

ADVANCED REVIEW

Water insecurity and gender-based violence: A global review of the evidence

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Abstract

We reviewed the existing literature documenting the association between water insecurity and gender-based violence to (1) describe the characteristics and contexts of available studies, and (2) identify and classify documented gender-based violence across domains of water insecurity (access, affordability, adequacy, reliability, and safety). 18 peer-reviewed articles mentioned associations between water insecurity and gender-based violence. All studies were conducted in sub-Saharan Africa and South Asia and were published in English. The most common manifestation of the relationship between water insecurity and gender-based violence was an increased risk of sexual and physical violence for women who walked long distances to access water. This was followed by intimate partner violence sparked by the inability to meet domestic obligations due to household water inadequacy. Despite these trends, the domains of water insecurity, and the types of violence experienced by women, were often intertwined. We conclude that there is a dearth of information assessing gender-based violence and water insecurity, especially in Latin America, North America, and Southeast Asia, and involving locally-based scholars. We suggest that the spectrum of what is considered “violence” in relation to water insecurity be expanded and that scholars and practitioners adopt the term “gender-based water violence” to describe water-related stressors that are so extreme as to threaten human health and well-being, particularly that of women and girls. Finally, we encourage the development of cross-culturally validated measures of gender-based violence, which can be deployed in conjunction with standardized measures of water insecurity, to evaluate interventions that target these linked threats to global health.

This article is categorized under:

Engineering Water > Water, Health, and Sanitation

Human Water > Rights to Water

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KEYWORDS

gender-based violence, intimate partner violence, water access, water adequacy, water insecurity

1 | INTRODUCTION

Water insecurity—the inability to access and benefit from affordable, adequate, reliable, and safe water (Jepson et al., 2017)—has far-reaching adverse consequences for social and economic wellbeing, nutrition and health (Rosinger & Brewis, 2020). These repercussions are disproportionately experienced by women and girls who globally bear the brunt of water acquisition, distribution, and related household tasks (Sorenson et al., 2011). A small but growing number of studies indicate that water insecurity increases the risk of gender-based violence against women (see Table 2). The United Nations defines gender-based violence as harm directed at an individual or group based on their gender and highlights that gender-based power differentials place women and girls at risk for multiple forms of violence.¹ In this article, we review the global literature documenting associations between water insecurity and gender-based violence, identify current gaps in knowledge, and recommend future avenues of research to address these growing and linked threats to public health.

2 | BACKGROUND

Research and action to address water insecurity is growing (see reviews by Adams et al., 2020; Hadley & Wutich, 2009; Rosinger & Young, 2020; Wutich, 2020; Wutich & Brewis, 2014), with accompanying developments in our understanding of “what water insecurity is.” Simply put, water insecurity can be defined as the lack of sufficient water of good quality to meet basic human requirements (Ray & Shaw, 2019) and can be broadly conceptualized across the domains of access, affordability, adequacy, reliability, and safety (Jepson et al., 2017).

Drawing from the literature that expands on these water-related domains (Hadley & Wutich, 2009; Jepson et al., 2017; Stevenson et al., 2012) and from the literature presented in this review, we define “water access” as the ways in which individuals or households acquire water: such as through taps, wells, or water vendors. Access also involves the physical conditions surrounding water acquisition and the time necessary to collect water. We conceptualize “water affordability” as the ability to pay for water in ways that do not compromise other household resource needs and “water adequacy” as having enough water, of high enough quality, to meet daily household needs. Finally, we define “water reliability” as water sources that do not fluctuate in ways that inhibit access and use (e.g., unplanned water shutoffs, droughts, and disruptions to water sources) and “water safety” as including both personal safety while acquiring water and the safety (i.e., quality) of water for use and consumption.

A substantial literature is emerging that documents how the multiple dimensions of water insecurity are linked to adverse social, economic, physical, and psychological consequences (Rosinger & Young, 2020; Wutich, 2020). For example, water acquisition requires inherent opportunity costs, such as walking long distances, that disrupt income generation, especially for women (Sorenson et al., 2011). Water-related disasters (e.g., floods and droughts) destroy livelihoods, decimate homes, infrastructure, and crops and create demands on already stressed resources (Calow et al., 2010; Rashid, 2000). Such stresses can tax socially-reciprocal relations (Stoler, Pearson, et al., 2020) and translate into intra-community conflict (Pearson et al., 2021). In terms of health, insufficient water causes dehydration (Rosinger, 2015; Stoler et al., 2019), while consumption and use of poor quality water are associated with diarrheal (Prüss-Ustün et al., 2014) and neglected tropical diseases (Downs et al., 2017), among others (Rosinger & Young, 2020). Mental health is also affected; stress related to water acquisition, use, storage, and management is associated with depression (Mushavi et al., 2020; Tallman, 2019), emotional distress (Cole, 2017; Ennis-McMillan, 2001; Sultana, 2011; Wutich & Ragsdale, 2008), and psychosomatic symptoms (Tallman, 2019).

Water insecurity disproportionately affects women and children, who are responsible for the majority of water carrying, intra-household distribution, and water-related household tasks (Geere & Cortobius, 2017; Sorenson et al., 2011), especially in rural and low-socioeconomic status households (Irianti & Prasetyoputra, 2019). The bulk of domestic activities—including cleaning, cooking, washing, childcare, and small-scale agriculture—all require water and fall predominantly on women (Pommells et al., 2018). Because women bear the primary responsibility for water acquisition

and use, they are more vulnerable to adverse consequences associated with water carrying, such as physical strain (Geere et al., 2010; Geere & Cortobius, 2017), miscarriage (Collins et al., 2019), and attack from animals and people (Kirchner, 2007; Mugumya et al., 2017; Stevenson et al., 2012). Women are also more likely to be shamed and blamed for the inability to meet standards of cleanliness for their homes, children, and families (Chipeta, 2009), even when water shortages that restrict these activities are outside of their control.

Within the larger body of evidence documenting the mental and physical risks women face as they navigate water insecurity, a number of studies indicate that water insecurity precipitates gender-based violence (see Table 2). While anyone can experience gender-based violence, the highest risk groups are women, transgender, and gender non-conforming individuals (WHO, 2016; Wirtz et al., 2020). Additionally, while gender-based violence can include a wide range of harm, the most common categorizations of gender-based violence are physical, economic, sexual, and psychological violence (Heise et al., 1999). As described by Hossen (2014), physical violence includes hits, slaps, kicks, beatings, burns, and the use of a weapon. Psychological violence can entail disparagement or scorn, the enforcement of isolation and/or embarrassing behavior. Sexual violence includes sexual harassment, unwanted sexual touching, and coerced sex. Finally, economic violence refers to the deprivation of access to a variety of resources including money, health care, education, shelter, and food. Although concise, cross-culturally validated measures of gender-based violence are lacking, organizations such as the United Nations and USAID have published reviews and guides for indicators used to measure gender-based violence in a variety of contexts (Janson, 2012; USAID, 2014).

Numerous studies document an association between gender-based violence and water-hygiene related issues such as sanitation (Sommer et al., 2015), open defecation (Belur et al., 2017), and menstruation (Cardoso et al., 2019). However, far fewer explore the relationship between water-specific causes of gender-based violence, especially within a water insecurity framework (Cole, 2020; Jepson et al., 2017; Nunbogu & Elliott, 2021). Therefore, in this article, we reviewed the existing literature documenting the association between water insecurity and gender-based violence with two main objectives. Our first objective was to describe the characteristics and contexts of all available peer-reviewed studies documenting water insecurity and gender-based violence in order to understand the types of studies that exist (location, study design, methodology, and disciplinary perspective). Our second objective was to identify and classify documented gender-based violence across domains of water insecurity (access, affordability, adequacy, reliability, and safety). By pursuing these two objectives, we identify trends and gaps in the literature, which inform our recommendations for future research directions.

3 | METHODS

3.1 | Search strategy

Literature searches were performed in PubMed, Web of Science, GoogleScholar, JSTOR, Scielo, Hinari, PsychINFO, Embase, EBSCO (all databases), SCOPUS, eHRAF World Cultures (all months and years), and Neliti. There were no language restrictions in any database. Co-authors searched Spanish, French, Indonesian, and Arabic manuscripts to ensure global scope of the review. We did not restrict our search by publication date.

Boolean terms were used and search terms differed slightly across databases. Key terms included “Water insecurity” OR “water scarcity” OR “water shortage” OR “water supply” OR “water stress” AND “gender-based violence” OR “domestic violence” OR “intimate partner violence” OR “violence against women” OR “partner violence” OR “marital violence” OR “violence against wife.”

3.2 | Eligibility criteria

We included all peer-reviewed studies that water insecurity and mentions of gender-based, spousal, or intimate partner violence. Any study design was eligible to capture the full range of experiences documented in the literature. No restrictions were applied for population size, characteristics, study year, or geographic location. Any studies specifically capturing water for sanitation and hygiene (WASH) or problems with water (e.g., drought, flooding) but not explicitly addressing dimensions of water insecurity were excluded from the main review. Grey literature and book chapters were excluded from the main review but incorporated into the discussion.

3.3 | Screening

All co-authors were assigned a database to search but relied on the same search strategy and terms (see Figure 1). Each individual conducted a title screen for all results from searches. After initial selection based on the title screen, each individual conducted an abstract screen to determine if an article should be included in full-text review. Once articles were identified for full-text review, authors screened full-text documents for inclusion.

3.4 | Quality assessment

Potential articles were assessed to determine if they met the eligibility criteria outlined by the authors at the onset of the review. Specifically, discussions were conducted to determine whether particular studies on WASH/drought/flooding studies were pertinent. The authors agreed to exclude studies that did not specifically address dimensions of water insecurity. The screening and selection process resulted in 18 peer-reviewed studies that documented associations between water insecurity and gender-based violence.

3.5 | Data coding and analysis

We developed a coding framework a priori from the literature that evolved iteratively while coding and based on co-author feedback. Content coding was conducted using the qualitative and mixed methods analysis program, Dedoose (Version 9.0.18.). We developed descriptors for items such as publication year, authors, journal name, study type, and setting. The second-author did a first pass on coding and the first-author reviewed coding for consistency and inter-rater reliability. Coded excerpts were read to identify illustrative examples of water insecurity and gender-based violence.

4 | RESULTS

4.1 | Search results

The initial search yielded 2460 studies (Figure 1). Title and abstract screening yielded 38 studies (1.58%), after duplicates were removed, 18 studies were eligible for full-text review following the aforementioned outlined criteria. Of these, 14 studies met the eligibility criteria. Identification of related studies (i.e., “hand-searching”) resulted in the addition of four additional studies. Overall, 18 studies met our inclusion criteria and were included in this review (Figure 1).

4.2 | Obj 1: Characteristics and contexts of all available studies

The 18 included studies were published between 2002 and 2021. Most studies were conducted in low- and low-middle income countries, 13 of the identified studies (72.2%) were conducted in sub-Saharan Africa. Among these, eight studies were conducted in rural sub-Saharan Africa, two were cross-country analyses, one was in a refugee context, and two were in urban or semi-urban areas. The remaining studies were conducted in South Asia, with two studies conducted in India, two in Bangladesh, and one in Nepal (Table 1). Figure 2 maps the geographic distribution of the included studies.

Over half of the studies (55.5%) were qualitative and used focus group discussions and interviews. Five studies were mixed-methods. The remainder (16.6%) were quantitative. Studies spanned a broad range of academic disciplines, including public health, medicine, economics, and the social sciences. There were two each in the journals of *Social Science Medicine* and *Violence Against Women*. There were seven articles in health/global health journals, including those that focus on the environment, conflict, and human rights. There were three articles in journals that focus on women/gender studies. The remaining four were found in a variety of social science journals. All the articles were written in English. No articles were found in French, Arabic, Spanish, or Indonesian language journals (Box 1).

4.3 | Obj 2: Water insecurity and gender-based violence across domains of water insecurity

Gender-based violence was documented across all domains of water insecurity (i.e., access, adequacy, affordability, reliability, and safety) and was often the result of insufficiencies spanning multiple water-related domains (Table 2, Box 2, Figure 3). Eleven studies were conducted in areas with chronic water problems (e.g., unreliable access, regular water shut-offs, seasonal shortages). One study was conducted in a refugee settlement, two were conducted after water-related interventions were introduced into the study area, one study was within the context of known arsenic contamination at water points, two occurred in drought or crisis settings, and one multi-site study captured varied water-related problems (Table 2). Below, we draw examples from this literature that further elucidate how water insecurity is associated with gender-based violence in these varying contexts.

4.3.1 | Access

Water access, conceptualized here as how an individual or household acquires water, was the most frequently mentioned driver of gender-based violence (94% of studies). The risk of sexual violence, including harassment, assault, and rape while accessing water sources, was one of the most common concerns expressed across studies (Asaba et al., 2013; Assefa et al., 2021; Barchi & Winter, 2020; Chipeta, 2009; Choudhary et al., 2020; Collins et al., 2019; Epstein et al., 2020; Karim et al., 2012; Logie et al., 2021; Meyiwa et al., 2014; Mukuhani & Nyamupingidza, 2014; Mushavi et al., 2020; Narang, 2014; Pommells et al., 2018; Shah, 2002; Sultana, 2011; Thompson et al., 2011). For example, Narang (2014) found that young girls were verbally harassed when walking to water sources in India, creating a constant atmosphere of fear. Similar feelings of fear and anxiety were expressed by young girls in Cameroon, as they worried about the real threat of physical assault and rape while walking long distances. As a participant in Cameroon stated, “Some children remain out of home right into the ‘unholy hours’ of the night just to fetch water. These children, who are most often young girls, are exposed to such vices as rape” (Thompson et al., 2011; pg. 121).

Aspects of water access associated with gender-based violence included long distances to and isolation at water sources, predictability of water gathering schedules, darkness, and other forms of cover (e.g., brush, grass, and trees) that permitted the targeting of women (Assefa et al., 2021; Logie et al., 2021). Women and adolescent girls regularly walked great distances to obtain water. In some of the studies conducted in sub-Saharan Africa, women reported walking 6 km (approx. 3.7 miles) per day in search of water, spending up to eight to ten hours round-trip collecting water (Assefa et al., 2021; Chipeta, 2009; Mukuhani & Nyamupingidza, 2014). Without accompaniment, “Girls are in danger

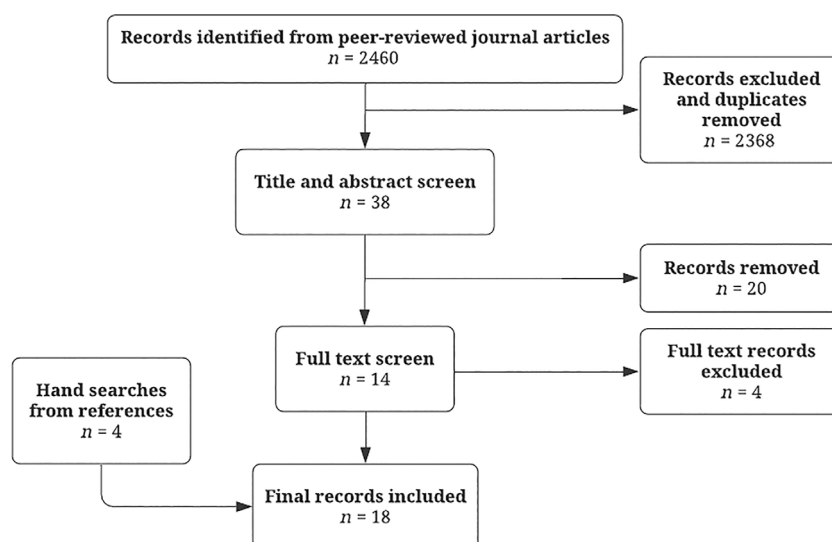


FIGURE 1 Screening and selection process for literature review of water insecurity and gender-based violence.

TABLE 1 Characteristics of studies included in review of water insecurity and gender-based violence ($n = 18$)

Author, year	Setting	Study design	Study type	Participants
(Mushavi et al., 2020)	Rural; Uganda	Mixed-methods	Cross-sectional	Men and women
(Pommells et al., 2018)	Rural; Rwanda, Tanzania, Uganda, Kenya	Qualitative: focus group discussions, key informant interviews	Cross-sectional	Community health workers and healthcare practitioners working in maternal and child health
(Stevenson et al., 2012)	Rural; Ethiopia	Mixed-methods	Two phases (mixed methods-Phase 1; survey Phase 2)	Women
(Meyiwa et al., 2014)	Rural; South Africa	Qualitative: interviews, workshops	Cross-sectional	Women
(Collins et al., 2019)	Rural; Kenya	Qualitative: focus group discussions, Go-along interviews, pile sorts, and photovoice	Cross-sectional	HIV- and HIV+ pregnant and postpartum women
(Assefa et al., 2021)	Rural; Ethiopia	Qualitative: key informant interviews, focus group discussions	Cross-sectional	Government officials, school girls, individuals with disabilities
(Logie et al., 2021)	Refugee settlement; Uganda	Qualitative: focus group discussions, interviews	Cross-sectional	Teenage male and female refugees (16–24 years)
(Thompson et al., 2011)	Peri-Urban; Cameroon	Qualitative: written and oral competition to evaluate impacts of water crisis and possible solutions	Two phases	Adolescent males and females, local water decision-makers
(Mukuhliani & Nyamupingidza, 2014)	Urban; Zimbabwe	Qualitative: observation, unstructured interviews, and questionnaires	Cross-sectional	City council officials from Bulawayo engineering department, local clinic, school heads and representatives of residents associations and non-governmental organizations. Secondary data analysis of newspaper articles, journals, and council minutes
(Barchi & Winter, 2020)	Mixed (DHS data); 20 countries across sub-Saharan Africa	Quantitative	Cross-sectional	Men and women
(Asaba et al., 2013)	Rural; Uganda	Mixed-methods	Cross-sectional	Household heads (male- female-, and child-headed households)
(Epstein et al., 2020)	Mixed (DHS data); 19 countries across sub-Saharan Africa	Quantitative	Cross-sectional	Men and women
(Chipeta, 2009)	Peri-Urban; Malawi	Qualitative: participatory research	Cross-sectional	Women
(Narang, 2014)	Rural; India	Qualitative: focus group discussions, participatory exercises, and key informant dialogues	Cross-sectional	Women

TABLE 1 (Continued)

Author, year	Setting	Study design	Study type	Participants
(Karim et al., 2012)	Rural; Bangladesh	Mixed-methods	Baseline and follow-up	Male and female village leaders; farmers; development workers; households; and married women
(Shah, 2002)	Rural; India	Qualitative: focus group discussions	Cross-sectional	Women
(Choudhary et al., 2020)	Mixed (DHS data); Nepal	Quantitative	Cross-sectional	Household members
(Sultana, 2011)	Rural; Bangladesh	Mixed-methods	Cross-sectional	Adult men and women

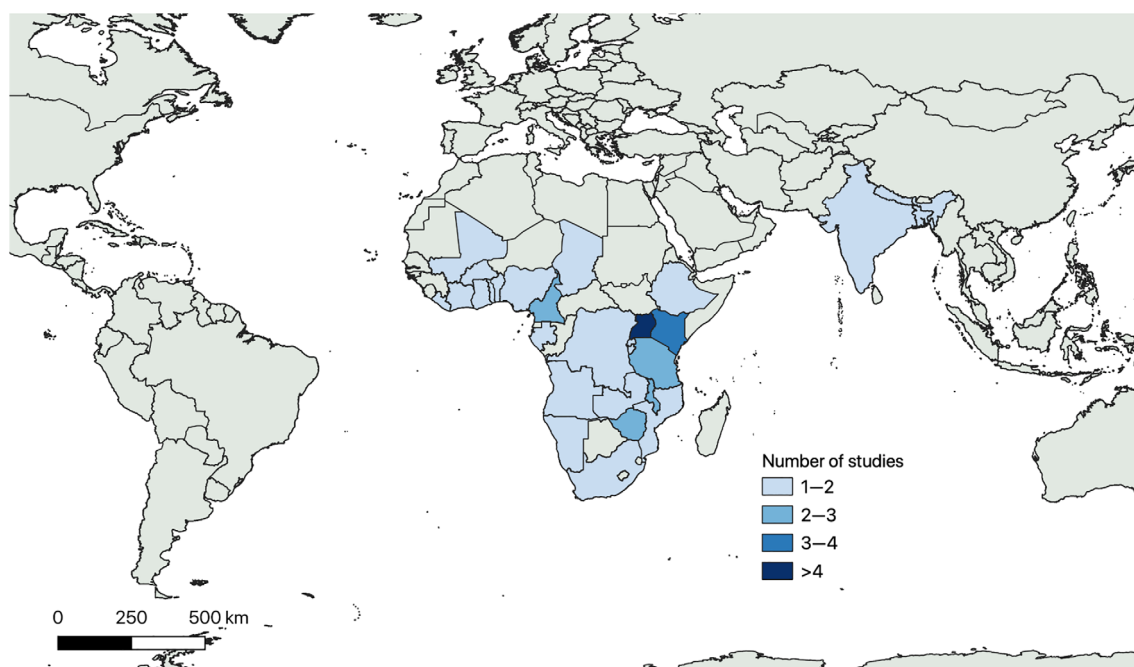


FIGURE 2 Map of study sites for articles that mentioned gender-based violence and water insecurity. Uganda was the most-researched site mentioned, included in six articles.

BOX 1 Recent, interdisciplinary attention to water insecurity, and gender-based violence

Almost half of the studies included in this review were published within the past 5 years. The recency and small number of studies addressing water insecurity and gender-based violence indicate that serious attention to this topic is still emerging. However, the use of mixed methods and interdisciplinary perspectives, demonstrate that this topic is of interest across fields and for scientists and practitioners.

when they go to fetch water, if something wrong happens along the way, we won't be able to do anything for them, as no one will help" (Narang, 2014; pg. 32).

In some settings, gender norms around non-partner sexual violence resulted in forced marriage following sexual assault, rape, and/or abduction. Meyiwa et al. (2014) reported that adolescent girls in Eastern Cape,

TABLE 2 Studies of water insecurity and gender-based violence, specifying water context, and typologies of violence by domain of water insecurity ($n = 18$)

Citation	Water context	Types of violence reported
(Mushavi et al., 2020)	Chronic, poor access	Physical violence between individuals queuing at water points (access); intimate partner violence due to insufficient water in households (adequacy). Failure to meet prescribed gender roles around water collection mentioned as a driver of GBV (reliability, affordability, and access).
(Pommells et al., 2018)	Chronic, poor access	Rape and sexual assault while traveling to water sources, at water points (access); transactional sex between water vendors and women/adolescent girls (access and affordability); Physical violence by intimate partners due to insufficient water in households (adequacy); intergenerational violence related to water collection; poor infrastructure and water quality associated with risk (reliability and safety).
(Stevenson et al., 2012)	Chronic	Verbal disputes with intimate partners due to household water insufficiency (adequacy).
(Meyiwa et al., 2014)	Chronic, within context of discussions around climate change concerns	Sexual assault and rape among women and girls at water points and while walking to collect water (access); prior sources have dried up, making communal taps unreliable; “bride” abductions—abductions of girls leading to child marriage (access).
(Collins et al., 2019)	Chronic	Verbal disputes and physical violence with intimate partners due to insufficiency of household water (adequacy); physical and sexual violence while traveling to water sources at night (access).
(Assefa et al., 2021)	Chronic	Intimate partner violence due to opportunity cost of water collection (adequacy); rape, abduction, psychological, and physical assaults while collecting water (access).
(Logie et al., 2021)	Refugee settlement, pervasive resource scarcity	Sexual assault and rape while walking to water (access).
(Thompson et al., 2011)	Chronic water problems	Fighting between water gatherers at water points; sexual harassment, assault, and rape while walking to water collection points (access). Unreliable and intermittent water supply creating a crisis (reliability).
(Mukuhliani & Nyamupingidza, 2014)	Introduction of water shedding project	Sexual harassment and assault at waterpoints (access), water shortages (reliability) driving long queues.
(Barchi & Winter, 2020)	Varied problems with water	Open water sources were associated with non-partner violence in rural sites across Mozambique, Burkina Faso, and Uganda and in urban areas in Democratic Republic of Congo (access).
(Asaba et al., 2013)	Chronic, poor access	Verbal attacks/insults from male children directed at female children while queuing or drawing water from water points (access) exacerbated by water shortages (reliability). Physical fights between male and female children at water points (access). Sexual assault, rape, threats of rape, and attempted rape among children and women at water points (access).
(Epstein et al., 2020)	Drought	Drought was associated with emotional, sexual, and physical violence (access and reliability).
(Chipeta, 2009)	Water scarcity crisis	Women wake up early to fetch water and are more vulnerable to attack and abuse (access); problems with access are driven by high water charges (affordability), disconnections (reliability), and inconvenient timing of openings of water kiosks.
(Narang, 2014)	Chronic water scarcity	Sexual harassment, abduction, sexual assault, and rape while walking to water collection points (access).
(Karim et al., 2012)	Chronic water scarcity	Physical intimate partner violence as punishment for exceeding time to collect water and not having enough time to perform other domestic

TABLE 2 (Continued)

Citation	Water context	Types of violence reported
		tasks (adequacy). Surface water drying, producing need to seek groundwater (reliability), and many hand-pumps restricted because of arsenic contamination (safety) Physical intimate partner violence when asking for assistance with water carrying (access).
(Shah, 2002)	After implementation of an irrigation management project	Women suffered unspecified “abuse” while collecting water from irrigation canals (access).
(Choudhary et al., 2020).	Chronic water scarcity	Sub-optimal water access is related to physical and emotional intimate partner violence (access) due to challenges in meeting household water-related tasks (adequacy).
(Sultana, 2011)	Arsenic-contaminated water points	Verbal disputes between women at water points (access); punishment against daughters-in-law by in-laws for failing to provide sufficient water on a reasonable timeline (adequacy); verbal disputes with water point owners/gatekeepers (access); and arsenic contamination driving disputes (safety).

BOX 2 Interconnection of water insecurity domains and links to gender-based violence

The most common manifestation of the relationship between water insecurity and gender-based violence was an increased risk of sexual and physical violence for women who walked long distances to access water. This was followed by intimate partner violence sparked by the inability to meet domestic obligations due to household water inadequacy. Despite these trends, the domains of water insecurity, and the types of violence experienced by women, were often intertwined. For example, women who feared household violence (in relation to not meeting water-related domestic duties), were more likely to engage in transactional and exploitative sex to improve their chances of accessing water (Pommells et al., 2018). Figure 3 showcases the types of violence related to water insecurity and visualizes the spatial dimensions of this association, going from the household, to the path back and forth to collect water, to access points.

South Africa, were regularly abducted and raped while walking to water collection points and coerced into child marriage. The community accepted this as “bridal abduction” (Meyiwa et al., 2014). Pommells et al. (2018) found similar phenomena in Uganda, where a female respondent stated, “It’s like a process of marrying. So basically you don’t just accept a man like that, but he has to sort of wrestle with you, and so if he manages to put you down, and kind of rape you, then you marry him. So it’s like a culture” (pg. 5). The cultural normalization of such violence was also expressed in Cameroon, where sexual assault of girls who were collecting water was attributed to female “promiscuity” (Thompson et al., 2011).

Finally, the type of water source accessed by a household influenced the risk of violence. A cross-national study conducted in sub-Saharan Africa found that access to open water sources (in contrast with private sources, such as a well or yard tap) was associated with non-partner violence in urban settings in Cote d’Ivoire, Sierra Leone, Mozambique, Uganda, and Burkina Faso (Barchi & Winter, 2020). Public open sources, private sources not belonging to study respondents, and improved water sources (i.e., protected from outside contamination) were also mentioned in some of the studies as sites for violence. For example, Indian women who accessed water from private wells “narrated experiences of abusive treatment from well owners they have to put up with, as there are no other options” (Shah, 2002; pg. 4418). Similarly, women in Bangladesh reported verbal disputes with water point owners (Sultana, 2011). Improved water sources also had more congestion and longer wait times as many households tried to access this safer source (Asaba et al., 2013). In several studies, improved sources were controlled by men, making these access points sites of sexual violence, rape, and transactional sex (Meyiwa et al., 2014; Mukuhlani & Nyamupingidza, 2014; Pommells et al., 2018).

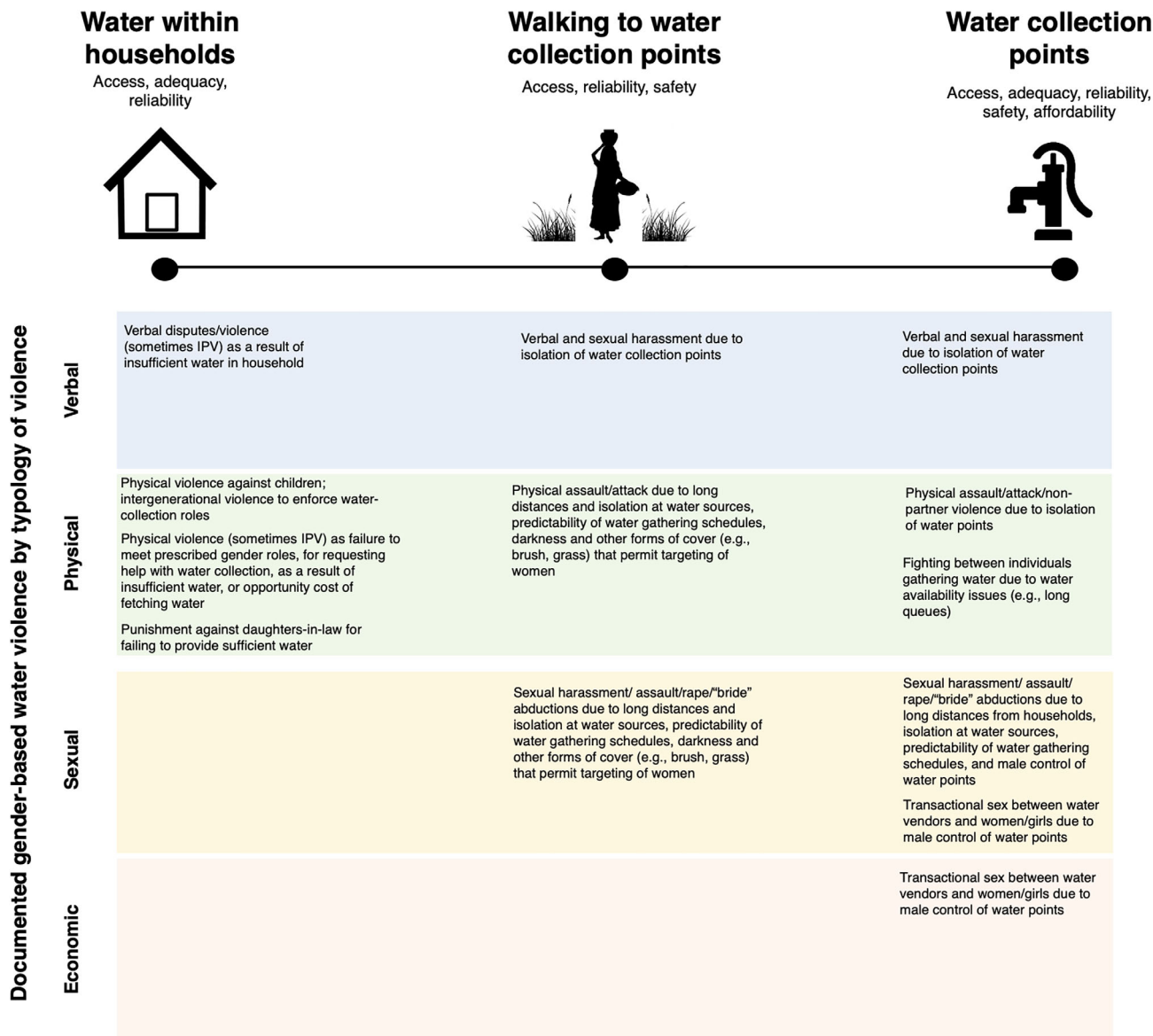


FIGURE 3 Documented gender-based water violence across typologies of violence, place where it occurs, and domain of water insecurity.

4.3.2 | Adequacy

Water inadequacy, which we conceptualize as an insufficient quantity or sub-optimal quality of water to meet daily household needs, was a major driver of violence between women, intimate partners, and other family members (44% of studies). The primary mechanism connecting these phenomena appears to be the opportunity costs of water acquisition that interfere with domestic activities (Assefa et al., 2021; Choudhary et al., 2020; Collins et al., 2019; Karim et al., 2012; Stevenson et al., 2012; Sultana, 2011), and insufficient water within the household for hygiene and consumption (Collins et al., 2019; Mushavi et al., 2020; Pommells et al., 2018).

Regarding opportunity costs, Stevenson et al. (2012) found that Ethiopian women expressed concerns over the time it took to obtain water as it prevented them from doing their household chores such as cooking. Not meeting their household obligations, like preparing food on time, led their husbands to insult and quarrel with them. Collins et al. (2019) documented similar patterns in Kenya, with one woman stating, “When my husband comes home, he wants to bathe, he will ask why there is no water and I tell him that I went and found a long queue...You will quarrel, and the man will ask you what your importance is to the family if you cannot fetch water” (pg. 655). When water is inadequate,

many women cannot meet their responsibilities or contribute in culturally meaningful ways, which motivates verbal and physical abuse (Karim et al., 2012).

The risk for violence in response to water inadequacy extends beyond intimate partners and feeds forward to children and extended family. In a study in Bangladesh, women were punished by their in-laws for failing to provide sufficient water on a reasonable timeline because of the time spent collecting water (Sultana, 2011). In Uganda, Mushavi et al. (2020) found that women created unreasonable water collection expectations for their children due to their own fear of intimate partner physical abuse driven by insufficient household water. As a Ugandan mother stated, “And for me because of the urgency of my chores sometimes I say to them, ‘I am going to spit on the ground and whoever finds my saliva dry, I will beat them.’ ... And so for those who come back when it is late, beatings it is. They will come saying that there was a long line of people ... I feel angry and bad about it and then I wish that if I had water near here, these things would not even happen” (Mushavi et al., 2020; pg. 11). Pommells et al. (2018) echoed these dynamics, stating that if children spent too long collecting water, they were subjected to physical violence and that violence between male and female household heads and toward children sets up an intergenerational pattern of violence, triggered in part by problems with water.

Men appear to intensify water inadequacy, reducing the amount of water available for hygiene and consumption for the household. Assefa et al. (2021) recorded women in Ethiopia, saying that “Males also consume huge quantities of water. They don’t save water and they don’t want to hear advice from us about water saving. One man may consume more than one jerry can for bathing, ahh they do not save and consume the water collected by females. Surprisingly, if we couldn’t make it ready, they may get disappointed or angry to the extent that they may beat us” (Assefa et al., 2021; pg. 6). In Kenya, Collins et al. (2019) found that women tried to avoid verbal abuse by reallocating household water stores to ensure their male partners had enough water for bathing and drinking. This was often to the detriment of their own water consumption. One participant stated “[Your husband] can even use abusive words towards you if he needs water to bathe and can’t get it. To avoid chaos, you give him drinking water to bathe” (pg. 5). This dynamic holds even during physiologically and emotionally vulnerable times, such as pregnancy and in the immediate postpartum period. Expanding on this, a key informant working with Pommells et al. (2018) lamented that a pregnant woman “won’t even have enough water for herself so she might as well end up having maybe potatoes with a cup of water and that makes a meal for the day, but she is expecting [pregnant] and so nutrition at this level goes down ... because she spends so much time [doing chores] rather than concentrating on her health or the health of the baby” (pg. 1856).

4.3.3 | Affordability

Although less commonly mentioned (17% of studies), affordability of water, which we conceptualize as the ability to purchase water in ways that do not compromise household needs, also led to gender-based violence. In Malawi, high water costs and inconvenient water kiosk operating hours inhibited access, driving women to seek water from alternative sources, and placing them at risk for violence while collecting water (Chipeta, 2009).

Fear of not meeting household obligations and provoking violence within the home also increased the risk of sexual violence. For example, Pommells et al. (2018) interviewed health and social care workers from Rwanda, Tanzania, Uganda, and Kenya who reported that girls and women felt coerced into providing sex or sexual favors to gain access to water or advance their position in a water queue. This sexual coercion was perpetrated by men “in good economic positions” who were often overseeing a “project of water wells” or were selling water. Individuals exposed to this violence were young girls or women who did not have money for the water they needed and used sex to get into a better position to obtain it. Themes of transactional and exploitative sex for access to water were reiterated by multiple respondents in their study (Pommells et al., 2018). This example demonstrates that economic, sexual, and physical abuse are linked to issues across domains of access, affordability, and adequacy.

4.3.4 | Reliability

Reliability, conceptualized here as the presence of water sources that do not fluctuate in ways that inhibit access, was integrally connected to other aspects of water insecurity and was described as an upstream driver of problems with access and adequacy in 61% percent of studies. As stated by Thompson et al. (2011), “The less certain the water supply, the more likely it is that girls will need to travel further from home and later into the evening to find water. The

participants identified that this uncertainty provides increased opportunity for the physical dangers of violence such as sexual abuse, harassment, and rape” (pg. 13).

Unreliability of water, and its relationship to problematizing water access, is exacerbated by dry seasons, drought, and high demand. In Eastern Cape, South Africa, Meyiwa et al. (2014) found that water sources that were previously reliable had dried up, driving people to rely on communal taps that sometimes yielded only a trickle of running water. Stated clearly by an informant, “when rivers close by our homes dry up; women and in particular young girls are susceptible to sexual abuse. Circumstances compel them to wake up as early as 3 am to search for water...” (Meyiwa et al., 2014; pg. 102). Women in Kenya also fetched water at irregular hours during dry seasons to get water before it was depleted and expressed concerns about the risk of violence during these times (Collins et al., 2019). In Uganda, unreliable water flows resulting from overuse and natural factors also contributed to water shortages and fighting while waiting in line (Asaba et al., 2013).

Reliability also intersected with adequacy and violence *vis-a-vis* increased opportunity costs for women within the household. A woman in Bangladesh stated, “I went to fetch water from the deep tube well. It took a long time because there was a long line ... but when I came back, I saw that the man (husband) was home. He asked me to serve lunch ... I replied that it took a long time to collect water (as our nearest three handpumps had dried out). But he said that it was my problem if other women can cook on time for their husbands! So when I told him to go to see the deep [deep tube well] ... he got angry and started beating me ... I did not argue anymore; rather, I went to cook.” (Karim et al., 2012; pg. 210). Thus, the reliability of water was the upstream driver of problems with access and adequacy, which were the proximate causes of gender-based violence.

Beyond the aforementioned studies that made clear connections between water reliability and gender-based violence, other studies tangentially described unreliability as contributing to women being placed in risky situations to obtain water from distant sources. For example, Thompson et al. (2011) described how imbalances in supply and demand create a “severe, unreliable, and intermittent water supply” in Cameroon (pg. 5), leading women to walk further to access alternative sources, exposing them to violence. Similarly, in Malawi, power outages contributed to unreliability in water flow and the need to seek other sources (Chipeta, 2009).

Finally, Epstein et al. (2020) hypothesized that drought-related severe water shortages in sub-Saharan Africa created stress that led men to want to control their partner’s movements and behavior, which was a novel pathway proposed that linked water unreliability to gender-based violence. Epstein et al. (2020) also stated that on a larger scale, drought and related water unreliability pushed women to migrate, increasing their risk for emotional, sexual, and physical violence. Issues of climate change, water unreliability, and migration were also addressed by Meyiwa et al. (2014), but not directly in association with gender-based violence.

4.3.5 | Safety

A number of studies discussed the consumption of unsafe water (Assefa et al., 2021; Chipeta, 2009; Mushavi et al., 2020; Thompson et al., 2011), but the only study that directly linked the safety of water to gender-based violence was Sultana’s (2011) study of women in Bangladesh. In this case, arsenic-contaminated water resulted in overcrowding and arguments at safe tubewells. These conflicts caused fear, stress, and anxiety. “As one woman put it, she would rather die from arsenic poisoning than face constant insults and arguments in fetching safe water elsewhere” (Sultana, 2011; pg. 171).

5 | DISCUSSION

In this review, we identified 18 peer-reviewed studies documenting a connection between gender-based violence and water insecurity. This body of research was predominantly conducted in sub-Saharan Africa with a heavy focus on risks posed by walking long distances for water. The relationship between water inadequacy within the household driving interpersonal violence was also salient, particularly in the studies situated in South Asia. Although issues with water access and adequacy were most commonly mentioned, a number of studies cited water unreliability as an upstream driver of water-related gender-based violence. Future research is needed to determine whether other aspects of water insecurity, such as safety and affordability, are linked to increased risks of violence for women and girls, particularly in areas outside of Africa and South Asia.

Our first objective was to describe the characteristics and contexts of all available studies documenting water insecurity and gender-based violence. We found that almost half of the included studies were published within the past 5 years. These articles often used mixed methods and interdisciplinary perspectives. Many of the articles were published in journals with an interdisciplinary scope, such as *Social Science and Medicine*. While the co-authors searched Spanish, French, Indonesian, and Arabic manuscripts to ensure global scope, only articles in English were found that documented an association between water insecurity and gender-based violence. The recency (last 5 years) and small number of studies indicate that serious attention to this topic is still emerging in the literature. Addressing this gap is a high priority, as gender-based violence is prevalent across all continents (Heise et al., 2002), and water insecurity is increasing and extending globally (Boretti & Rosa, 2019). Additionally, while the journals publishing these studies indicated that they are highly interdisciplinary, the bias toward English language publications suggests that more studies by non-English-speaking scholars are needed. Research conducted by scholars from areas affected by water insecurity could offer novel findings and powerful interpretations of those findings (Sultana, 2011).

Our findings that water-related gender-based violence was most commonly reported in sub-Saharan Africa, India, and Bangladesh, supports the known implication that low- and middle-income settings are more frequently examined for water insecurity in comparison to high-income settings (Venkataramanan, Collins, et al., 2020). Similarly, we found that most of the studies included in this review were conducted in rural settings. This mirrors the predominance of rural, in comparison to urban, studies of water insecurity (Venkataramanan, Collins, et al., 2020; Venkataramanan, Geere, et al., 2020). While there are important studies of water insecurity, stress, and health in some urban settings in low- and middle-income countries (Adams et al., 2020; Wutich, 2011), more research in high-income (Eichelberger, 2018; Jepson & Vandewalle, 2016; Meehan et al., 2020) and high wealth disparity settings is needed, with particular attention to the social and ecological drivers of insecurity.

The second objective of this review was to identify and classify documented gender-based violence across domains of water insecurity. We found that gender-based violence occurred across access, adequacy, affordability, reliability, and safety, but not evenly. Access was the most common domain addressed, followed by reliability and adequacy. Affordability and safety were only rarely mentioned as directly associated with gender-based violence. However, it is clear that these aspects of water insecurity are often closely tied to access and inadequacy, indicating that, in reality, the dimensions of water insecurity cannot be fully separated into discrete categories. For example, a lack of reliable and/or safe water led women to wake up earlier and walk further into remote areas to access water. These circumstances increased the risk of rape and/or physical assault while collecting water (Pommells et al., 2018).

Thus, the dimensions of water insecurity that influence risk for gender-based violence are intertwined, as are the types of violence women experience. For example, the most salient type of violence reported in relation to water insecurity was the risk of sexual violence while accessing water. This was followed by physical violence, often perpetrated by intimate partners, in response to water inadequacy in the household. Again, these are not necessarily dichotomized experiences as fear of violence from not meeting domestic duties increased vulnerability to sexual coercion to gain access to water (Pommells et al., 2018).

In the majority of the studies, violence against women was connected to gendered norms that rationalized violence, made water and related household tasks the sole responsibility of women, and limited women's ability to ask for support (Aihara et al., 2016; Karim et al., 2012; Mushavi et al., 2020; Stevenson et al., 2012; Subbaraman et al., 2014; Sultana, 2011). In Bangladesh, women were expected to manage household tasks on time and unconditionally obey husbands, even in contexts of resource scarcity and severe time constraints (Karim et al., 2012). These limitations intersected with norms that make all water-related tasks "women's work." In Uganda, water collecting is a task that is traditionally reserved for women, no matter the level of physical exertion required. Traditional norms have deemed water gathering as "unmanly," shameful, and demeaning, with men facing ridicule that they have been "charmed" by their partners to be submissive (Asaba et al., 2013). Mushavi et al. (2020) reported that in Uganda, even asking a male partner for help is tantamount to witchcraft, and in Bangladesh, it was cited as a rationale for physical abuse (Karim et al., 2012).

Additionally, gendered norms around sexual rites of passage such as "bridal abductions" and paying a "bride price" or dowries serve to further excuse violence against women in connection to water (Meyiwa et al., 2014; Pommells et al., 2018; Thompson et al., 2011). These issues are exacerbated by poverty, with some families accepting "bridal abductions" to benefit financially from "bride price" (Meyiwa et al., 2014). In other cases, paying a dowry solidifies women as "property" and serves as an excuse to abuse women when they cannot meet water-related domestic duties (Karim et al., 2012). Such patriarchal systems justify men's aggression and dominance as "natural" (Choudhary et al., 2020) and put women at further risk of violence when they are unable to fulfill gendered obligations due to water

insecurity (Pommells et al., 2018). An important point linked to gender norms is that scholars and the public are increasingly recognizing that gender is not binary (Dubois et al., 2021). There is serious concern, by both scholars and practitioners, regarding the right to safe and accessible sanitation and hygiene for transgender communities (Ganguly & Singh, 2021). However, more attention to transgender, non-binary, and other gender-fluid categories in research on gender and water insecurity is needed (e.g., Wutich, 2020). Finally, the gendered risks associated with water insecurity likely interact in *syndemic* ways. The term “syndemics” describes synergistic interactions among comorbid health conditions (i.e., epidemics), especially under circumstances of structural and political adversity (Willen et al., 2017). In this case, women who have experienced injuries or been subjected to violence are less physically able to collect water, creating further risk for scarcity in the household and related repercussions for nutrition and health. Water insecurity co-occurs and exacerbates food insecurity (Brewis et al., 2020; Wutich & Brewis, 2014), HIV (Krumdieck et al., 2016; Nagata et al., 2021; Workman & Ureksoy, 2017), and COVID-19 (Adams et al., 2021; Staddon et al., 2020; Stoler, Jepson, & Wutich, 2020). Water is also integral to sanitation and hygiene (Choudhary et al., 2020), increasing the potential for deleterious, *syndemic* interactions between water-related infectious diseases, malnutrition, and dehydration.

Indeed, there are multiple related bodies of research that connect problems with water to women's health that were outside the scope of this review. Specifically, there is substantial water, sanitation, and hygiene (WASH) literature that documents the ways that open defecation, unsafe latrines, and menstrual hygiene needs create risk for gender-based violence (Assefa et al., 2021; Belur et al., 2017; Fisher et al., 2018; Khanna & Das, 2016; Mara, 2016; Mehta, 2013; Truelove, 2011). Risks to women are amplified in post-disaster and humanitarian settings where mass unemployment, migration, and suffering increase tensions and incidents of violence (Alston, 2012; Kirchner, 2007; Rezwana, 2017). While we excluded studies of WASH, drought, and flooding that did not specifically address dimensions of water insecurity, the combined dangers of extreme weather events and poor infrastructure will undoubtedly increase with climate change (Meyiwa et al., 2014; Resurrección, 2019; Sultana, 2011; Watt & Chamberlain, 2011). In all these cases, women and children tend to be the worst affected (Rashid, 2000).

6 | CONCLUSION

In this review, we found that the studies investigating the relationship between water insecurity and gender-based violence conceptualized violence as harm inflicted on one person by another, typically with attention to “conventional” categorizations of violence such as physical, economic, sexual, or psychological violence (Heise et al., 1999). In the future, we suggest that the spectrum of what is considered “violence” in relation to water insecurity should be expanded, with a particular focus on the dynamic relationship between women and children. For instance, water carrying is physically demanding, particularly in areas with rugged terrain (Asaba et al., 2013; Geere & Cortobius, 2017; Stevenson et al., 2012; Venkataramanan, Geere, et al., 2020). These physical demands create multiple manifestations of embodied pain (Sultana, 2011) related to the labor involved in hand-lifting and/or head-loading jerry cans (Asaba et al., 2013; Collins et al., 2019; Geere & Cortobius, 2017; Mushavi et al., 2020; Narang, 2014). Hauling water also places women and girls at risk for injuries (Rosinger et al., 2021; Sorenson et al., 2011; Venkataramanan, Geere, et al., 2020) and micronutrient deficiencies due to the high caloric expenditures of water collection and carrying (Sorenson et al., 2011). Risks of injury, high caloric expenditures, and overall bodily strain are particularly problematic for women who are pregnant, breastfeeding, and/or have small children (Collins et al., 2019; Mukuhlani & Nyamupingidza, 2014). The physical demands of water acquisition create significant opportunity costs for pregnant and postpartum women, putting them at greater risk of domestic violence (Mushavi et al., 2020; Pommells et al., 2018).

Thus, the relationship between water insecurity and conventional forms of violence against women only reveals the “tip of the iceberg”. Underneath the surface is a wider “spectrum of violence” associated with water insecurity, which include WASH-related stressors, extreme reproductive burdens, opportunity costs, and adverse biosocial effects on children. We propose the term “gender-based water violence” to describe these water-related stressors, and others, that are so extreme as to significantly threaten human health and well-being, particularly that of women and girls. Further, we suggest that there is potential for *syndemic* interactions between these water-related stressors and poor health outcomes that may contribute to the developmental origins of health and disease (DOHaD; Goldstein et al., 2017) and the inter-generational transmission of social and health disparities (Hoke & McDade, 2014). We suggest that future work considers these possible interactions, particularly in areas where water is under-researched. This is particularly important

as climate change, environmental degradation, migration, and emerging infectious diseases continue to exacerbate insecurities globally and widen the spectrum of harms producing “gender-based water violence.”

Pushing forward conceptualizations of “gender-based water violence” and investigating the potential for this violence to have intergenerational effects is imperative to understanding the range and depth of harm inflicted by water insecurity. This is particularly important for international organizations such as the United Nations (especially for SDG 5 on promoting gender equality and SDG 6 on promoting clean water and sanitation for all), global funders (USAID, Beill and Melinda Gates Foundation etc.) and implementing partners (such as USAID, OXFAM, etc.), as the current focus on conventional forms of violence obscures the range of harm that results from water insecurity. Without a more complete framing of what constitutes “gender-based water violence,” implementing and monitoring activities will miss the level of social protection that water interventions may yield. Yet the step from conceptual expansion to practical implementation is far from being achieved and much more theoretical and methodological innovation is needed. Anthropology, public health, and aligned environmental and biological sciences have a key role to play in this work and in developing methods that can bring a quantitative component to these issues. Therefore, we applaud continued interdisciplinary efforts to develop and refine cross-culturally validated tools to measure water insecurity (Jepson et al., 2017; Young et al., 2019) and hope to see the emergence of similar cross-culturally validated measures of gender-based violence. Such standardized measures can be deployed to monitor and evaluate community-based interventions that target the linked threat of water insecurity and gender-based violence. Creating connections between science and practice to address “gender-based water violence” is particularly important as rapid environmental and social changes are producing an urgent need to find meaningful solutions.

AUTHOR CONTRIBUTIONS

Paula S. Tallman: Conceptualization (equal); data curation (lead); formal analysis (lead); funding acquisition (equal); methodology (equal); writing – original draft (lead); writing – review and editing (lead). **Shalean Collins:** Conceptualization (equal); data curation (lead); formal analysis (lead); methodology (equal); visualization (lead); writing – original draft (lead); writing – review and editing (equal). **Gabriela Salmon-Mulanovich:** Conceptualization (supporting); data curation (supporting); funding acquisition (equal); writing – original draft (supporting); writing – review and editing (supporting). **Binahayati Rusyidi:** Conceptualization (supporting); data curation (supporting); funding acquisition (equal); writing – original draft (supporting); writing – review and editing (supporting). **Aman Kothadia:** Visualization (equal); writing – review and editing (supporting). **Stroma Cole:** Conceptualization (lead); data curation (equal); funding acquisition (lead); project administration (lead); writing – original draft (supporting); writing – review and editing (supporting).

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

DATA AVAILABILITY STATEMENT

Data sharing is not applicable to this article as no new data were created or analyzed in this study.

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ENDNOTE

¹ unwomen.org/en/what-we-do/ending-violence-against-women/faqs/types-of-violence

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