

Everywhere is Nowhere: A Systematic Review of Menstrual Health and Hygiene Management (MHHM) as a Human Right

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Abstract

Background: In many countries, stigma surrounds menstruation, which impacts several Sustainable Development Goals, including good health, quality education, gender equality, and water and sanitation. Despite its relationship with several development issues, menstrual health and hygiene management among adolescents has until recently been ignored by practitioners and researchers. This paper is a systematic review of existing literature and argues that menstrual health and hygiene management is a human rights issue, cross-cutting through development domains of health, education, nutrition, child protection, and water, sanitation, and hygiene.

Methods: Four coders independently screened PubMed, Academic OneFile, and Google Scholar to obtain articles using iterations of the key terms: menstrual health; adolescents; health outcomes; education; nutrition; water, sanitation, and hygiene; and child protection. English language primary studies in peer-reviewed or grey literature articles published after 2000, that mentioned adolescents, health or hygiene, and menstruation or menstrual were included. A 9-item scale was used to rate selected full-text articles as strong, moderate, or weak. Synthesis of the results were narrative and examined the relationships between menstrual health and hygiene management and the cross-cutting domains.

Results: In total, 28,745 articles were screened, with 84 articles included in the full-text review and quality assessment. Nine articles were coded as “strong” (10.8%), 46 (55.4%) as “moderate,” and 28 (33.7%) as “weak.” More than 60% of the articles examined the relationship between menstrual health and hygiene management and health (37.3%) or water, sanitation, and hygiene (25.3%). Only 11 manuscripts examined menstrual health and hygiene management as a cross-cutting issue impacting more than one development domain.

Conclusions: Access to adequate facilities and menstrual health and hygiene management resources are the most common relationships documented within literature. However, there is little focus on menstrual health and hygiene management in the context of other development domains, highlighting the fact that poor menstrual health and hygiene management has not been studied as a human rights issue, negatively impacting millions of girls. Using a cross-cutting, human rights framework to address inadequate menstrual health and hygiene management is fundamental to promoting menstrual health and hygiene management with dignity among girls and women across the globe.

Background

Introduction

Menstruation is a natural, monthly occurrence for women and girls of reproductive age. Beginning sometime in adolescence, menarche—the initiation of menstruation—is an important phase for an adolescent girl, signaling her transition into puberty and womanhood (1). After reaching menarche, there is a need to ensure adequate menstrual health and hygiene management (MHHM) for adolescent girls and women, so that they can fully participate in daily activities. Adequate MHHM is defined as the “use of

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” (2, 3).

Despite being a normal, biological process, many adolescent girls and women are unable to practice adequate MHHM. Literature across low- and middle-income countries demonstrates that approximately 50% of girls and women practice inadequate MHHM because of reasons beyond their control, such as social restrictions, lack of knowledge about menstruation, and lack of menstrual hygiene products and facilities (4, 5). Adolescent girls and women not being able to adequately practice MHHM have far-reaching negative impacts on their lives, such as mobility restrictions, restrictions on attendance at school and community gatherings, compromised safety, and additional stress and anxiety (6). When their basic MHHM needs go unmet, adolescent girls and women are denied their rights to manage their menstrual cycle in a dignified, healthy way (6).

As MHHM encompasses a significant portion of adolescent girls’ and women’s daily lives, inadequate MHHM negatively impacts their health, education, nutrition, safety, and hygiene, making MHHM a human rights issue (5, 7-10). Inadequate MHHM has implications for several Sustainable Development Goals (SDGs), including SDG 3: good health; SDG 4: quality education; SDG 5: gender equality; and SDG 6: water and sanitation (7). Figure 1 outlines how MHHM is a cross-cutting public health and human rights challenge that requires attention and action if SDGs 3-6 are to be attained (7, 11).

[INSERT FIGURE 1]

Background of Current Literature

The connections between MHHM and the individual development domains of water, sanitation, and hygiene (WASH); health; education; nutrition; and child protection are documented in the literature. With regards to education, the relationship with MHHM is centered around schools providing adequate health education programs. MHHM also arises as an education issue when menstruation impacts girls’ school attendance, thus impacting the completeness and quality of their education (4, 12).

WASH plays a significant role in MHHM as suitable WASH facilities are necessary for the attainment of adequate MHHM. A lack of appropriate WASH facilities at school can impact school attendance, and inadequate WASH facilities at home can reduce overall quality of life (13, 14). According to UNICEF (6), over 335 million girls still go to schools without clean water and soap, making it crucial to have private and adequate WASH facilities to practice proper MHHM.

The relationship between MHHM and health is mostly measured by access to healthcare or seeking healthcare, and the health effects of menstruation, such as irregular cycles and dysmenorrhea, and infections. Several studies show that being able to access healthcare and MHHM resources, such as disposable absorbents positively correlate with fewer symptoms of menstruation; therefore, adolescent girls not having adequate access to such resources impact their daily lives, tying into the notion of health as a human rights issues (9, 15, 16).

Menstruation has also been related to dietary restrictions, which impacts the nutrition of girls. Scientific studies show that the number of adolescent girls facing restrictions on eating specific foods range from 4.6% to 70% worldwide (17-29). As women and girls are already discriminated against in comparison to men and boys in terms of food provision, there is a compounding effect that makes them more vulnerable to under-nutrition. Under-nutrition reduces the capabilities of adolescent girls and has long-term implications for the physiologic function of the body and the ability to thrive later in life (21, 30).

Finally, the relationship between MHHM and child protection has been depicted mostly through addressing child marriage. Studies have shown a significant association between age at menarche and child marriage (31-33). When an adolescent girl attains menarche, she is thought to be a woman, signaling maturity and her ability to bear a child (34, 35). Family honor and social traditions dictate that an adolescent girl who has attained menarche is of marriageable age (5, 10, 32, 35). Child marriage is a harmful practice because it is associated with significantly higher rates of mental and physical health conditions, such as maternal mortality and morbidity, infant mortality and morbidity, intimate partner violence, depression, and anxiety.

While there is ample literature documenting the relationships between MHHM and the individual development domains of WASH; health; education; nutrition; and child protection, the literature is fragmented, stems from different academic disciplines, and frames MHHM as an issue within each of the five domains. This systematic review argues that MHHM has been hitherto neglected in the overall development sphere and aims to evaluate the extent to which adequate MHHM among adolescent girls is a fundamental human right. Jyoti Sanghera stated that, *“Stigma around menstruation and menstrual hygiene is a violation of several human rights, most importantly of the right to human dignity”* (36). In addition to this violation of human dignity, stigma around MHHM perpetuates violations of rights to education, health, consensual marriage, and WASH (37). The Universal Declaration of Human Rights (UDHR) is a landmark document for human rights, which holds all participating nations accountable to its tenets (38). According to the UDHR, people are the ‘rights holders’ to security, dignity, and well-being and states are the ‘duty-bearers’ to respect, protect, and fulfil those rights (39). Table 1 outlines the covenants, comments, and articles that are most relevant to MHHM and how the states are violating their rights as duty-bearers.

Table 1: Human Rights Articles and how the Rights are Respected, Protected, and Fulfilled?

<i>Convention/Document/Treaty/Rapporteur</i>	<i>Article Description</i>	<i>How are the rights violated by the state? (Respected, protected, fulfilled?)</i>
Right to human dignity and non-discrimination		
Universal Declaration of Human Rights (UN General Assembly, 1948)	(1): "All human beings are born free and equal in dignity and rights."	States do not protect AG right to dignity
	(2): "Everyone is entitled to all the rights and freedoms set forth in this Declaration, without distinction of any kind, such as sex"	States do not fulfil AG right to freedom and non-discrimination.
Right to education		
Convention on the Rights of the Child (The United Nations, 1990)	(28e): "States Parties recognize the right of the child to education, and with a view to achieving this right progressively and on the basis of equal opportunity: Take measures to encourage regular attendance at schools and the reduction of drop-out rates."	States do not fulfil to take measures to encourage regular attendance at schools. Which impacts health and future capabilities.
Right to consensual marriage		
Convention on the Elimination of All Forms of Discrimination against Women (UN General Assembly, 1981)	(16.1): "States Parties shall take all appropriate measures to eliminate discrimination against women in all matters relating to marriage"	States do not protect the girl from getting married before legal age, which impacts education and health.
Highest attainable standard of health and comprehensive health education		
International Covenant on Economic, Social and Cultural Rights (UN General Assembly, 1966)	(12.1): "The States Parties to the present Covenant recognize the right of everyone to the enjoyment of the highest attainable standard of physical and mental health."	States do not fulfil the right to physical and mental health.
International Covenant on Economic, Social and Cultural Rights - General Comment 14 (UN Economic and Social Council (CESCR), 2000)	(34): "should refrain from limiting access to...health-related information, including sexual education and information, as well as from preventing people's participation in health-related matters."	States do not fulfil the right to comprehensive health education.
	(44d): "provide education and access to information concerning the main health problems in the community, including methods of preventing and controlling them".	
Right to water and sanitation		
International Covenant on Economic, Social and Cultural Rights General Comment 15 (UN Economic and Social Council (CESCR), 2003)	(2): "The human right to water entitles everyone to sufficient, safe, acceptable, physically accessible and affordable water for personal and domestic uses."	States do not fulfil the right to adequate facilities and clean water.

Identifying MHHM as a health and human rights issue requires states to respect, protect, and fulfil the right of its citizens to adequate MHHM (39). Placing the UDHR as its foundation and using the human rights framework, this manuscript aims to assess existing literature to evaluate the practice of treating MHHM as a cross-cutting human rights issue through a narrative systematic review.

Methods

Eligibility Criteria

To be included in the review, articles had to: be in English language (this was the only language all coders understood); mention adolescents, health or hygiene, and menstruation or menstrual; be primary studies in peer-reviewed or grey literature; and be published after year 2000 (considered adequate to gain a full sense of the extant literature). The exclusion criteria were: not in English language; did not have the key terms adolescents, health or hygiene, or menstruation or menstrual; systematic review, meta-analysis, commentaries, dissertations or editorials or not peer-reviewed; or published before 2000.

Information Sources

A total of four coders independently screened PubMed, Academic OneFile, and Google Scholar to obtain articles. Each coder focused on the relationship of MHHM with either health outcomes, education, child protection, nutrition, or WASH. If the article was not available in the locally or through the interlibrary loan, the corresponding author was contacted through email by the coder. Furthermore, the bibliographies of all included articles were screened to identify additional relevant articles pertaining to the research question.

Search

Iterations of seven key terms were used in the search: i) menstrual health; ii) adolescents; iii) health outcomes; iv) education; v) nutrition; vi) WASH; and vii) child protection. Table 2 includes the key terms and the iterations used across all three databases, taking into account the eligibility criteria identified above.

Table 2: Seven key term combinations used to conduct searches in PubMed, Academic OneFile and Google Scholar

<i>Menstrual Health</i>	<i>AND</i>	<i>Adolescents</i>	<i>AND</i>	<i>Cross-cutting</i>
Menstrual health and hygiene management		Adolescents		<i>Health Outcomes:</i>
OR		OR		
Menstrual health hygiene management		Youth		1. Health outcomes
OR		OR		OR
Menstrual health management		Girls		1. Medical outcomes
OR		OR		OR
Menstrual hygiene management		teenagers		
OR				1. Mental health outcomes
Menstrual health				OR
OR				1. Anemia
Menstrual management				OR
				1. Pregnancy
				OR
				1. Puberty
				OR
				1. PMS/Premenstrual syndrome
				OR
				1. Urinary Tract Infection
				OR
				1. Reproductive Tract Infection
				OR
				1. Bacterial Vaginosis
				<i>Education:</i>
				1. Education
				OR
				1. School
				OR
				1. School Absenteeism
				OR
				1. School Attendance
				OR
				1. School Dropout
				<i>Nutrition:</i>
				1. Nutrition
				OR
				1. Diet
				OR
				1. Healthy Diet
				OR
				1. Food restrictions
				OR
				1. Iron

WASH:

1. WASH
OR

1. Water
OR

1. Sanitation
OR

1. Personal Hygiene
OR

1. WASH AND privacy
OR

1. Toilet
OR

1. Latrine
OR

1. Handwashing
OR

1. Bathing
OR

1. Cloth

Child Protection:

1. Child protection
OR

1. Child rights
OR

1. Child Marriage
OR

1. FGM
OR

1. FGMC
OR

1. Abuse
OR

1. Exploitation
OR

1. Trafficking
OR

1. Commercial sexual exploitation
OR

1. Child Labor
OR

Study Selection

The PRISMA flow diagram used to screen for articles that answered the research question and met the eligibility criteria. Screening was done at the title, abstract, and full-text review stages. When full-text articles were excluded, a reason was reported. Due to the high volume of results in Google Scholar (n=26,004), article selection was based on relevance, i.e. if twenty articles in a row were not relevant to the topic, the research moved on to the next search. Figure 2 outlines the PRISMA diagram of the systematic review process.

[INSERT FIGURE 2]

Data Collection Process

Each coder assessed the quality of the selected full-text articles. Sirriyeh, Lawton, and Garner's (40) coding matrix and quality assessment was adapted for this study, as it allowed assessment of quantitative, qualitative, and mixed-method studies and demonstrated good face validity and reliability. Table 3 outlines the criteria used for coding and assessment.

Table 3: Criterion to assess quality of manuscripts

<i>Item</i>	<i>Coding Category</i>	<i>Description</i>
1.	Citation	Full citation APA style
1.	Type of manuscript	Peer Review Journal Article, Editorials/Commentary, Report, Newspaper Article
1.	Type of sub-publication	Original article, narrative systematic review, meta-analysis
1.	Precise location	School, village, district, province, state, country
1.	Location	Enter country where study was conducted
1.	Location: Region	Enter the region of the world
1.	Intervention	Did the manuscript mention/describe an intervention? If yes, describe the intervention. Make sure to state who the intervention was for, the intervention activities, the dose, the site where activities took place, and duration of the intervention.
1.	Audience: Primary	What was the primary audience of the intervention?
1.	Audience: Secondary	What was the secondary audience of the intervention?
1.	Level of influence: intrapersonal	Was the intervention addressing the intrapersonal domain of the socio-ecological model?
1.	Level of influence: interpersonal	Was the intervention addressing the interpersonal domain of the socio-ecological model?
1.	Level of influence: social	Was the intervention addressing the social domain of the socio-ecological model?
1.	Level of influence: policy	Was the intervention addressing the policy domain of the socio-ecological model?
1.	MHHM Definition	Was a definition for menstrual health and hygiene management stated? If yes, enter the definition.
1.	Evaluation	If an intervention was described, was an evaluation conducted?
1.	MHHM Variable	Is the MHHM variable the independent, dependent or confounding/mediator/moderator variable?
1.	Other study variables	What are the other study variables? Are these the independent, dependent or confounding variables?
1.	Type of study	Cross-sectional, Randomized control trial, quasi-experimental, case-control, longitudinal
1.	Methods	What type of methods were described in the manuscript? Qualitative, Quantitative, Mixed-Methods, Participatory
1.	Key Results	Discussion of key results (if quantitative study, state the significant findings)
1.	Conceptual/Theoretical Frameworks	Theory of change is outlined and applied to examine the key components
1.	Statement of aims/objectives (Research question)	Description on why the manuscript was written and its contribution to literature is provided.
1.	Justification for analytical method selected	Detailed explanation on why an analytical method was selected.
1.	Sample Description	Who are the participants of the study? Include the sample size as: (n=)
1.	Sample size consideration in the analysis	How was the sample size calculated? For quantitative studies, power analysis is provided; for qualitative studies enough individuals to reach saturation.
	Statistical assessment	Are measures used reliable? (e.g. was pretesting conducted? Was a literature

1.	of reliability	review conducted on the measures used? Was reliability analysed?). Enter text to explain.
1.	Strengths	Discussion of strengths of all aspects of study design, data collection, or evaluation as stated by the authors of the manuscript
1.	Limitations	Discussion of limitations of all aspects of study design, data collection, or evaluation as stated by the authors of the manuscript
1.	Recommendations	Discussion on specific recommendations for improvement of measure as stated by the authors of the manuscript
1.	Assessment of Quality*	Each manuscript will be given a rank of strong, moderate and weak based on specific criteria (item 21 - 29) outlined above.

*: Assessed on a scale of 0 – 3 based on items 21 – 29

The assessment criteria were a 9-item scale (items 21 – 29). A number was assigned for each criterion. If the outlined criterion was not mentioned, 0 was given. If there was limited mention of the criterion, 1 was given. Some discussion of the criterion received a 2 and if there was thorough discussion of everything outlined in the criterion, 3 was given. A maximum of 27 points could be given to each study. If a study received 19 – 27 points, it was coded as a “strong,” if a study received 10 – 18 points, it was coded as “moderate,” and if a study received 0 – 9 points, it was coded as “weak.”

To ensure reliability of the quality assessment scores, double coding was conducted on a sub-sample of the articles. A fifth coder independently coded 20% of the database to ensure inter-rater reliability. Approximately 70% of the scores were within 4 points of the original score. Differences in coding were discussed and challenges were resolved.

Results

Overall, a total of 28,745 articles were screened across the three databases, with 3,427 included as part of the abstract review (11.9%), 371 for full-text eligibility (1.3%), and 84 in the desk review (0.3%).

Based on the quality assessment for the 84 articles, nine articles were coded as “strong” (10.8%), 46 (55.4%) were coded as “moderate,” and 28 (33.7%) were coded as “weak.” The two criteria that had the highest percentages of 0’s were “outlining a conceptual framework” (73.96%) and “justification for analytical method” (60.42%). The two criteria that had the highest number of 3’s were “outlining a research question” (64.58%) and “recommendations” (43.75%). Table 4 includes background information on the 84 articles where over 80% reported cross-sectional data and more than half (54.2%) used quantitative methodologies. The studies were derived from multiple geographical locations. Almost all studies involved adolescent girls.

Table 4: Summary of Articles Included in the Systematic Review (N=84)

<i>Categories</i>	<i>N</i>	<i>%</i>
Methodology		
Quantitative	46	54.2
Qualitative	17	20.5
Mixed-methods	12	14.4
Participatory	9	10.8
Cross-sectional	69	82
Geographic Regions		
South Asia	35	42.2
Eastern Africa	35	42.2
Southern Africa	24	28.9
West and Central Africa	9	10.8
Middle East and North Africa	9	10.8
East Asia and the Pacific	4	4.8
Americas and the Caribbean	1	1.2
Combination	1	1.2
Targeted Audience		
Girls	83	99
School staff and administrators	16	19.3
Community members	10	12
Boys	6	7.2
Parents of girls	6	7.2
Non-governmental organizations and ministries	3	3.6

More than 60% of the articles looked at the relationship of MHHM with health (37.3%) or with WASH (25.3%). The rest looked at the relationship of MHHM with education (13.3%) nutrition (7.2%), and child protection (2.4%). Additionally, 14.4% of the studies examined the relationship between MHHM and two

development issues, for example, 7.2% of the articles examined the links between adequate MHHM with WASH and education.

MHHM was defined in only seven (8.4%) articles. None of the definitions matched WHO/JMP's (2012) definition, which summarizes the sub-constructs of procurement, storage, personal hygiene, privacy, frequency of changing and disposal. All seven definitions outlined personal hygiene, six included procurement of clean absorbent, four included privacy and discreet disposal, and two included frequency of changing the absorbent. None of the definitions specified storage of absorbents.

Only 19 articles referenced theories, with the most commonly used theory being the socioecological model, which represents a social system with every level of the system impacting the individual. Other mentioned theories include the grounded theory, social cognitive theory, the PRECEDE model, MRC framework, and feminist theory.

Access to adequate facilities emerged as a major factor, with ramifications for child protection, WASH, education, and health. A total of 30 articles (34%) outlined the relationship between MHHM and access to facilities. Lack of facilities were also examined in the context of knowledge, restrictions, seeking healthcare, facilities available in school, access to information and support, and not disposing the menstrual absorbent in the toilet or latrine. Limited access to facilities was associated with dirty and constricted water and sanitation facilities within the school and home environment. The cycle of inadequate procurement of clean menstrual absorbents, infrequent changing of absorbents, inadequate drying of absorbents in the sun, and unsafe disposal further led to physical discomfort, inconvenience, embarrassment, and school absenteeism. Seven studies demonstrated that access to facilities (including covered toilets, locked doors, and availability of clean absorbents, water, soap, and dustbins) coupled with education programs was protective for MHHM and school attendance during menstruation (41-47).

Sociodemographic factors that came into play included poverty, social restrictions, secrecy around menstruation within the societies in which the studies took place, lower socio-economic status, and mothers with lower literacy. These factors were also associated with lack of facilities (48, 49).

14 articles outlined the relationship between MHHM with health and nutrition. Some manuscripts focusing on this also tangentially discussed MHHM in the context of educational achievement. One article demonstrated that those with better individual health had better menstrual health ($p = 0.001$) (50). Most of the studies associated poor MHHM with social secrecy and taboos surrounding menstruation, which led adolescent girls to use unhygienic methods (cloth), stay home from school, not exercise, and be unable to perform daily tasks during menstruation. This in turn led to adolescent girls being significantly more likely to exhibit at least one symptom of a reproductive tract infection (RTI) (OR = 1.046 – 1.94, $p < 0.05$), vaginal discharge (OR = 1.303, $p < 0.001$), urinary tract infection (UTI) (OR: 1.38, $p < 0.05$), and sexually transmitted infections (STI), as well as lower likelihood of seeking treatment for any of these health problems (15, 51-56). One article provided contradictory information by showing no association between either washing the cloth with soap and water or not, or drying the cloth in the sun or not and having RTI/ STI symptoms (57). Two articles outlined a negative relationship between adequate MHHM and nutrition. Religion and

mothers' education showed either societal-imposed or self-imposed restrictions, such as avoiding food during menstruation to manage menstrual flow (48, 58).

There were 15 articles (18%) outlining the importance of pre-menarche training and health education that cut across health, education, and WASH issues. (12, 44, 50, 57, 59-69). These programs covered all definitional aspects of MHHM, all of which were operationalized except for the ability to change the absorbent in privacy. Additional MHHM information in these programs included regularity of menstrual cycle, knowledge, health seeking behavior, student's behavior during first day of menstruation, tendency to stay at home, school absenteeism during menstruation, change in diet during menstruation (restrictions), and methods for managing menstrual problems.

Overall, there was a lack of consistency in the results when it came to pre-menarche training. Those who had prior knowledge on menstruation had better handwashing (69), had a higher proportion reporting no pain during menses (29.3% vs 20.7%, $p=0.05$), had a higher proportion having no effect on schooling life (33.3% vs 19.8%, $p<0.01$), had a higher proportion using sanitary pads (75.1% vs 61.7%, $p<0.01$), and had a higher proportion disposing absorbents by burning (35.5% vs 25.2%, $p<0.01$) (59). At the same time, pre-menarche training and frequency of changing absorbent were not significantly associated (Aniebue et al., 2009). In one study, those who did not have prior knowledge on menstruation had better disposal practices (69).

Results from studies summarizing health education programs in schools showed that after adjusting for other co-factors, those who had never received health education had a 44% greater probability ($p=0.04$) of dysmenorrhea than those who had previously received health education (62). Health educational programs had a positive correlation with improved intention to visit the health center at any time, increased knowledge, better attitudes, hygienic choice of absorbent, increased frequency of changing sanitary pads, reusing of cloth after washing, proper cleanliness of genitalia during menstruation, improved self-care behavior, increased bathing during menstruation, increased school attendance, fewer health complications, and seeking treatment for RTI or STI as compared to the control group (12, 44, 50, 57, 60, 61, 64-68). One study demonstrated that, while training by either parents and health trainers was beneficial in comparison to no training, school health trainers elicited better MHHM behaviors (63).

Discussion

The systematic review found that most studies were set in developing, low- and middle-income countries with India having the highest representation, in 29 articles (35%). This is in line with developing countries having a heavier burden on the lack of or limited water and sanitation services (70). As the results of some studies suggest, putting the focus on developing countries for improving MHHM is essential because cultural and traditional beliefs that are negative towards menstruation still exist, teachers do not have sufficient knowledge of MHHM, girls cannot afford to buy disposable sanitary pads, and there is a lack of adequate WASH facilities in schools (71). This in and of itself supports the idea that MHHM is a cross-cutting issue and that future approaches to improve MHHM should take a multi-sectoral approach.

This systematic review sought to understand the extent to which adequate MHHM is related to WASH, health, education, nutrition, and child protection. Overall, the quality of the studies was too variable to make explicit conclusions on MHHM as a human rights issue, with 89% being of low or moderate quality when evaluated by the adapted quality assessment scale. Nonetheless, the results do demonstrate relationships between MHHM and the SDG goals and provided important insight into future research and programming to consider MHHM holistically in the context of health, education, WASH, child protection, and nutrition. One of the most salient recommendations from the systematic review is the need to standardize the concept and definition of MHHM.

The review illustrated that most articles did not explicitly consider MHHM as a human rights issue, but rather framed it as a single issue or in some cases a combination of two issues. Primarily, articles framed MHHM as either a health, wash, or education issue (42%, 26%, and 21% respectively), while only 7% focused on nutrition and 2% on child protection. The articles that focused on more than one topic area mostly combined WASH with education. For example, a result found in multiple studies was that menstruation has a negative impact on education because girls miss school due to schools lacking adequate and private WASH facilities; this in turn leads to gender discrimination in the school environment (72). The other common combination of topics was health and education, with studies that showed lack of proper health education due to secrecy and taboos surrounding menstruation led to girls using unhygienic methods during menstruation and thus, increased risks of vaginal discharge, urinary tract infections, and sexually transmitted infections.

Only a handful of studies utilized a multi-disciplinary approaches to address MHHM, which calls for increasing the integration of less represented sectors, such as nutrition and child protection, in future research and programs.

Using theories and conceptual models is imperative for evidence-based research, because they provide a roadmap of how to achieve the desired behavior change. These frameworks then serve as a guide to design and evaluate interventions and programs. However, only 19 articles (23%) included in this study mentioned using a conceptual model or theory. The low percentage of studies employing a theory or model as a basis for the research demonstrates the need to emphasize this approach. Regardless of the theory chosen, future studies should be created using a framework to assure measurability of their efficacy. Studies using this model often take a multi-level approach to attain the maximum level of impact. The socioecological model takes into account societal and cultural norms, environmental and social influences, and personal perceptions and is frequently used to create effective MHHM interventions (45).

While most of the studies targeted adolescent girls, some studies also targeted women, parents, schoolteachers, male students, and school administrators. Targeting not just girls but other influential members of the society allowed studies to use a participatory approach to gain a better understanding of different perspectives of girls' challenges and experiences, as well as the gaps in knowledge and resources regarding MHHM in the target communities. One study by Long (73) conducted focus group discussions with mothers, teachers, and male students; the mothers expressed discomfort and fear in regard to talking about menstruation with their daughters because they lacked formal MHHM education, teachers admitted

difficulty in teaching menstruation and reproductive health because of cultural norms and disapproval from parents, and students described their teachers, particularly male teachers, as scared to teach about menstruation and only giving the class an overview of the topic. From these findings, the study recommends schools to have policies, facilities, and resources to allow girls to discreetly and affordably manage menstruation, providing comprehensive menstruation education to be provided to pre-menarche primary school girls, strengthening teachers' capacities so they can provide in-depth and accurate information in schools, and local and national governments to enact policies that encourage adequate WASH facilities in schools (73). In order to tackle MHHM issues from a comprehensive, community approach, it is essential to broaden the scope of the target population and engage a wide range of stakeholders. Treating MHHM as a human rights issue encourages programs to take such a comprehensive approach.

Limitations

Limitations exist in every study. This study included a time limit to conduct the searches, which may have led researchers to miss some articles that could have qualified for the study. There were multiple coders, which may have resulted in discrepancies of coding. However, in an attempt to eliminate these discrepancies, a thorough screening of the articles that qualified for the study was conducted by one of the co-authors and 20% of those articles were reassessed by an external reviewer to evaluate inter-rater reliability. This also ended up being a narrative systematic review rather than a meta-analysis because the study team believed it was necessary to include qualitative and mixed-methods studies. Only English publications that were available online were included in the search, reducing the generalizability to non-English publications.

Publication bias could also be a concern, but this was minimized since grey-literature (reports) were allowed as part of the inclusion criteria. In terms of the location of the studies, although there were no exclusion criteria for geographical setting of the studies, all studies were from low and middle-income countries. This limited the extent of analysis for studies in developed countries.

Recommendations

MHHM as a construct has not been measured consistently within scientific studies. There has only been one study that conducted a psychometric testing of a MHHM scale and, even then, only in the pre-testing phase (74). Reliable and valid measures are essential to understanding the burden of inadequate MHHM within communities. Furthermore, MHHM has been studied in silos, focusing on its relationship with individual issues in WASH, health, hygiene and nutrition, education, and child protection, despite the fact that MHHM cuts across several SDG goals. There is a need to focus on MHHM as a cross-cutting topic and generating understanding that improvements in MHHM could impact multiple SDGs.

One way to elevate MHHM into the global development agenda is to push for MHHM as a human rights issue. Countries, states, and communities can: 1) provide infrastructure within schools for separate water and sanitation facilities that are gender sensitive and responsive to adolescent girls' needs; 2) incorporate

menstruation education into school curricula to increase pre-menarche preparedness and enable open dialogues with peers, teachers, and family; 3) provide affordable sanitary materials to increase school attendance and retention, as well as to decrease RTI; 4) give access to adolescent-friendly reproductive services through the existing health system; and 5) provide safe and discreet disposal facilities of used menstrual products.

However, countries and states will be challenged to meet these recommendations if the current taboos around menstruation remain unchanged. Participatory methods would be an effective way to break the silence and increase communication about MHHM among community members. At the same time, states can protect and respect the rights of adolescent girls by engaging and contracting with local grassroots non-governmental organizations to educate adolescent girls, boys, mothers, fathers, and community members to decrease stigma and to increase dialogue about menstruation (4, 75). Participatory methods would be effective tools to empower community members as implementers and change cultural norms to make sustainable changes around MHHM.

Human rights documents need to place greater emphasis on MHHM issues; as one literature review demonstrated, menstruation is a neglected topic in such documents and is only suggested ambiguously, even though it cuts across many human rights articles and treaties (76). Until MHHM is treated as a human rights issue and explicitly acknowledge in human rights documents, it is challenge to holding states, countries, and governments accountable for addressing inadequate MHHM (76).

Conclusion

The Charter of Compassion states, "*The principle of compassion lies at the heart of all religious, ethical and spiritual traditions, calling us always to treat all others as we wish to be treated ourselves*" (77). Although menstruation is a normal biological process, it is associated with impurity and considered a taboo in many countries worldwide. The silence around menstruation generated by the taboo makes women and adolescent girls vulnerable to many human rights and health violations. It is essential examine MHHM as a cross-cutting, multi-disciplinary, human right issue, that is key to achieving several SDGs.

Abbreviations

MHHM- menstrual health and hygiene management

SDG- Sustainable Development Goals

WASH- water and sanitation hygiene

UDHR- Universal Declaration of Human Rights

RTI- reproductive tract infection

STI- sexually transmitted infection

Declarations

Ethics approval and consent to participate

Not applicable

Consent for publication

Not applicable

Availability of data and materials

The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

SS1 was the principal investigator, oversaw the review process, and edited the manuscript. SS2 and MO reviewed the data and wrote and edited the manuscript. AR conducted the majority of the review and assisted with manuscript writing. MH reviewed and edited the manuscript. All authors read and approved the final manuscript.

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Figures

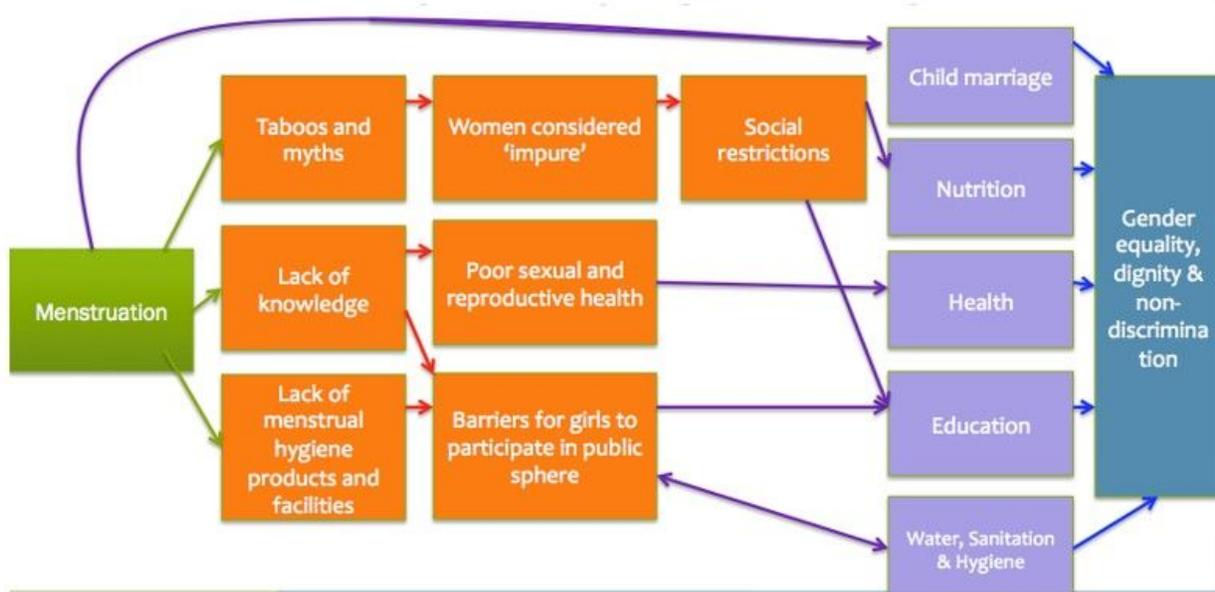


Figure 1

Health and Human Rights Framework adapted from Neumeyer (Neumeyer, n.d.)

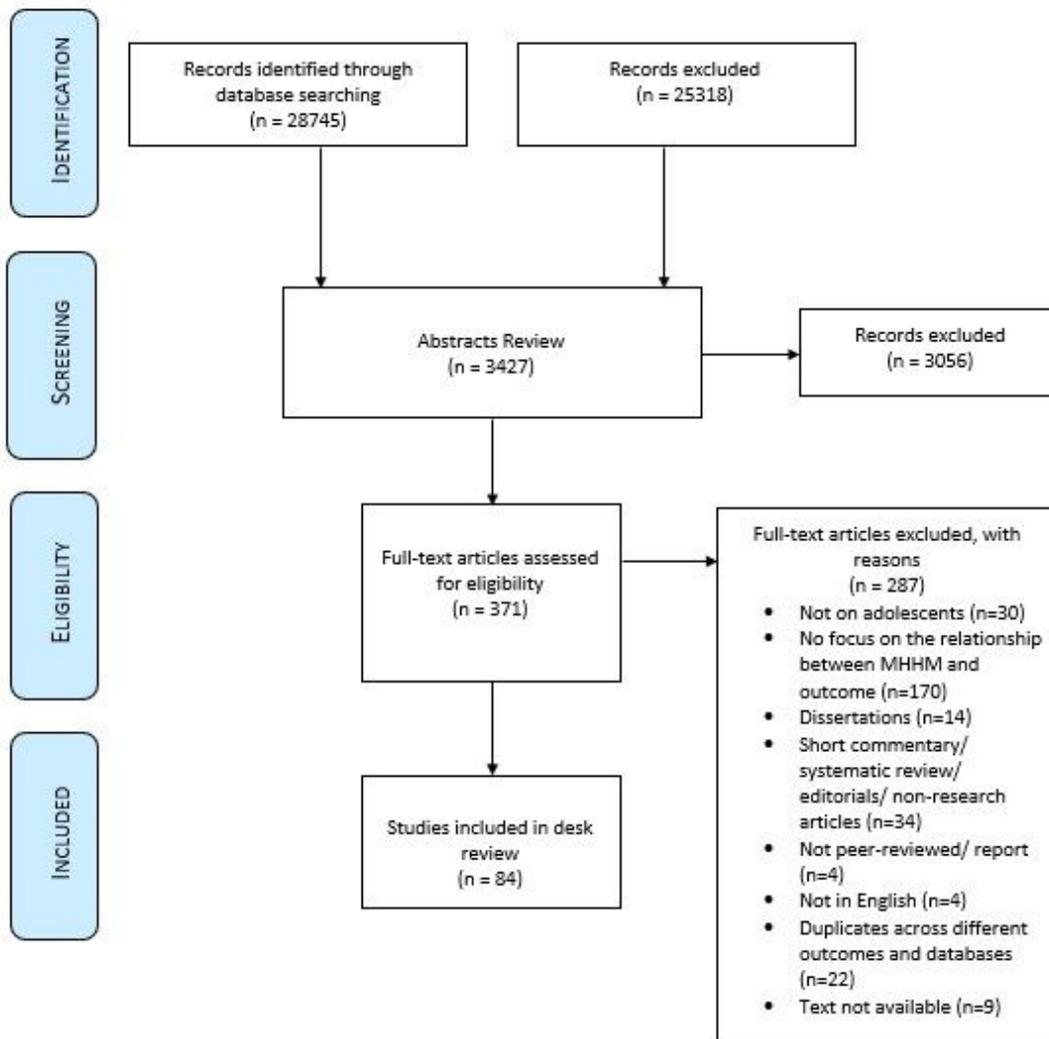


Figure 2

Systematic outline of the review process