, Columbia University, USA, 2008.

## Bibliography

Abedian, Z et al. "The Effects of Peer Education on Health Behaviors in Girls with Dysmenorrhea."

*Journal of American Science* 7.1 (2011). Web. 3 May 2016.

Appollis, Tracey. "Keeping Girls in School through Better Menstrual Hygiene Management: An Outcome Evaluation of the Always Keeping Girls in School Programme." University of Cape Town, 2014. Web. 23 Feb. 2016.

Birdthistle, Isolde et al. "What Impact Does the Provision of Separate Toilets for Girls at Schools Have on Their Primary and Secondary Enrolment, Attendance, and Completion? A Systematic Review of the Evidence." *ResearchGate*. July 2011. Web. 2 Feb. 2016.

Boosey, Robyn, Georgina Prestwich, and Toity Deave. "Menstrual Hygiene Management amongst Schoolgirls in the Rukungiri District of Uganda and the Impact on Their Education: A Cross-Sectional Study." *The Pan African Medical Journal* 19 (2014). *PubMed Central*. Web. 2 Feb. 2016.

"Country and Lending Groups | Data." *World Bank*. 22 Oct. 2013. Web. 19 Apr. 2016.

Crofts, Tracey J. "Will They Cotton on? An Investigation into Schoolgirls Use of Low-Cost Sanitary Pads in Uganda." Water, Engineering and Development Centre, Institute of Development Engineering, Loughborough University, 2010. Web. 15 Mar. 2016.

Djalalinia, Shirin et al. "Parents or School Health Trainers, Which of Them Is Appropriate for Menstrual Health Education?" *International Journal of Preventive Medicine* 3.9 (2012): 622–627. Web. 8 Mar. 2016.

El-Gilany, A-H., K. Badawi, and S. El-Fedawy. "Epidemiology of Dysmenorrhoea among Adolescent Students in Mansoura, Egypt." *Eastern Mediterranean Health Journal* 11.1/2 (2005): 155–163. Web. 16 Feb. 2016.



- “Every Woman’s Right to Water, Sanitation and Hygiene.” *United Nations Human Rights Office of the High Commissioner*. 14 Mar. 2014. Web. 3 May 2016.
- Fetohy, Ebtisam M. “Impact of a Health Education Program for Secondary School Saudi Girls about Menstruation at Riyadh City.” *The Journal of the Egyptian Public Health Association* 82.1-2 (2007): 105–26. Web. 8 Mar. 2016.
- Freeman, Matthew C. et al. “Assessing the Impact of a School-Based Water Treatment, Hygiene and Sanitation Programme on Pupil Absence in Nyanza Province, Kenya: A Cluster-Randomized Trial.” *Tropical Medicine & International Health* 17.3 (2012): 380–391. *Wiley Online Library*. Web. 2 Feb. 2016.
- Grant, Monica J., Cynthia B. Lloyd, and Barbara S. Mensch. “Menstruation and School Absenteeism: Evidence from Rural Malawi.” *Comparative education review* 57.2 (2013): 260–284. *PubMed Central*. Web. 16 Feb. 2016.
- Gultie, Teklemariam, Desta Hailu, and Yinager Workineh. “Age of Menarche and Knowledge about Menstrual Hygiene Management among Adolescent School Girls in Amhara Province, Ethiopia: Implication to Health Care Workers & School Teachers.” *PLoS ONE* 9.9 (2014). *PubMed Central*. Web. 2 Feb. 2016.
- Guya, Ezra, Aloyce W. Mayo, and Richard Kimwaga. “Menstrual Hygiene Management in Secondary Schools in Tanzania.” *International Journal of Science and Technology* 3.1 (2014): 27–40. Web. 23 Feb. 2016.
- Hennegan, Julie, and Paul Montgomery. “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 (2016): e0146985. *PLoS Journals*. Web. 16 Feb. 2016.

- Jasper, Christian, Thanh-Tam Le, and Jamie Bartram. "Water and Sanitation in Schools: A Systematic Review of the Health and Educational Outcomes." *International Journal of Environmental Research and Public Health* 9.8 (2012): 2772–2787. [www.mdpi.com](http://www.mdpi.com). Web. 2 Feb. 2016.
- Jothy, K., and S Kalaiselvi. "Is Menstrual Hygiene Management an Issue for the Rural Adolescent School Girls?" *Elixir Social Science* 44 (2012): 7223–7228. Web. 23 Feb. 2016.
- Khan, Asif. "Perceptions and Practices about Menstrual Hygiene among Adolescent Girls in a Rural Area - A Cross-Sectional Study." *International Journal of Health Sciences and Research* 2 (2012): 29–34. Web. 19 Feb. 2016.
- Konapur, Kavita, and Chitra Nagaraj. "Dysmenorrhoea and Premenstrual Syndrome: Frequency and Effect on Daily Activities of Adolescent Girls in Rural Areas of Bangalore." *International Journal of Medical Science and Public Health* 3.10 (2014): 1225. *CrossRef*. Web. 16 Feb. 2016.
- Mbizvo, M.T. et al. "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 (1997): 575–577. *ScienceDirect*. Web. 3 Mar. 2016.
- "Menstrual Hygiene Day." *MenstrualHygieneDay.org*. Web. 26 Apr. 2016.
- Montgomery, Paul et al. "Sanitary Pad Interventions for Girls' Education in Ghana: A Pilot Study." *PLoS ONE* 7.10 (2012). *PubMed Central*. Web. 7 Feb. 2016.
- Mwangolo, Samson Beja. "Influence of Kenya Government Interventions on Girlchild Dropout in Public Primary Schools in Malindi Subcounty, Kilifi County, Kenya." Thesis. University of Nairobi, 2015. [erepository.uonbi.ac.ke](http://erepository.uonbi.ac.ke). Web. 26 Feb. 2016.
- Njue, Eunice Kagendo, and George M. Muthaa. "Influence of Availability of Sanitary Facilities on the Participation of the Girl-Child in Public Primary Schools in Garissa County, Kenya." *Open Journal of Social Sciences* 03.08 (2015): 162–169. *CrossRef*. Web. 19 Feb. 2016.

- Oster, Emily, and Rebecca Thornton. "Menstruation, Sanitary Products and School Attendance: Evidence from a Randomized Evaluation." *American Economic Journal: Applied Economics* (2010). Web. 7 Feb. 2016.
- Pillitteri, Sally Piper. *School Menstrual Hygiene Management in Malawi: More than Toilets*. Cranfield University, 2012. Web. 15 Mar. 2016.
- Puberty Education and Menstrual Hygiene Management*. UNESCO, 2014. Web. 2 Feb. 2016.
- Rani, Alka, Manoj Kumar Sharma, and Amarjeet Singh. "Practices and Perceptions of Adolescent Girls Regarding the Impact of Dysmenorrhea on Their Routine Life: A Comparative Study in the Urban, Rural, and Slum Areas of Chandigarh." *International Journal of Adolescent Medicine and Health* (2015). DeGruyter. Web. 2 Feb. 2016.
- Schechtman, Lisa. "Menstruation Matters: Why Menstrual Hygiene Management Is Core to Our Contract with the Future." *Impatient Optimists*. 28 May 2015. Web. 2 Feb. 2016.
- Scott, Linda et al. *Impact of Providing Sanitary Pads to Poor Girls in Africa*. University of Oxford, 2009. Web. 19 Feb. 2016.
- Sommer, Marni, and Murat Sahin. "Overcoming the Taboo: Advancing the Global Agenda for Menstrual Hygiene Management for Schoolgirls." *American Journal of Public Health* 103.9 (2013): 1556–1559. *PubMed Central*. Web. 2 Feb. 2016.
- Sumpter, Colin, and Belen Torondel. "A Systematic Review of the Health and Social Effects of Menstrual Hygiene Management." *PLoS ONE* 8.4 (2013): e62004. *PLoS Journals*. Web. 3 May 2016.
- Tamiru, Selamawit et al. "Girls in Control: Compiled Findings from Studies on Menstrual Hygiene Management of Schoolgirls." *SNV.org*. 2014. Web. 2 Feb. 2016.

- Tamiru, Selamawit et al. "Towards a Sustainable Solution for School Menstrual Hygiene Management: Cases of Ethiopia, Uganda, South-Sudan, Tanzania, and Zimbabwe." *Waterlines* 34.1 (2015): 92–102. *developmentbookshelf.com (Atypon)*. Web. 1 Apr. 2016.
- Tegegne, Teketo Kassaw, and Mitike Molla Sisay. "Menstrual Hygiene Management and School Absenteeism among Female Adolescent Students in Northeast Ethiopia." *BMC Public Health* 14 (2014). *PubMed Central*. Web. 2 Feb. 2016.
- Thakre, Subhash et al. "Menstrual Hygiene: Knowledge and Practice among Adolescent School Girls of Saoner, Nagpur District." *Journal of Clinical and Diagnostic Research* 5.5 (2011): 1027–1033. Web. 19 Feb. 2016.
- Wanja, Mugendi Millicent. "Factors Influencing Primary School Girls Participation in School Activities in Runyenjes Sub-Province, Embu County, Kenya." University of Nairobi, 2014. Web. 23 Feb. 2016.
- Wilson, Emily, Josephine Reeve, and Alice Pitt. "Education. Period. Developing an Acceptable and Replicable Menstrual Hygiene Intervention." *Development in Practice* 24.1 (2014): 63–80. *CrossRef*. Web. 8 Mar. 2016.
- WoMena. *Improving Quality of Life Through Dissemination of Reproductive Health Solutions and Menstrual Management*. Kampala: WoMena, 2016. Print.
- Wong, Li Ping. "Attitudes towards Dysmenorrhoea, Impact and Treatment Seeking among Adolescent Girls: A Rural School-Based Survey." *Australian Journal of Rural Health* 19.4 (2011): 218–223. *Wiley Online Library*. Web.
- World Economic Forum (@wef). "1 in 10 girls in #Africa will drop out of school for this reason. Wef.ch/1PhNkNU #gender #edchat." 25 Dec. 2015. Tweet.

Zegeye, Desalegn Tegabu, Berihun Megabiaw, and Abay Mulu. "Age at Menarche and the Menstrual Pattern of Secondary School Adolescents in Northwest Ethiopia." *BMC Women's Health* 9 (2009): 29. *BioMed Central*. Web. 16 Feb. 2016.