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A Structured Review of Emotional Barriers to WASH Provision for Schoolgirls Post-Disaster

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Abstract: Pubescent girls face unique emotional barriers to returning to school after a disaster concerning water, sanitation and hygiene (WASH). This paper explores themes of WASH, gender violence, the lack of dignity and sense of shame arising from inadequate WASH facilities for girls in disaster settings. We conducted a structured literature review of 126 sources to investigate the emotional constraints facing pubescent girls concerning WASH in schools in Indonesia, a region prone to frequent disasters. Findings are synthesised into four major themes: psychological experiences of WASH, challenges faced by girls in schools, barriers to inclusive WASH provision and how to create a holistic approach to WASH. Key conclusions include the need for interdisciplinary research, cross sectoral collaboration, more evidence and research in Indonesia, especially regarding menstrual hygiene management, improved toilet design to reduce the physical barriers linked to emotional barriers and inclusive design for those with disabilities.

Keywords: WASH; schoolgirls; disaster settings; psychological factors; Indonesia; wellbeing

1. Introduction

Indonesia is prone to a range of natural hazards, such as earthquakes and tsunamis. When disasters occur, children are one of the most psychologically vulnerable groups [1]. To facilitate the recovery of young people, it is important for them to return to school as soon as possible after a disaster, as schools constitute a safe, familiar environment that promote a sense of normalcy [2]. However, disasters can cause devastating physical damage to school buildings, including water and sanitation (WASH) infrastructure. Inadequate WASH facilities following disasters are likely to exacerbate the psychosocial stress young people experience after a disaster [3]. This may be particularly important for pubescent girls, who may be reluctant to attend school if toilets are not viewed as safe spaces that safeguard dignity and privacy.

The environmental and societal risk factors that exist for women and girls in disaster settings are well documented, especially concerning the use of and access to WASH facilities.

The psychological impacts of disasters may disproportionately affect girls, who report greater levels of emotional distress than their male counterparts [4–6]. Girls are also uniquely and more adversely affected by poor quality or lack of WASH facilities in post-disaster settings due to biological and societal factors [6,7]. Yet, little research has explored the emotional barriers for women and girls in these contexts. This paper explores themes of WASH, gender violence and the lack of dignity and sense of shame arising from inadequate WASH facilities. Due to the gendered impacts of disasters [8], this paper focuses on the experience of pubescent girls (between 11 and 14 years old).

2. Background

2.1. Research Context: Indonesia

With a gross national income per capita of USD 3870 in 2020 using the World Bank Atlas method, Indonesia is a lower middle-income country [9,10]. However, as of 2019, almost a half of the population lived on less than USD 5.50 (PPP 2011) per day [9], indicating a high incidence of poverty and high degree of income inequality. Secondary school enrolment is relatively high for developing nations, standing slightly higher for girls than boys, at 90% compared with 88%, respectively [9].

Prior to the 2018 earthquake and tsunami in Palu and the COVID-19 pandemic, 36% of secondary schools across Indonesia had no hand washing facilities [11], contrary to government requirements [12]. In the province of Central Sulawesi where Palu lies, 61% of secondary schools in that region had no hand washing facilities in 2019 [13]. Indonesian policy requires toilets for males and females to be separated [12]. Yet, only 59% of Indonesian secondary school toilets are sex segregated and, in addition, only 68% are usable and improved [11]. Improved sanitation refers to sanitation facilities that hygienically separate excreta from human contact. They include flush/pour flush toilets connected to piped sewer systems, septic tanks or pit latrines; pit latrines with slabs; and composting toilets [13]). In the province of Central Sulawesi in 2019, only 14% of female school toilets were assessed to be in good condition, whereas 53% were assessed as heavily damaged [14]. In addition, the ratio of girls per toilet was 45, whereas for boys it was 41 per toilet [15]. This falls short of the ambitions laid out in Indonesian legislation of one toilet for every 25 female students, and one for every 40 male students.

2.2. Seismic Challenges of Indonesia

Indonesia is located on the Pacific "Ring of Fire", at the intersection of several tectonic plates. The archipelagic country is prone to frequent earthquakes, volcanic eruptions, tsunamis, landslides and liquefaction. The Indonesian National Agency of Disaster Management (BNPB) recorded at least 13 major earthquake events after the Indian Ocean earthquake and tsunami of 26 December 2004 in Indonesia that caused loss of life [15]. Major earthquakes and natural hazard events can result in large numbers of casualties, loss of property, damaged infrastructure and weakened natural environments, which in turn can have economic consequences [16].

On 28 September 2018, an earthquake measuring 7.7 Mw with a depth of 10 km triggered a tsunami in the province of Central Sulawesi, Indonesia, close to the capital Palu [17,18]. This triggered additional liquefaction and landslides that caused further damage and loss of life [18]. Over 211,000 people were displaced to spontaneous and informal settlements [19]. The damage caused by the multi-disaster event affected 1299 schools as of December 2018 in Central Sulawesi and an estimated 374 school buildings were seriously damaged [20]. During the early post-disaster phase, the Joint Need Assessment (JNA) identified 152,000 people in need of WASH support, including toilets and access to clean water as the main priority, and many females avoided using toilet facilities at night due to lack of lighting around the latrine areas [21]. In response to the situation, when the evacuated communities were moved to temporary shelters (Huntara), WASH infrastructure was equipped with gender-segregated latrines with lightbulbs, waste containers, community-based sanitation management, boreholes and pipes for water distribution.

Temporary schools were established within or near the Huntara compound [21]. Since March 2020, World Vision Indonesia (WVI) has been implementing a programme to reduce COVID-19 infection [21] and to improve WASH facilities in the area.

2.3. Framework

It is vital to examine girls' challenges and emotive experience of WASH in low- and middle-income disaster settings, such as Indonesia, to effectively support their WASH needs. Addressing gender needs helps empower women in society to achieve greater equality [22,23]. For example, recent empirical investigations have explicitly linked social and environmental influences to the disempowered experiences of women and girls in low- and middle-income countries [24,25].

In a review aimed at exploring how empirical studies of WASH over the last decade have engaged with gender equality, MacArthur et al. [26] identified four major motivations for WASH studies and programmes to consider regarding gender:

1. the *inherent* challenges faced by women and girls (e.g., biologically, pregnancy, menstruation);
2. the *integral* role of women and girls in WASH related to gender roles in their communities (e.g., responsibility for homekeeping, cooking, cleaning, childcare);
3. the *instrumental* objectives that are achieved through WASH programmes (e.g., community/familial/individual sustainability, economic gains, improved health, improved economic livelihoods); and
4. the *ideological* foundations that suggest it is our ethical and moral obligation to care about the wellbeing of others, especially where there are improvable circumstances concerning inequality and inequity due to social factors (such as gender).

These major motivations provide valuable concrete insight into the connections between gender and WASH, based on a strong evidence base of interdisciplinary research. We use these motivations as a framework for interpreting the findings of our structured search and contextualising a discussion concerning WASH studies and gender, especially given that our aim is to contribute recommendations for improving circumstances for pubescent girls in disaster settings.

2.4. Aims of This paper

This paper's objective is to provide recommendations to improve WASH circumstances for girls in schools in Indonesia. Existing research in this area has lacked the interdisciplinary perspective that our innovative psychology–WASH collaboration provides. To reach this goal, a review was conducted to examine interdisciplinary evidence pertaining to the emotive experience of WASH in schools, with a focus on Indonesia, combining knowledge from the WASH and psychology disciplines.

3. Method

To review the literature, we followed a structured approach that allowed us to examine the available interdisciplinary evidence to address our research questions. While our comprehensive method does not intend to meet all the criteria of a systematic review (see [27] for a discussion of definitions of systematic reviews), the approach meets the principle of a scoping review and is consistent with numerous other well-cited publications across academic disciplines (for example, [28–31]). We developed the search strategy used by Kizilcec and Parikh [29] by incorporating the SPIDER search framework to guide our inclusion and exclusion criteria. The SPIDER framework is a well-cited tool developed to help define key elements of a review and standardise the search strategy, adding rigor to qualitative and mixed methods reviews [32,33].

All papers were found with search terms including but not limited to WASH, psychological factors, girls, schools and disaster settings. Four themes were identified and the review is written accordingly: (1) the psychological experiences of WASH, (2) the challenges faced by girls in schools, (3) the barriers to inclusive WASH provision and (4) how to create

a holistic approach to WASH provision. The literature was searched between 14 February 2021 and 15 April 2021. Key concepts used to discuss findings are defined in Table 1. We then develop recommendations for WASH practitioners in mitigating risk and improving circumstances for girls in schools in Indonesia.

Table 1. Definition of key concepts.

Concept	Definition
Environment	This paper focuses on the definition of environment as defined by the socioecological model [34], meaning any "social or cultural norms [. . .] or large societal factors including the health, economic, educational, and social policies that help to maintain economic or social inequalities between groups in society".
Disaster	This paper acknowledges that "there is no such thing as a natural disaster, only natural hazards" [35]. We use the term "disaster" in accordance with the widespread view in disaster studies that a hazard only becomes a disaster by interacting with pre-existing human vulnerability [36].
WASH	Provision of safe and reliable water, adequate sanitation and good hygiene promotion [37].
WASH programming	WASH programming is understood as the measures for improving health, socioeconomic development and poverty reduction through long-term interventions and control measures, including the response to global emergencies and outbreaks of life-threatening illnesses through WASH provision [38].
Psychosocial wellbeing	The connection between individual psychological aspects (thoughts, emotions and behaviours) and collective social aspects (relationships, traditions and culture) that are central to positive human functioning but which are often disrupted by traumatic events [3].
Emotional aspects	Emotional aspects refer to the mental processes occurring within or among individuals in relation to WASH: a complex set of cognitive and affective interactions that often trigger physiological responses [39]. Many emotional aspects are social phenomena, such as shame or embarrassment [40]. We also consider non-social emotions, such as fear evoked by environmental risk factors.
Shame	An intense, adverse emotional response triggered by actions we perceive to be moral transgressions; shameful behaviours are appraised as personal failures of one's ability to meet a certain moral or competency standard and negatively influence one's sense of self [41,42].
Embarrassment	A feeling of discomfort triggered by an acute concern for social evaluation. This emotion is similar to shame, but is distinctly less intense and is not as deeply linked to one's sense of self. It results from non-extreme social transgressions (within or outside of one's control) that one appraises as damaging to one's social identity within a particular interaction [41,42].
Disgust	An adverse emotion triggered by physical or social violations that marks a rejection response to a stimulus. This response is often accompanied by a motivation to avoid, expel or terminate contact with the object and is closely linked to shame and anger [41,42].
Stigma	A relational attribute that emerges in social settings and discredits the person as having a "spoiled identity" [43] (p. 3; see also [44,45]).
Gender interests	Gender interests "develop by virtue of social positioning" depending of the gender identity of the person and can be either practical or strategic, having different implications for women's subjectivity [46] (p. 62).
Practical gender needs	Practical gender needs arise "from the concrete conditions women experience, in their engendered position within the sexual division of labor" and are formulated by women in these positions in relation to their socially defined roles [47] (p. 1803; e.g., providing women with a water tap may reduce burden on women's lives, which would allow more time for other domestic tasks [48]).
Strategic gender needs	Strategic gender needs are those that women identify from their subordinate position to men, which vary depending on the particular sociopolitical and cultural context [47] (p. 1803). These needs can include or challenge power and control, division of labour or traditional norms and roles [23,47,48] (e.g., women managing WASH facilities could result in changes in power relations within their community [48]).

Search Strategy

The authors co-developed the search strategy and the search terms through their expert disciplinary knowledge and understanding of the context. The search strategy was guided by the following research questions:

1. What is the nature of WASH in schools in Indonesia?
2. How does it affect girls (e.g., emotional experience)?
3. How does "disaster" influence these circumstances (e.g., exacerbate risks/threat to wellbeing, safety; damage to facilities/inaccessible facilities, etc.)?

The literature search aimed to explore themes of WASH, gender violence and the lack of dignity and sense of shame arising from inadequate WASH facilities, with a target age group of 11- to 14-year-old girls in Indonesian schools. Our inclusion and exclusion criteria for the initial search are outlined in Table 2.

Table 2. Inclusion and exclusion criteria.

SPIDER (Standardized Systematic Search Strategy)	Inclusion Criteria	Exclusion Criteria
Sample	• Human studies • Pubescent and adolescent schoolgirls • Young women • In middle- and low-income countries • Disaster settings	• Men and boys • Outside of middle- and low-income countries • WEIRD (Western, educated, industrialised, rich, democratic) countries • Aged over 19 years
Phenomenon of Interest	• Emotional barriers • For girls • In schools • In disaster settings	• Health outcomes from a medical perspective
Design	• Not specified	
Evaluation	• Not applicable	
Research Type	• WASH education and programmes • Qualitative, quantitative, mixed methods, reviews • Interventions	
Other	• Type of publication: journal articles, chapters, unpublished theses, NGO data reports, situation reports, conference proceedings, fieldwork guides • Language of publication: English, Indonesian	• Types of publications: brochures, news reports • Language of publication: non-English and non-Indonesian

Note. SPIDER is a search strategy tool for qualitative/mixed methods research. See [31].

Using the search criteria in Table 2, a structured search was conducted using the search strategies and databases outlined in Table 3. Academic literature was identified through search criteria highlighted in Table 3. Grey literature was also searched, through the institutional website, Google Search and Google Scholar, which included NGO and world organisations' data and reports.

The search resulted in 52,369 scholarly sources (e.g., peer reviewed journal articles, academic book chapters) and 46 works from the grey literature were identified through snowballing (e.g., NGO reports, practitioner handbooks, policy). The number of selected sources based on screening by reviewing abstracts for relevance (see inclusion and exclusion criteria) was 329. A total of 169 sources were found to be duplicates and were removed, leaving 160 sources (see Figure 1).

The 160 publications were selected, downloaded to Mendeley and reviewed independently by the research team. An extract form created in Excel was used for screening the relevant papers retrieved from the search. The extract form also had a dual purpose as a reference list, where additional papers could be identified as means of snowballing additional material. A two-stage screening process was conducted to narrow down the selection of the materials to be used for this paper. The first stage consisted of screening of the publications' titles and abstracts against the inclusion criteria and the initial key themes (WASH, girls, schools, emotions, disaster settings and Indonesia). The second

stage consisted of reviewing the full text of the publications against the extract form. We then conferred on included publications through regular meetings to review the extract form and discuss findings, and consensus was reached on the themes that emerged from the publications.

Table 3. Search criteria and results.

Database	Search Criteria	Article Type	Search Results
Web of Science	(WASH OR water* OR sanitation OR bathroom OR toilet*) AND (girls OR schoolgirls) AND Indonesia AND (wellbeing OR relationship* OR "mental health" OR emotion* OR dignity OR shame OR stress OR anxiety)	All document types	5
Scopus	("WASH" OR water* OR "sanitation" OR "bathroom" OR toilet*) AND ("girls" OR "schoolgirls") AND "Indonesia" AND ("wellbeing" OR relationship* OR "mental health" OR emotion* OR "dignity" OR "shame" OR "stress" OR "anxiety")	Article and Review and Conference paper	384
Proquest	WASH OR water* OR sanitation OR bathroom OR toilet*) AND school* AND "Indonesia" AND (wellbeing OR relationship* OR "mental health" OR emotion* OR dignity OR shame OR stress OR anxiety) AND (disaster OR "post disaster")	Article and Review and Conference paper	49,197
PsychINFO	(WASH or water or sanitation or bathroom or toilet*).tw. AND (girls or schoolgirls).tw. AND Indonesia*.tw. AND (wellbeing OR relationship* OR (mental AND health) OR emotion* OR dignity OR shame OR stress OR anxiety).tw	Database Field Guide Journals, Database Field Guide APA PsycArticles Full Text, Database Field Guide APA PsycInfo 1806 to February Week 4 2021, Database Field Guide Social Policy and Practice 202010, Database Field Guide Global Health 1973 to 2013 Week 17 on TRIAL, Database Field Guide Ovid MEDLINE(R) ALL	100
Institutional library	("WASH" OR water* OR "sanitation" OR "bathroom" OR toilet*) AND ("girls" OR "schoolgirls") AND "Indonesia" AND ("wellbeing" OR relationship* OR "mental health" OR emotion* OR "dignity" OR "shame" OR "stress" OR "anxiety")	Articles, Reviews, Reports	1714
Google Scholar Garuda, Neliti, One Search	("air dan sanitasi" OR "air bersih" OR sanitasi) AND (gender OR perempuan) AND (kekerasan OR pelecehan) AND (toilet OR WC OR kamar mandi OR kamar kecil) AND (sekolah OR madrasah OR pesantren OR siswi OR murid OR santri)	Article, Conference paper	969

*—wildcard symbol that broadens the search

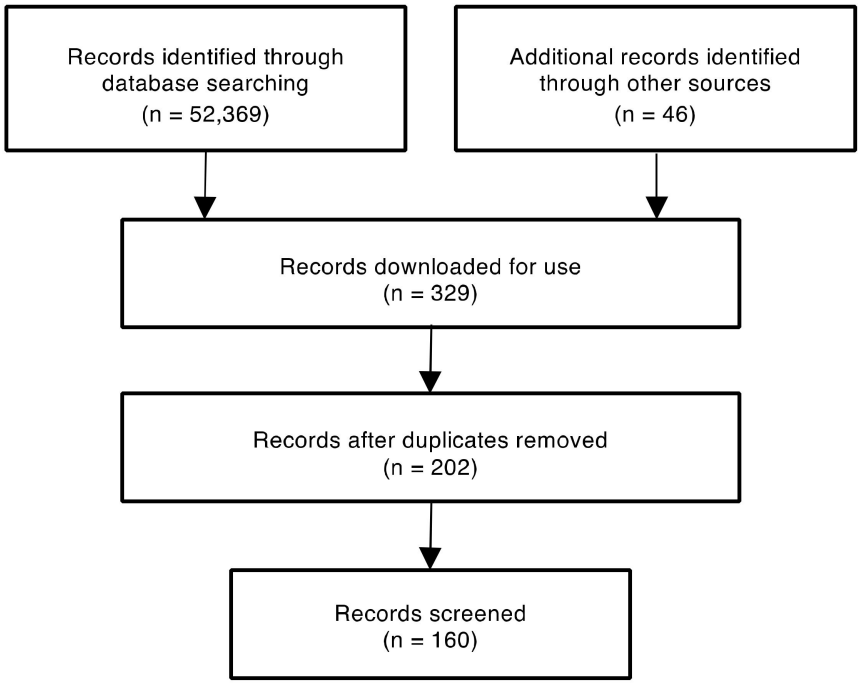

Figure 1. Literature search and selection process.

4. Results and Discussion

In reviewing the literature, we identified four key themes linked to improving WASH circumstances for girls in schools in Indonesia: (1) the psychological experiences of WASH, (2) the challenges faced by girls in schools, (3) the barriers to inclusive WASH provision and (4) how to create a holistic approach to WASH provision. The literature on the emotive experiences of WASH in disaster and post-disaster settings, namely Indonesia, was found to be scarce. The discussion of this paper is therefore based on broader literature and research conducted in other settings.

4.1. Publication Dates

The literature screened for this paper has increased over the last 6 years, with 99 out of 149 publications (66%) screened texts being published since 2015 (Figure 2). With the major 2018 earthquake, tsunami and relief work, there has been an increase in publications focusing on Indonesia in recent years.

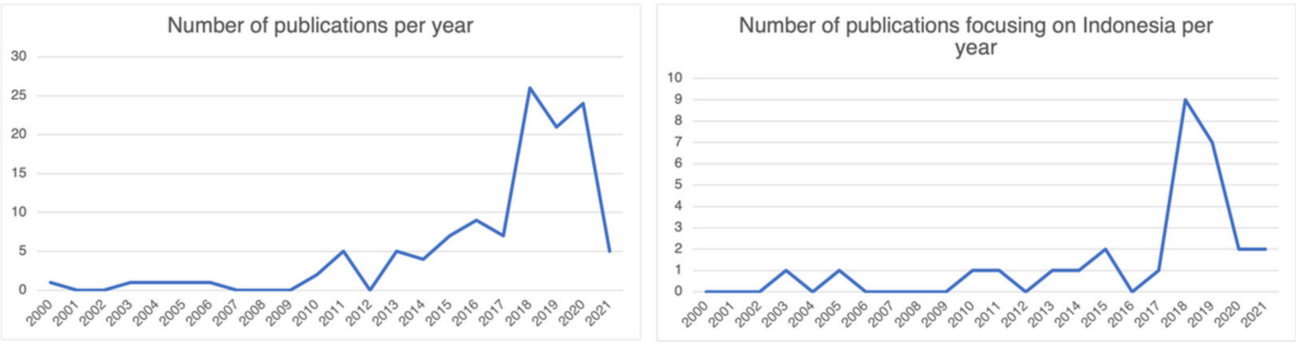

Figure 2. Number of total publications screened and number of publications focusing on Indonesia per year.

The publications reviewed included peer-reviewed articles (84 publications/70%) as well as book chapters and grey literature—including conference proceedings, NGO reports, presentations and toolkits (36 publications/30%). The peer-reviewed articles were divided

into three types: empirical (50 publications/60%), conceptual—including commentary papers, theoretical articles and literature reviews (33 publications/39%)—and intervention assessments (1 publication/1%).

4.2. Countries of Focus

The search found 30 publications that focused specifically on Indonesia (of which four were the situation reports from UNICEF that provided updates on the tsunami situation). Given this paucity of literature, the search included literature from other countries and regions. The most common region found in the literature was Africa as a region or an African country and South Asia, with 22 publications. It is worth noting that half of the publications pertaining to South Asia were located in India (11 publications). The second most common geographical category was low- and middle-income countries (LMICs) with 16 publications, including publications that focused on three or more countries in this region. The remaining publications, including publications that covered entire continents or a single country, were grouped geographically, as shown in Figure 3.

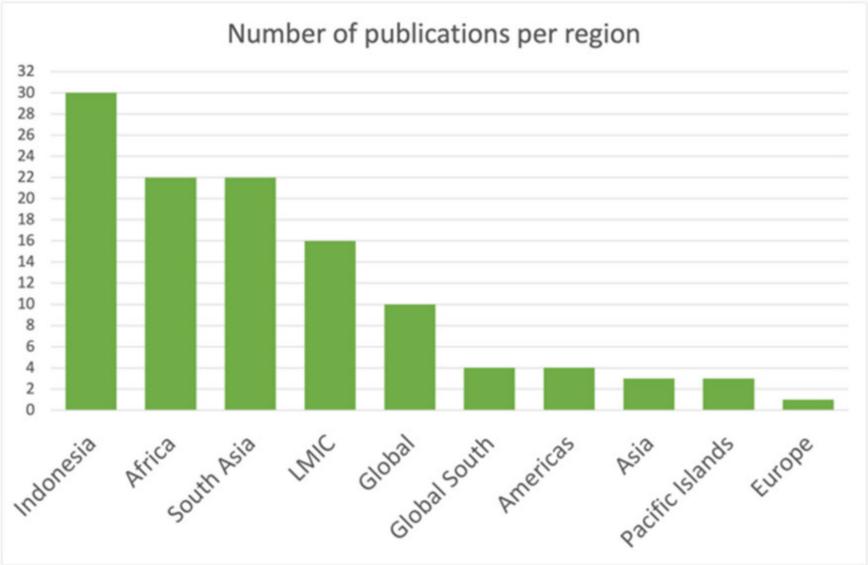

Figure 3. Number of publications per region.

4.3. Gaps in Literature

As an outcome of this review, we found a gap in research conducted on the emotional aspects of pubescent girls related to WASH specific to the Indonesian region, in both the academic and grey literature. More broadly, existing research has mainly focused on the absence of WASH facilities resulting in open defecation, or the inadequacy of facilities provided in temporary accommodation. The emotional experience of using inadequate or communal sanitation facilities may be part of the overall experience of loss following a disaster. The trauma of experiencing loss of resources has been shown to negatively impact wellbeing, and frameworks exist that can give insight in this specific regard (e.g., conservation of resources, see [49]). Yet, an explicit, unified framework for working with WASH and psychosocial aspects, including emotions, was not found.

4.4. Topics Covered

The publications were examined regarding whether they covered the following topics: WASH, school settings, disaster settings, country of focus, psychosocial wellbeing and emotional aspects. The findings are synthesised into themes (see Table 4) and we subsequently present a thematic synthesis of the knowledge base that informs these themes.

Table 4. Overview of major and minor themes (findings).

1. Psychological Experiences of WASH	2. Challenges Faced by Girls in Schools	3. Barriers to Inclusive WASH Provision	4. Holistic Approach to WASH Provision
1.1 Prevalence of shame and disgust	2.1 Menstrual hygiene management	3.1 Physical barriers	
1.2 Safeguarding girls' psychological wellbeing through adequate WASH	2.2 Environmental, social and sexual stressors	3.2 Impact on education	

We highlight the various mechanisms that perpetuate unique WASH-related challenges for girls, including overall menstrual hygiene management (MHM) and the commonly experienced emotional constraints, which are influenced by gender roles and societal norms regarding females (e.g., shame, embarrassment, disgust). More research is needed to understand whether this is the case for Indonesian girls. Where possible, we also point to research conducted in Indonesia; however, we make the case through this analysis that these experiences are not unique to a single location.

4.5. Psychological Experiences of WASH

The extant research strongly suggests that people experience the use of sanitation infrastructure in an emotive way. A plethora of negatively valanced emotions related to WASH are reported in the literature reviewed, including shame, anxiety, fear, embarrassment and disgust. It is worth noting that no studies were found with a focus on psychological factors and WASH for girls in schools with an Indonesia-based sample; we report findings from the non-Indonesia literature, where 51 publications (43%) contained emotional themes.

4.5.1. Prevalence of Shame and Disgust

The emotion of shame was frequently referred to in the literature (27 publications/53% of the publications containing emotional aspects referred to shame and/or embarrassment), due to being seen by men during open defecation in a way that violates social norms [50–52], in relation to mensural hygiene management (see [53] for a review) and for schoolgirls regarding being seen using the toilets at school [54]. A systematic and qualitative synthesis by Sclar et al. [55] on the relationship between sanitation and wellbeing found shame, embarrassment and anxiety resulted from a lack of access to sanitation, which also impacted privacy and safety. Shame is believed to serve the adaptive function of maintaining social hierarchies [56–58] and therefore will depend on the internalised norms of participants, so may vary depending on the location of the study. Norms were found to be gendered; for example, girls may internalise sociocultural beliefs that menstruation is shameful, which may, in turn, influence behaviour by constraining their access to clean menstrual hygiene products [51].

Experiences of disgust were also cited in the literature reviewed (five publications/10% of the publications containing emotional aspects referred to disgust). This is unsurprising considering the robust evidence in the wider psychological literature that disgust evolved to serve a protective function against pathogens [59,60]. Often in the literature reviewed, disgust was found in relation to the practice of open defecation. For example, Sahoo et al. [52] reported that during the rainy season women were disgusted by the mud potentially mixed with faeces. Disgust is often elicited by a lack of cleanliness, which Hirve et al. [50] reports as a stressor associated with open defecation. However, whether this lack of cleanliness triggered a disgust response was not explored. "Cleanliness" also arose inductively during coding in a systematic review and qualitative synthesis on the relationship between sanitation and wellbeing by Sclar et al., [55]. Although "cleanliness" was not systematically analysed by the authors, they note studies in their review that found

an experience of unclean facilities led to feelings of shame (e.g., [61–63]). Disgust was experienced in a study of shared latrines [64] and in relation to poor sanitation conditions and menstrual hygiene management [24,65].

The review also highlighted empirical links between WASH experiences and psychosocial elements of fear (nine publications/18% of the publications containing emotional aspects referred to fear). Though not specific to girls, many women in low- and middle-income contexts fear using WASH facilities [66]. After an earthquake in Pakistan, Ahmed (2018) found that girls did not have access to toilets in shelters, so were required to navigate an emotional choice between experiencing embarrassment during open defecation or returning to damaged homes to use toilets but fearing the cracked buildings and unstable infrastructure. In a rural area, girls explained that cloth toilets were provided, but they were unused due to fear of boys looking inside and sexual abuse [67]. For girls in schools, the strongest link between fear and WASH concerns menstrual hygiene management (MHM) due to the difficulties in managing menstrual bleeding; this exacerbates school absenteeism and disengagement [68]. Many girls remain unprepared to manage their menstruation and therefore suffer distress and fear concerning public concealment and cleanliness. Lack of adequate facilities in schools in disaster-affected settings exacerbates this vulnerability and introduces distress [69,70]. We expand on the implications of MHM for girls in schools in disaster settings in later sections.

4.5.2. Implications for Safeguarding Girls' Psychological Wellbeing through Adequate WASH

The experiences of "shame" and "disgust" found in the literature reviewed may be linked. It has been suggested in the wider psychological literature that disgust may be the primary emotion that evokes the self-conscious emotion of shame [56]. "Basic" emotions (i.e., disgust, sadness) can be distinguished from more cognitively complex "self-conscious" emotions (i.e., shame, embarrassment) which require self-awareness and self-representations [71]. From a child's developmental perspective, young children depend on the external standards of others (e.g., being reprimanded by a parent or teacher for not washing their hands), whereas in older children these emotions are elicited by internalised norms (e.g., self-expectations of hygiene and cleanliness, "I should be clean and wash my hands" [71]). From this developmental perspective, it can be expected that older children's self-conscious emotions could be provoked in relation to WASH by the actions of another (e.g., embarrassment resulting from being teased regarding use of sanitation facilities) or, in the absence of others, may be experienced when the individual violates a perceived social norm (e.g., shame at not being able to dispose of menstrual hygiene products in a socially acceptable way). However, there is a paucity of literature that explores the association between girls' experiences of disgust and shame in relation to WASH.

Providing sanitation infrastructure post-disaster without ensuring regular monitoring, maintenance and cleaning of toilets is insufficient. Beyond the benefit of disease prevention and related illness, the adequate maintenance and monitoring of sanitation infrastructure is necessary to improve psychosocial wellbeing by minimising anxiety over cleanliness and the experience of disgust. This could benefit girls, in particular, as experiences of disgust may also be gendered. There is preliminary evidence from the wider psychological literature that women are more disgust sensitive than men [59]. However, studies on gender disgust sensitivity need to be replicated in non-English speaking settings and samples [72]. Furthermore, disgust is so pertinent to experiences of WASH that it has been harnessed in community sanitation interventions that aim to change hygiene norms, such as reducing open defecation and promoting hand washing. These interventions aim to trigger a strong disgust emotional response, which has been shown to be an effective method of rapidly changing hygiene behaviour [73,74]. However, such interventions have been shown to have unintended negative social consequences, including exaggerating social divisions, reinforcing stigmatised identities and promoting a lack of empathy [72].

4.6. WASH Experiences and Challenges Faced by Girls in Schools

Menstrual Hygiene Management

Stigma was a recurring theme in the menstrual hygiene management (MHM) literature, cited as the issue at the root of many challenges related to MHM [75–78] According to Gottlieb [79], stigma is linked to shame and embarrassment, which, together with lack of information, can act as barriers to physical and mental health and prevent many women from seeking medical attention. Other emotions that studies found in relation to menstruation included fear, secrecy, sexual vulnerability, positive and negative attitudes and sociocultural constraints rooted in myths and taboos [80,81]. Many girls in various low- and middle-income countries reported not being mentally prepared for reaching menarche, including describing feeling disgusted by their period [64]. The literature suggests that the older girls were when reaching menarche, the more prepared they felt, and the less negative emotions they reported. According to Sommer et al. [81] (p. 1) the challenges most girls around the world face in relation to MHM include: *limited or non-existent information prior to menstrual onset; inadequate health education about menstruation and puberty; a lack of social support from teachers and peers for managing menses in school, and from families; and insufficient access to water, sanitation, hygienic materials and disposal infrastructure.* These barriers contribute to pervasive menstruation-related stigma, gender discriminatory physical school environments, enabling behavioural restrictions, feelings of shame, stress and taboo, all of which can hinder girls' education [80].

A systematic review by van Eijk et al. [82] focusing on India found that behavioural restrictions during menstruation are common, especially associated with religious practices and food consumption, but also with other activities such as cooking, household work, exercise and playing, moving in and out of the house and attending social activities. Studies have found that education around menstruation tends to be mostly obtained through mothers, although this may not be girls' preferred source of information and mothers can be prone to passing down their own biases and stigmas regarding menstruation [65,78,80]. Several studies stated that community and male involvement are key to address many of the challenges surrounding menstruation, in particular tackling stigma [78,79,83,84].

A scoping review conducted by Mutiarini and Nuzuliana [77] found that environmental challenges contributing to the poor practice of MHM include poor sanitation facilities in school toilets, lack of MHM lessons and gender discomfort. Similarly, Coast et al. [80] found that negative emotions related to menstruation were associated with issues of MHM around schooling and menstrual blood. Bhattacharjee [85] found that other key challenges include the absence of disposal systems for menstrual waste and separate toilet facilities, especially in relief camps or temporary shelters in disaster situations.

In the Indonesian context, a study by Davis et al. [69] found regional differences related to MHM attitudes and practices within Indonesia: approximately a third of girls in South Sulawesi (31%, 93/299) and Papua (32%, 77/239) believed that the community considers it shameful or taboo to discuss menstruation, whereas this was less prominent in other provinces. Similarly, around a third of girls (34.1%, 102/299) reported that they consider a menstruating girl unclean, compared to only around a tenth in Papua (10.9%) and East Java (9.5%). The study found that MHM attitudes negatively impact school attendance, as school absenteeism was 47% higher for girls who thought menstruation should be kept secret than for those who did not. The study also found misconceptions related to menstrual knowledge, including knowledge relating to physical activity, avoidance of certain foods, menstrual blood containing harmful substances and poor MHM in rural areas compared to urban areas. Existing Indonesian studies solely emphasize personal hygiene in adolescents, i.e., [86], menstrual pain, i.e., [87], and how local traditions are related to menstruation in female adolescents, i.e., [88]. They do not explore emotional implications.

4.7. Environmental, Social and Sexual Stressors

A growing body of literature documents that in many low-income contexts access to WASH involves confronting stressors related to the physical and social environment, which

are likely to be exacerbated by infrastructural damage post-disaster. Sahoo et al. [52] refer to environmental, social and sexual stressors related to sanitation. Similar categories of stressors emerge in a systematic review by Sclar et al. [55]: structural, environmental and social. Research suggests social influence strongly contributes to negative experiences for women and girls in WASH contexts such as social conflict, privacy and social restrictions. Sociocultural factors such as education level, local customs or gender inequality influence such experiences by limiting knowledge exchange and understanding about female issues amongst both sexes, limiting social support for females (e.g., shaming and bullying in schools), and shaping internalised and externally enforced behavioural expectations (e.g., based on tradition, religious policy) (e.g., [68,75,89,90]). Yet, WASH programmes in schools have been found to foster changes in social norms in children [91] in ways that may be passed on to families as children often become agents of change in their households and communities (e.g., [74]).

In post-disaster situations, women and girls are at greater risk of gender-based violence, and according to previous post-disaster emergencies in other contexts, there is a need to address this violence within 24 h after the disaster [92]. During the 2015 Nepal earthquake, there were estimates showing that around 28,000 women potentially required post-rape care services. A response strategy in the area included establishing female-friendly spaces, with linkages to adolescent-friendly information corners in schools and adolescent-friendly service centres in health facilities. Chaudhary et al. [92] (p. 37) recommend that addressing adolescents' sexual reproductive health needs is imperative, including protection against abuse, trafficking, substance abuse and availability and disposal of menstrual hygiene products. It is critical that WASH programmes and interventions, which seek to support women and girls with respect to their WASH needs, consider the practical elements of safe facilities and sustainable access [50], but also seek to foster empowerment by considering power, roles and sociocultural context (see also [93]).

Living in internally displaced people camps or temporary shelters is one of the long-term effects of disaster that may disturb the psychological wellbeing of children and adolescents [6,94–96]. They not only struggle to cope with the traumatic experience of a disaster, but also face greater security risks from being in an unfamiliar and unfriendly environment and can potentially become more vulnerable to experiencing violence, harassment and discrimination, as many shelters are not designed as child-safe spaces [6,94–96]. For example, after an earthquake in Pakistan, girls reported avoiding the shelter toilets, as the toilets were poorly designed to protect from peeping and sexual violence [67]. During the period November 2018–May 2019, the Central Sulawesi Women's Equality Struggle Group (KPKP-ST) of Indonesia recorded at least 20 cases of sexual violence and abuse experienced by children and women survivors, 42 cases of complaints of gender-based violence and 7 reports of attempted rape. Unfortunately, these cases were not pursued legally because of the lack of protection and the helplessness of the survivors [97].

4.8. Barriers to Inclusive WASH Provision

4.8.1. Physical Barriers

During the 2018 tsunami in Indonesia, access to basic water and sanitation services was challenging [98], which is a common occurrence during disasters. In post-disaster situations, the likelihood that infrastructure may be compromised is high. However, there can also be an increased presence of NGOs, leading to improvement of WASH when compared to the situation prior to the disaster. Ahmed [67] investigated the experience of women and girls after the 2005 earthquake in Pakistan. The author's research found there was a new awareness of sanitation, including the value of indoor toilets and running water due to an influx of NGOs. While infrastructure may be a barrier for a period of time after the disaster, it is possible that the acquired knowledge can provide some protection for a future event. Pedro et al. [99] identified 21 sanitation technologies recommended for flood-prone areas that could be grouped under the headings of "dry solutions" and "water flush solutions".

Indonesia has a Child-Friendly School programme that states that schools must be inclusive, gender-sensitive and non-discriminatory [12,100]. Despite describing the physical components of WASH in schools and an MHM programme, the guidelines do not include emotional aspects. Additionally, triggered by the COVID-19 pandemic, the Ministry of Education and Culture of Indonesia released a report of baseline sanitation conditions in junior high schools prior to the pandemic. A set of indicators from the Sustainable Development Goals (SDGs) relating to WASH, particularly for schools, were taken into account to provide a comprehensive analysis on the actual condition (i.e., Kemdikbud, 2020). The aim was to provide a baseline for decision makers in planning, implementing strategic policy, monitoring and evaluating the guidelines in the educational sector [101]. While the report baseline and the WASH school guidelines are a positive step towards improving WASH conditions in schools, it showcases the Indonesian government's priority for assessing school sanitation conditions solely on the basis of physical aspects [14].

4.8.2. Impact on Education

Poor school sanitation facilities may have an adverse impact on the health of students and teachers, which in turn has psychological implications and can interfere with comfort in learning activities [102], especially in schools that implement full-day schooling. A study in the tycoon-prone Philippines found that the availability of water and sanitation is a statistically significant predictor of years of schooling for both boys and girls, but more so for girls [103]. In Bangladesh, the provision of water and sanitation increased girls' attendance by 11% [104,105]. For children aged 9–12, water and sanitation availability impacted girls almost three times more than boys. For students aged 17–20, the differential impact was less though still noteworthy, at 1.5 times more for girls. This finding is not unique. A systematic literature review that analysed the impact of water, sanitation and hygiene interventions in schools in low-income countries corroborated this trend (McMichael, 2019). According to McMichael [106], "improved school WASH conditions may reduce student absence by providing services (including for girls who are menstruating) and by reducing illness transmission".

In a number of regions in Indonesia, including in the province of Central Sulawesi, water scarcity, limited access to sanitation and lack of personal hygiene are still a concern in schools. The poor condition of sanitation and hygiene management and menstrual health in schools is illustrated by the 2016 and 2017 Government Basic Education Data (dapodik) showing two out of three schools in Indonesia have inadequate toilets [107]. As many as 12% or around 17,938 elementary schools in Indonesia do not have latrines. In addition, only 65% of schools have access to water, meaning that 35% of schools (i.e., 75,000 schools) do not have hand washing facilities [108] and 45% of schools nationwide had no access to both soap and water [11]. The condition might be worsened by students' low level of knowledge and awareness of water, sanitation and hygiene as well as their limited knowledge of hand washing techniques, including soap use [109]. In this case, children need help and guidance from parents and teachers, but unfortunately education related to personal (including menstrual) hygiene, water and sanitation is still a challenge for women, especially mothers, who may not have received sanitation education themselves [65,80].

Methodological limitations of studies that investigate the association between WASH and school absenteeism often include looking at full days absent from school, rather than hours of school missed, which is likely to be more prevalent for menstruating girls [69]. There is a lack of randomised control trials (RCTs), as highlighted by a systematic review conducted by Hennegan and Montgomery [53]. The authors state that it can be challenging to conduct RCTs in LMICs, on which most of this literature is based, and that there is a skewed geographical distribution of existing literature. Sclar et al.'s [55] review of the literature on the relationship between sanitation and wellbeing indicates that research is mainly representative of the African context (particularly Kenya and Uganda) and (urban) India. While there is evidence that experiences of girls regarding WASH can apply across

cultures, there is still a need to understand local needs and challenges in order to address issues effectively.

4.9. Holistic Approach to WASH Provision: Practical Recommendations

There is growing recognition that "effective, equitable, and sustainable sanitation interventions need to consider the associated psychosocial vulnerability among girls and women" [64] (p. 2). There is a need to involve girls in the design of sanitation facilities [52]. It should not be assumed that improving toilets will alleviate the psychological and physical challenges girls face [52,64]. Privacy and safety should be focused on when designing interventions, as these have an influence on social and emotional wellbeing [54]. Often the areas surrounding the WASH facilities make girls and women feel unsafe [110,111]. Therefore, it is crucial to understand what aspects of sanitation facilities are problematic and how they can be improved [64] (p. 2). We argue, however, that while meeting girls' practical needs improves their wellbeing, it does not change their status in society [46–48].

Children with disabilities are disproportionately affected in school by inadequate WASH. This is especially pertinent to an LMIC context, where as many as 80% of people with physical and cognitive disabilities live, many of whom are school-aged children [63] (p. 1000). While no data on this issue were found for the Indonesian context, it is widely acknowledged that girls with disabilities face additional challenges regarding WASH access in LMIC contexts [63]. Redman-Maclaren et al. [112] suggest that a more inclusive and holistic approach for girls with disabilities must consider the entire school WASH system, from infrastructure to education. The authors state that this would require considering the local cultural, environmental and social contexts, as well as integrating technical aspects of WASH with local epistemologies and pedagogies.

Emotional constraints of using WASH facilities vary depending on the age of the participants [52]. Therefore, considering how vulnerabilities and mitigation strategies vary across a life span is important, particularly in relation to disaster. For example, younger women are more likely to draw on social support and use toilets in pairs to increase feelings of safety and privacy against men, i.e., one can guard the door/look out for others; other mitigation strategies include changing the time of day of going to the toilet and withholding food/drink or defecation/urination [52] or waiting until no one else is around.

Improvement of WASH facilities in schools also needs to be combined with hygiene and MHM education. In a study using data from eleven countries including Indonesia, symptoms of depression were found to be associated with reduced hand washing in both males and females, while loneliness was associated with poor hand hygiene in girls [113]. As mentioned, poor sanitation facilities can lead to poor MHM practices and increased stigma associated with menstruation [69]. This has implications for post-disaster settings where young people's mental health is likely to be impacted by the disaster, possibly leading to reduced hygiene.

Megaw et al. [48] suggest that participation in decision making can range from collective action and consultation to co-option. The authors suggest the first option as the strongest and most meaningful form of participation, the second option as the middle point of the continuum, and the last as the weakest form of participation. Children's involvement has been successful in reconstruction planning regarding the design of homes to ensure the environment meets their needs [114]. Consulting with girls, young people and other excluded communities, including people with disabilities and people of diverse sexual orientation, identity and expression, on the design or redesign of sanitation infrastructure would be beneficial for designing more inclusive toilets [115,116]. These consultations should be accompanied by respectful public messaging and avoiding stigma [115].

4.10. Limitations

This work has limitations regarding the type of search that was performed. Following a structured literature search is not as comprehensive as a full systematic review. While structured reviews are common, they do not follow standardised steps. The reviewed

literature was not subjected to a quality assessment, despite the majority of the literature being from peer-reviewed sources. Additionally, sources in other languages that were not English or Indonesian were excluded.

4.11. Future Work

More research is needed to understand the various mechanisms that perpetuate unique WASH-related challenges for girls, and whether they are influenced by gender roles and societal norms for Indonesian girls. Overall, while it was found that there was an emotional experience regarding sanitation facilities in the literature reviewed, there is a dearth of research on the psychological experience of WASH in schools in post-disaster settings. There is also a need for further research that explores the association between girls' experiences of disgust and shame in relation to WASH. Additionally, to avoid psychosocial harm, further research must explore how disgust interventions can be conducted in a way that encourages social cohesion rather than the stigmatision of others as "dirty" and creation of further divisions. There is also a need for exploration of how the disaster context affects the psychological experience of WASH. Much of the literature reviewed is in LMIC settings but not disaster contexts. In disaster settings, the loss of resources can be traumatic and distinct from the trauma of the disaster, and there is a need to explore these concepts separately. Moreover, according to Davis et al. [69], despite the plethora of studies on MHM, "there is currently little context-specific research regarding MHM and no published studies on MHM in school settings" (p. 35) in Indonesia, which calls for further research on this topic. Future research should also examine the experiences of boys, and boys' perceptions of girls' issues, for the benefit of both girls and boys.

5. Conclusions

This paper has explored evidence of emotional constraints linked to WASH in schools in LMICs following a structured approach to the literature search. Key themes identified include the psychological experiences of shame, disgust and fear linked to WASH, the challenges faced by girls in schools and the barriers to inclusive WASH provision. The paper highlights that there is a lack of literature and research covering emotive experiences of WASH in disaster and post-disaster settings. On the basis of what has been found in the literature reviewed, key recommendations include the need for (1) interdisciplinary research into the psychological experiences of WASH, (2) increased cross sectoral collaboration on improving inclusive toilet design to reduce physical and emotional barriers to accessing WASH and (3) greater exploration of the Indonesian context regarding the four themes identified. Furthermore, future research should examine the experiences of boys, and boys' perceptions of girls' issues, for the benefit of both girls and boys. Engaging with gender in WASH research and programming, especially in post-disaster reconstruction, can help foster social inclusion, community resilience, sustainable development and increase children's outlook for healthy development, all of which are crucial for gender equality.

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