Water and Development: A Gender Perspective

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Summary

The large and multidisciplinary literature on water for domestic use and gender has two primary foci: (1) the negative health and well-being impacts of inadequate access to safe water, and (2) the effects of women's participation in water allocation and management decisions. These foci are reflected in both the research and policy literatures. Smaller bodies of work exist on water and social power, and on nonmaterial values and meanings of water. The term "gender" refers to the socially constructed roles and identities of girls, women, boys, men, and nonbinary people, but the literature on water and gender to date is mainly concerned with women and girls, on whom inadequate water access places a disproportionate burden.

The water and health literature during the Millennium Development Goals era focused overwhelmingly on the consequences of unsafe drinking water for child health, while paying less attention to the health of the water carriers and managers. Studies on women's participation in water-related decisions in the household or community were (and to some extent remain) mixed with respect to their effects on equity, access, and empowerment. Both the health and participation strands often assumed, implicitly or explicitly, that water work was women's work. Yet data on access was mainly collected and presented by household or community, with little effort to disaggregate access and use by gender.

In keeping with the spirit of the Sustainable Development Goals, the post-2015 literature has gone beyond a focus on infectious diseases to include the psychosocial stresses of coping with unreliable or inadequate water supplies. These stresses are acknowledged to fall disproportionately on women. A relatively small literature exists on the health impacts of carrying heavy loads of water and on the hard choices to be made when safe water is scarce. The negative impacts of inadequate domestic water access on girls' education opportunities, on the safety of those who walk long distances to collect water, and on family conflicts have also been studied. Access is being defined beyond the household to prioritize safe water availability in schools and in healthcare facilities, both of which serve vulnerable populations. Both are institutional settings with a majority-female workforce. The definition of domestic water post-2015 has also broadened beyond drinking water to include water for cooking, sanitation, and basic hygiene, all of which particularly concern women's well-being.

Intersectionality with respect to gender, class, ability, and ethnicity has started to inform research, in particular research influenced by feminist political ecology and/or indigenous values of water. Political ecology has drawn attention to structural inequalities and their consequences for water access, a perspective that is upstream of public health's concerns with health impacts. Research on participation is being augmented with studies of leadership and decision-making, both within communities as well as within the water sector. Critical studies of gender, water, and participation have argued that development agencies can limit modes of participation to those that "fit" their larger goals, e.g., efficiency and cost-recovery in drinking water systems. Studies have also analyzed the gendered burden of paying for safe water, especially as the pressure for cost recovery has grown within urban water policy.

These are significant and growing new directions that acknowledge the breadth and complexities of the gender and water world; they do not simply call for gender-disaggregated data but attempt, albeit imperfectly, to take water research towards the recognition of gender justice as a foundation for water justice for all.

Keywords: women, gender, water, development, access, health, participation, hygiene

Subjects: Policy, Governance, and Law, Management and Planning

Introduction: Why Gender and Water?

An iconic image of unmet development needs around the globe is that of a woman carrying water on her head or balanced against her hips, or both, often with the scorching sun above. This image indeed represents the reality of fetching water for more than 20% of households globally, because there is no water nearby, and because social expectations dictate that women and girls bear the burden of this domestic chore. Recognizing this reality, the United Nations (UN) Sustainable Development Goals (SDGs), the human-rights-based framework of global anti-poverty and development goals, identifies both gender equality and universal access to water, sanitation, and hygiene (WASH) as priorities for the years 2015–2030. In contrast to the Millennium Development Goals (MDGs), the SDGs promote intersectoral cooperation to achieve their aims. The literature on gender and water is informed by a wide range of disciplines, but much of the research remains siloed within fields and subfields. An earlier review (Ray, 2007) concluded that the sparsity of gender disaggregated data and a lack of consensus on how to theorize gender and development has created difficulties in identifying clear policy recommendations for development goals on women and water. To a considerable extent, as this literature review will show, this observation remains salient.

Our review is both guided and constrained by the dominant framings of gender within the WASH literature. Water access has been a global development priority since at least the 1970s, and the research on gender and water is situated within globally evolving contexts and sectoral trends. Beginning in the 1970s, the women in development (WID) approach framed investment in women as "smart economics" (Chant & Sweetman, 2012; Razavi & Miller, 1995). The gender and development (GAD) approach developed in the late 1980s framed gender roles as context-specific, with dynamic gender relations, rather than "women," as key to understanding the connections between women, water, and development. "Gender" framed as binary and heteronormative is a reflection of development practice more broadly (Jolly, 2011). The majority of the WASH literature either treats gender as a neutral category (i.e., it does not explicitly address it), or focuses on women for their instrumental value (e.g., their ability *to fetch* water, *to care* for ill family members, or *to nurture* young children) rather than for their intrinsic worth. This has important implications for how women's access to water is valued within a mainstream development discourse in which calculations of costs and benefits influence investments in water and sanitation.

The objective of this review is to provide a summary of the literature on women and domestic water over the 1990–2020 period, and to call out some of the gaps that remain in this era of ambitious goals for both safe water access and gender equality. The focus is on domestic water,

rather than economic uses of water such as for farming or small-scale enterprises. Access to water for such productive uses is not explicitly considered within the Human Right to Water and does not have its own target under the Sustainable Development Goals; these are the two frameworks drawn upon in this article. Widely accepted guidelines for water quality and quantity needs are also based on domestic uses—drinking (and cooking), sanitation, and hygiene (Gleick, 1996; Howard et al., 2020). Though this review is limited in scope to debates within the WASH sector, there exist significant discussions of gender as it pertains to irrigation water, land and water rights, Indigenous values, symbolic values of water, and women's leadership in water governance (e.g., Agarwal, 1995; Cleaver, 1998; Meinzen-Dick et al., 1997; van Koppen, 1998). The literature on rural women and water for irrigation is particularly important; this literature meaningfully casts women as farmers and producers as opposed to (only) reproducers and caregivers (Zwarteveen, 1997).

Part 1: Toward Improved Access and Gender Equality

Part 1 reviews the evolution of the literature on the state of *access* to safe drinking water, on the negative *health* impacts of inadequate access to safe water, and on the effects of women's *participation* in water allocation and management. Access, health, and participation are the three dimensions of domestic water that have been the focus of national water policies, international development agencies, and donor financing; this literature is thus at the intersection of academic research and policy advocacy. The focus is on studies from approximately 1990–2010, about five years away from the end of the Millennium Development Goals era, during which the global community aimed to halve the proportion of the population without access to safe water, relative to 1990 baseline levels. In 2010, the MDG drinking water targets were declared as met. Later work took a broader view of drinking water and health, a nuanced view of participation and its benefits, a more intersectional approach to gender overall, and considered water use and access in relation to climate change; these aspects are addressed in Part 2.

Frameworks for Gender and Water

By the mid-1970s, it had become clear to scholars, policymakers, and activists that development and modernization were not rising tides that were lifting all boats. Rural women, in particular, were still spending many hours a week collecting water and fuel (e.g., Agarwal, 1983). Women were also the *de facto* managers of water in their households, and often in their communities. Thus, the rights to access, as well as to make decisions over, water resources were gradually recognized as key to the fulfillment of development aspirations as well as to gender equality (Agarwal, 1997; Jackson, 1998; Ray, 2007).

In 1992 the International Conference on Water and Environment was held in Dublin, Ireland. The meeting culminated in four guidelines for the global water sector, collectively known as the Dublin Principles:

- Fresh water is a finite and vulnerable resource, essential to sustain life, development, and the environment;

- Water development and management should be based on a participatory approach, involving users, planners, and policymakers at all levels;
- Women play a central part in the provision, management, and safeguarding of water; and
- Water has an economic value in all its competing uses and should be recognized as an economic good.

Several early efforts to link gender and water emerged after Dublin, in the form of papers, special issues, conferences, and the formation of the Gender and Water Alliance (see, e.g., Lahiri-Dutt, 2006). The Dublin framework linking women, water, participation, and development was augmented in 2000 at the United Nations Millennium Summit, which subsequently gave rise to eight Millennium Development Goals (MDGs). Of these, Goal 3 (promote gender equality and empower women) and Goal 7, Target C (halve, by 2015, the proportion of the population without sustainable access to safe drinking water and basic sanitation) were most relevant to the quest of greater access to safe water for women. The MDGs quickly became the primary framework through which development policy was made, development assistance was meted out, and development progress was compared; this last entailed regular assessments of which countries were "on pace" to meet specific MDGs and which were "failing" (Easterly, 2009).

The Dublin Principles and the MDGs implied that increased access to safe water and greater women's participation in water management should result in (a) improved child health, which was a direct benefit to women because they are so often the primary caregivers in the family and community, and (b) more control in women's hands over how water in the household and community was managed and used. The global development community hoped that better water access, health, and participation could deliver greater autonomy and improved well-being for women in the Global South. From the start, however, there were debates within feminist scholarship on whether "woman-centered" water policies would increase women's well-being or their workloads (Cleaver, 1998). Ethnographic work argued that development agencies cared about women's participation in water projects because water work was women's work, and that participation was approved of in terms set by the agencies as opposed to by women (O'Reilly, 2006; Sultana, 2006). These debates critiqued what were seen as simplistic and essentializing notions of women's roles in water management, and, by extension, in the development process.

The final major framework relevant to women and water in the early 2000s was the United Nations' declaration that safe water was a human right. General Comment 15 explicitly declared that there was a right to safe, accessible, and affordable water for all (ECOSOC, 2002). That safe water was a human right had been argued earlier (Gleick, 1998), but the UN General Comment made this "official" for the community of nations, with particular attention to the rights of traditionally powerless groups and individuals. In principle, rights-holders are individuals rather than households or communities. In practice, however, measures of water access are tracked by households, though resource allocation within a household is always determined by the power balance between its (adult) members (Alderman et al., 1995). We return to this point later in this review. Collectively, the Dublin Principles, the MDGs, and the Human Right to Water functioned as frameworks for many of the women-and-water policies at the domestic and community scales through the MDG era.

Access

The UNICEF and World Health Organization [WHO] Joint Monitoring Program (JMP) definition of *improved* versus *unimproved*, based on whether the construction of the water point protects the source from contamination, became the most widely used indicator of safe water access as the metric for progress toward the MDGs. *Improved sources* include taps or standpipes, borewells/tubewells, protected dug wells, protected springs, or collected rainwater. *Unimproved sources* are unprotected wells or springs, vendor-provided water, tanker trucks, bottled water (due to quantity and price limitations), or surface water (WHO/UNICEF, 2014). By 2002, the JMP estimated that over 80% of the world population used improved drinking water sources, with the lowest proportion of population coverage in sub-Saharan Africa, but the greatest total numbers lacking access (i.e., using *unimproved* sources) in Asia (WHO/UNICEF, 2004).

During this era, research on the gendered burden of water focused primarily on "time poverty" and its consequences, with women and girls contributing significantly more to "household time overhead" through domestic chores such as water-fetching and caregiving for family members with water-related illness (Wodon & Blackden, 2006). Global data showed that women and girls were primarily responsible for water management in most but not all settings (see Hawkins & Seager, 2010, in Mongolia, for an exception).

Economic accessibility, or affordability, was the least clearly defined criterion of access, although it is generally described as an acceptable percentage of income spent on water supply. Although affordability is a logical requirement for access, and various agencies have set affordability thresholds (e.g., 3% of income by the UN Development Programme; 2.5% by the U.S. Environmental Protection Agency), the lack of data for global monitoring led this criterion to be deleted from the MDG target for safe water access (Hutton, 2012). Affordability thresholds, however, do not account for the unpaid, and mainly women's, work of collecting, treating, and storing water; nor do they include the opportunity costs and risks involved in fetching and collecting water (Sorenson et al., 2011). Thus, the financial costs of domestic water likely underestimate its true cost in lower-income settings.

Water access was (and continues to be) measured as a household attribute, with very little data on intra-household disparities in use, and comparable, accurate, and consistently collected data on domestic water use has been rarely available (Gleick, 2003). The 45 countries that reported water access metrics to the JMP early in the MDG era used a wide range of definitions, with various acceptable thresholds for quantity, distance, and/or time to water source (Aiga & Umenai, 2003). The 1992 baseline and 2002 midline JMP reports during the MDG era included data disaggregation by urban versus rural setting, but not disaggregation by gender. The unitary model of the household glosses over gender-specific differences in use, setting of priorities, and practical as well as symbolic values for water within households and communities (see Joshi & Zwarteveen, 2012).

The policy-oriented research on access to domestic water tended to focus on household- and community-scale analyses. However, a more critical literature drew on urban political ecology (UPE) to show how politics and power overall shaped water access at smaller scales. Specifically, UPE scholars argued that flows of water within urban systems followed flows of social power

(Kaika, 2006; Loftus, 2007; Swyngedouw, 2004). UPE research during this period showed how even household water access was a multiscalar phenomenon, but, with few exceptions, focused on class and social status rather than on gender inequality.

Health

Diarrheal disease is the greatest water-related health burden and is the basis for economic estimates of the health costs of unsafe water access (Hutton et al., 2007; Prüss et al., 2002). Diarrhea was the fifth and seventh leading cause of death in 1990 and 2010, respectively, with an especially heavy toll on children under age 5 (Lozano et al., 2012). Mortality in this age group declined enormously during this time, but morbidity remained high, with children in developing countries experiencing several episodes of diarrhea on average each year (Kosek et al., 2003). Women and girls are primarily responsible for providing home-based care during these episodes; the WHO even developed "Mother's Cards," an informational sheet reminding mothers how to treat diarrheal illness in their young children (WHO/UNICEF, 2002). Promotion of home-based management of diarrhea using oral rehydration therapy (ORT) focused on educating mothers about how to prepare and use it (WHO, 1993).

Since 1972, the Bradley Classification has served as a way to broadly define four categories of water-related disease: waterborne (e.g., diarrheal diseases such as typhoid and cholera), water-washed due to lack of water for hygiene (e.g., trachoma), water-based (e.g., schistosomiasis), and water-related with an insect vector (e.g., malaria) (White et al., 2002). Far less attention in safe water research was paid to non-diarrheal disease outcomes, although epidemiologic studies assessed the higher burden they placed on the women as household water managers and fetchers. Compared to men, women experience far higher rates of trachoma, the leading preventable cause of blindness; and caring for children (the age group with the highest incidence of the infection) is associated with greater incidence of trachoma among women (West et al., 1991). Schistosomiasis, spread in freshwater bodies used for chores such as washing clothes, infects women in far higher numbers; female genital schistosomiasis can lead to poor pregnancy outcomes, infertility, and potentially increased risk of HIV infection (Kjetland et al., 2006; Nour, 2010). Outside of these categories of water-related disease, women's increased risk of spinal injuries from regularly carrying 20 kg loads of water on their heads and potential dangers such as drowning or snake bites as they ventured out to collect and use water were acknowledged but not well measured (Faveau & Blanchet, 1989; Geere et al., 2010). The time burdens could impact seemingly unrelated health outcomes as well; in rural South Africa, time spent fetching water significantly reduced the use of prenatal care (McCray, 2004).

Although the MDG safe water goal was declared met in 2010 (WHO/UNICEF, 2012), the use of improved sources, as defined by the JMP, did not necessarily mean the water was safe from pathogens (Bain et al., 2014). Additional recontamination during water transport and storage in the home could result in consumption of unsafe water even with access to a safe source (Wright et al., 2004). To improve drinking water quality and protect it in the home, low-cost household water treatment (HWT) technologies and safe storage strategies were developed and widely promoted during the MDG era (Sobsey, 2002). This was seen as a faster and cheaper safe water solution than could be achieved through construction of centrally treated and piped drinking

water systems, and it was a way to empower households to take control over their own safe water access. Since women and girls are primarily responsible for household water management, they became the *de facto* target population for promotion and use of household water treatment, which includes boiling, filtering, chlorinating, or using solar disinfection to treat drinking water. In fact, the relatively "low-cost" in-home safe water solutions were low cost in part because the labor of (primarily) women and girls that went into maintaining them was unpaid, and was therefore considered "free" (Ray & Smith, 2021).

Participation

Since the 1970s, there has been broad agreement in policy and (mainstream) academic circles on the need to include women in water planning and decision-making. This was the dominant view for water management at the community scale, but perhaps less so for national or transboundary water management. Dublin Principle 3 in 1992 cemented women's participation as a core value for the international water community. Many reasons were proffered: women's participation in water management was said to lead to more efficient and sustainable water use (e.g., Mason & King, 2001; Narayan-Parker, 1989, 1990); women both knew and needed the local water sources, and therefore they should be the loci of decision-making (Mies & Shiva, 1993; Shiva, 1989); and women's participation in water management could increase self-confidence and status in the household and community (e.g., van Wijk-Sijbesma, 1985). Feminist scholars sought to make visible the often uncounted and unpaid work in the domestic and agricultural water sectors that women routinely performed (see Lahiri-Dutt, 2006).

Project reports during this period suggested that the inclusion of women in decision-making over the use of water could, but did not always, lead to better access and more control over local water resources (Cleaver, 1991; Hoffman, 1992; Wood, 1993). Supporters of Dublin Principle 3 argued that water projects without women's participation could neither be equitable nor be a vehicle for empowerment; dissenters pointed out that participation could be "token" and that the empirical evidence did not make clear *on what terms* women's participation actually improved access and control (O'Reilly, 2006; Ray, 2007). Low-level engagement could not sway water decision-making the way more active involvement could, but low-level (and low-influence) engagement that left actual authority in male hands was common (e.g., Prokopy, 2004). In some cases women were expected to act as "natural" protectors and caretakers who could manage community water resources without compensation (Jackson, 1993), so participation based on women's water knowledge and traditional responsibilities could increase women's workload without increasing their well-being (Joshi & Zwarteveen, 2012).

By the end of the MDG era, there was no consensus on whether women's health would measurably improve with better management of water, and several reports had indicated that participation of male community members could also be effective for efficient and sustainable water management (e.g., Prokopy, 2004). Feminist scholars pointed out (not for the first time) that project data was so rarely disaggregated by gender that the impacts of women's participation on their own lives or on the outcomes of a water project were almost inevitably unknown (e.g., Kleemeier, 2000; Zwarteveen, 1998). Scholars and practitioners also argued that equitable access to water for women meant water not just for drinking and health alone, but also for domestic

needs such as food preparation, laundry, and family hygiene (Goff & Crow, 2014). Thus, women could be more willing to manage and safeguard their water resources, and could potentially benefit more from participation, if they had access to water for their full range of needs. This more expansive notion of drinking water became the normative definition within the "drinking water" access goal of the SDG era.

Part 1 Conclusions

Understanding how women's access to safe and reliable water and women's health, participation, and well-being mutually reinforce one another demands gender-disaggregated data from households and communities. The Human Right to Water framework in particular demands a behind-the-scenes examination of water access within the household, though this remains rare in development research and practice (see Part 2). As the international development community moved away from the MDGs and into the SDG era, the calls for disaggregated data on key indicators, and even for new indicators altogether, became more widespread. Calls for including men, boys, and gender nonbinary people in addition to women and girls in gender and water analysis also grew. Research on water and development from 2011 to the present has been more attuned to the gendered nature of all aspects of water access, but, as we show in the following sections, the practice of water policy has yet to catch up with the research frontiers.

Part 2: Toward Universal Access and Gender Justice

By 2010, global water communities of both research and practice were looking ahead to the post-MDG era for frameworks within which to conceptualize sustainable and accessible water for all. The MDGs had already been critiqued for aiming for less than universal access (Langford, 2005), and for becoming, in practice, a way to label countries as being "on pace" or "failing" to meet their targets (Fukuda-Parr et al., 2013). Two frameworks for action came to dominate this period. First, the eight MDGs gave way to 17 Sustainable Development Goals (UN, 2015). Second, the Human Right to Water framework rose to new prominence; this was not a new concept (ECOSOC, 2002; Gleick, 1998), but it was explicitly adopted as a guiding framework for safe and adequate water provision only in 2010 (UN, 2010). Both frameworks are highly compatible in that they emphasize universal access with particular attention to the poorest and most vulnerable. SDG 6, echoing the right to water, explicitly calls for "clean water and sanitation for all" (UN, 2015). Adjacent concepts that emphasize reliability as well as safety and adequacy, such as household water (in)security, have also begun to emerge (Jepson et al., 2017). These frameworks, unlike the older literatures, have collectively shown that the failure to meet the human right to water is not a feature of low-income countries alone; failures can be found in marginalized communities in otherwise wealthy and well-served countries such as the United States (Balazs & Ray, 2014; Heaney et al., 2013; Meehan et al., 2020). Comparative work has also emerged, seeking to understand differences and similarities in dispossession pathways across sites in the Global North and South (e.g., Mehta et al., 2014; Ranganathan & Balazs, 2015).

Broadly reflecting the new(er) frameworks, recent work on gender, water, and development is redefining several older concepts to slowly, albeit imperfectly, give greater recognition to specifically gendered perspectives. These redefinitions are particularly evident in the research on access and health. For instance, within the SDG targets, the JMP explicitly interprets "drinking water" to also include water needed for "cooking, food preparation, and personal hygiene" (WHO, 2017). This is a potentially gender-equitable change as domestic water is a traditionally "female" domain. New experimental studies on safe water have shown the challenges of achieving measurably better health outcomes using household safe water technologies (Cumming et al., 2019; Pickering et al., 2019b). At the same time, water-related health research is expanding beyond its conventional focus on gastrointestinal diseases to the health impacts of waiting for and fetching water, as well as the psychosocial stresses from inadequate household water access. Water for hygiene is prominent in this line of research. These changes can also be seen as gender-inclusive. Attention to occupational and mental health has opened up the unitary household as a unit of analysis and has encouraged researchers to consider a disaggregated model of the household in which intra-household inequalities are revealed and studied. In addition, led by JMP efforts, research on drinking water has gone beyond the household to investigate access in shared facilities, particularly schools and healthcare facilities (washdata.org).

The participation strands of the water literature have started to focus more on women's leadership rather than on participation alone. Participation in water-related activities has frequently been critiqued as tokenistic, so newer studies are investigating the access and equity impacts of women's leadership at all levels of the domestic water and sanitation sector. Drawing on decades of feminist research, as well as on the interlocking-goals premise of the SDGs, a small literature has started to see women and water through an intersectional lens, highlighting the coexistence of gender, ethnicity, indigeneity, age, ability, and class within the same body. We elaborate on these aspects in the following sections.

Finally, we note that climate change is explicitly acknowledged as an existential threat in the SDG era, with climate action included among the 17 development goals. Although climate change may not be a central focus of much of the research discussed in Part 2, scientific consensus indicates it will exacerbate water scarcity in already-dry regions, lead to more frequent natural disasters such as droughts and floods, threaten water quality, and increase the risk of waterborne disease in the coming decades (Intergovernmental Panel on Climate Change, 2014). As the household water managers in much of the world, women and girls will be disproportionately burdened. The recognition of the gendered impacts of climate change has led to the call that there can be "no climate justice without gender justice" (Terry, 2009).

Redefining Access

While the MDG era's binary categorization of *improved* versus *unimproved* focused on water quality, the SDGs introduced a ladder of water service levels. The highest rung is safely managed water, defined as "from an improved water source which is located on premises, available when needed and free of faecal and priority contamination" (WHO, 2017). The rights-based discourse

of the SDG framework and the Human Right to Water brought a normative description of water access to the fore, specifically that domestic water must be "sufficient, safe, acceptable, physically accessible, and affordable" (ECOSOC, 2002). This notion of "deep access" beyond simply the presence of infrastructure highlights the important distinctions between modes of access, toward a more multidimensional understanding of access and its often gendered consequences (Obeng-Odoom, 2012; Subbaraman et al., 2015).

For example, time costs for water, primarily borne by women and girls, can accrue from walking 30 minutes to and back from a tubewell or from waiting at home for a water tanker truck to arrive. Both are considered "improved sources" in the SDG era, yet the different modes of access lead to different hardships and benefits for household and personal well-being. In rural Zambia, households that gained access to reliable piped water accrued significant weekly time savings (primarily to women and girls) and increased their household's food security through household gardens (Winter et al., 2021). In Morocco, households that upgraded from public taps to private household taps used the saved time for leisure and socializing (Devoto et al., 2012). In Brazil, women reported they would use time savings to sleep, rest, or care for their children (Silva et al., 2020). Empirical data from Ghana quantified the time savings benefits for girls' education, with attendance increasing multiple percentage points when water-fetching time was reduced by half (Nauges & Strand, 2013). However, a small set of studies, reflecting long-standing feminist critiques of "woman-friendly" policies, suggested that more reliable access to water did not always reduce women's work; waiting to collect water could attenuate the benefits of more accessible water (Gross et al., 2018), or women might not have autonomy over the use of their saved time.

Once safe water systems were constructed, water safety plans—risk assessment and management strategies—became a widely promoted systems maintenance approach to ensure continued safe water access (Bartram et al., 2009; WHO, 2004). One World Health Organization water safety planning field guide emphatically stated, "Do not forget to involve women!" as they are best able to identify risks because of their roles as primary water collectors and managers (WHO, 2014). Household water treatment (which renders safe water provision a domestic chore) continued as the dominant strategy for ensuring safe water at the point of consumption, although research in this era focused less on developing new technologies and more on motivating correct and consistent use of existing technologies (Wood et al., 2012). A handful of studies on passive, in-line chlorination technologies have begun to offer an alternative to manual household water treatment. These have potential to reduce burdens on women, both by reducing the burden of treatment and by effectively reducing incidence of diarrhea among their young children (Caruso & Sinharoy, 2019; Pickering et al., 2019a). Affordability has remained a poorly defined aspect of water access, although the data show that the poorest households paid disproportionately more for service, often having to gain access through informal means (Hutton, 2012). Feminist scholars have further argued that market-based and cost-recovery-oriented models of water access and management could exacerbate intra-household gender inequalities (Harris, 2009).

Finally, while measurement of access focused primarily on physical proximity to and quality of water supply, insights from feminist political ecology further unpacked the complex social relationships and rules that mediate daily access to and control of water resources (Sultana, 2011;

Truelove, 2011; Udas et al., 2014). This literature builds on critiques of the shift toward privatization and commodification of water, a system which freely benefits from women's domestic labor, conflates women's participation in an era of commodified water with women becoming "modern" (O'Reilly, 2012), and simultaneously marginalizes women who may not control the household budget for purchasing water or water treatments. This is not to deny that, in some cases, some women have benefited from corporate-meets-community modes of water supply (Cheng, 2015). Yet, as climate change threatens potable water sources (e.g., through droughts that leave wells dry or floods that spread fecal contamination), Sultana (2014) points out that, while social expectations may require women to find other, perhaps farther, sources to secure safe water, restrictions on women's mobility outside of their homes and lack of control of financial resources place them at heightened vulnerability during climate-related disasters. In other words, it is women who will simultaneously bear the greatest burden and have the least ability to adapt.

New Evidence on Water and Health

Research continued to focus primarily on water-related pathogens, evaluating the impacts of safe water on the physical health of children and involving mothers mainly through their instrumental role as caregivers. Sorenson et al. (2011) write that despite the central role of women in safe household water management, when it comes to health research, the "water fetchers are almost secondary to the water itself." The focus remained largely on child health, as WASH researchers worked to understand specific transmission pathways and the particular pathogens responsible for disease outcomes in children (Kotloff et al., 2013), as well as the links between nutrition, diarrhea, and child growth and development (Arnold et al., 2013; Humphrey et al., 2015). However, research on women's health has begun to recognize women's unique health challenges, beyond "maternal and child health" and "sexual and reproductive health," which had been the dominant framings of women's health in prior decades (Langer et al., 2015).

The results of three large randomized controlled trials, evaluating the impacts of WASH on child diarrhea and growth, showed no impacts of water treatment, though sanitation and hygiene interventions reduced diarrhea in one setting (Humphrey et al., 2019; Luby et al., 2018; Null et al., 2018). The trials enrolled pregnant women so that infants would receive the interventions from birth, and the expected success of the trials relied on these women as the primary caregivers and implementers of the household-level water treatment, hand hygiene, and sanitation interventions. The mostly null primary results of these trials have motivated the idea of "transformational" or "transformative" WASH, concluding that traditional WASH interventions are insufficient to reduce pathogen exposure in highly contaminated settings and suggesting that WASH improvements at scales beyond the household level, such as community-level infrastructure and service provision, may be required to improve health (Cumming et al., 2019; Pickering et al., 2019b). Notably, relatively little data in these studies was collected on the mothers.

Although safe water access has mainly been considered an LMIC (low-and-middle-income country) issue, the "universal access" mandate of the SDG era brought greater attention to water and health in marginalized communities in high-income countries as well. Some chemical

contaminants of concern (e.g., lead in Flint, Michigan (Hanna-Attisha et al., 2016); nitrates in California's Central Valley (Balazs et al., 2011)) can be particularly consequential for pregnant women or infants. Finally, frameworks have emerged within the health literature for gender-transformative approaches to health promotion; they are not simply "gender accommodating," but rather an attempt to transform harmful gender norms to eliminate the underlying social determinants of gendered health inequities (Pederson et al., 2015), such as those resulting from gendered water- and sanitation-related behaviors and burdens (Caruso et al., 2017).

Women's Health: Cumulative Physical Burdens on Women's Bodies

The integrated framework of the SDGs parallels increasing attention to the "linked burdens" faced by women through their lived experiences (Caruso et al., 2015). The focus of water and health studies has overwhelmingly remained on diarrheal diseases and child health, but more research has begun to connect water access with the multiple burdens on women's bodies. Pregnancy is one such burden. Data across multiple countries show that water fetching by women and girls is associated with reduced use of antenatal care (Geere et al., 2018; McCray, 2004). Women in western Kenya associate pregnancy complications with carrying heavy water loads (Collins et al., 2019), and women in Uganda have described how pregnant women, tired but still expected to fetch water, would fall behind on chores and end up with less food and water for themselves at a time when they have increased caloric and water needs (Pommells et al., 2018). HIV is yet another burden. People living with HIV (PLHIV) are more susceptible to infections from water-related pathogens, yet their care requires greater volumes of water for hygiene and medication (West et al., 2013). In sub-Saharan Africa, where water scarcity is greatest, the majority of new HIV infections are among women, who are simultaneously responsible for the home-based care of ill household members (The Lancet HIV, 2019).

Globally, the data clearly show women and girls do the majority of water fetching (Geere & Cortobius, 2017), yet the physical health consequences of this enormous burden are not well quantified. The musculoskeletal pain or injuries that can result from carrying heavy loads of water on heads, hips, or backs are not reflected in global estimates of morbidity and mortality due to inadequate water (Sorenson et al., 2011). In Brazil, women reported that carrying heavy loads on their heads could cause wounds, even bleeding (Silva et al., 2020). Thirteen percent of households across 21 LMICs reported a water-fetching injury, including from falls, accidents, animal bites, simply from using the water source, and even physical confrontations when attempting to access water; women were more likely to report an injury (Venkataramanan et al., 2020). Researchers have pointed to a continued sparsity of data on sexual assault against women during water fetching (Pommells et al., 2018; Sorenson et al., 2011). Studies in Nepal and Kenya have also linked water insecurity with intimate partner violence, a gendered pattern that has been reported under scarcity of other household resources such as food (Choudhary et al., 2020; Collins et al., 2019). These observations, amongst others, have led to a small but significant feminist political ecology literature that highlights the embodied nature of water access and water scarcity; how water scarcity is experienced is a gender-specific bodily phenomenon (Truelove, 2011).

Broadening Outcomes to Psychosocial Health

Current research on water and health has broadened beyond water-related diseases to consider mental health and stress from lack of adequate, accessible, and affordable water, with an emphasis on women rather than children. Early work from "squatter" settlements in Bolivia showed that inadequate access to water and water conflicts produced emotional distress in women, many of whom expressed fear of running out when water shortages resulted in overt interpersonal conflicts (Wutich & Ragsdale, 2008). Both men and women reported water-related stress during severe shortages in Mozambique, with women feeling that they could not be good wives when there was no water in the house (van Houweling, 2016). Similar associations of women's mental distress and water scarcity have been found in rural Ethiopia (Stevenson et al., 2012). Survey results of urban households in India with piped but unpredictable and intermittent water services found (mainly) women reporting that they frequently had low-level worry about water arriving on time (Kumar et al., 2018). Studies have argued that mental health stressors from water insecurity are similar to those from food insecurity: anxiety from, and coping with, insecure supplies are necessary in both cases, and similar methods of measurement could prove useful (Stevenson et al., 2012; Wutich & Brewis, 2014).

Other than anxiety, the emotions of indignity and shame from unsafe WASH have given rise to a rich ethnographic literature. Low-income women face stress and fear of sexual assault when seeking safe sanitation or carrying water over distances (Sahoo et al., 2015); women find themselves torn between fetching water from outside sources and taking care of home and family (van Houweling, 2016); and girls struggle with shame when they are in school, without WASH supplies, when they are menstruating (McMahon et al., 2011); see the section "Water for Hygiene". Overall, multicountry, multidisciplinary reviews have confirmed that women carry disproportionate psychosocial burdens when they do not have adequate and accessible water supplies, but that these aspects are not always "counted" and operationalized as health impacts (Bisung & Elliott, 2016; Wutich et al., 2020). Emotions (such as shame) are also embodied phenomena that lead to gender-specific claims and priorities (Doshi, 2017).

Water-induced stress is not an exclusively LMIC phenomenon. The environmental justice literature has repeatedly shown that poor communities in the United States also experience these stresses. For example, respondents in a Letcher County, Kentucky, study with coal mining pollution in the water supply reported shame and low self-esteem because they smelled bad and had dirty clothes in church and at school (Blakeney & Marshall, 2009). Flint, Michigan, residents whose water service had been cut off similarly reported the "ripple effect, mentally and physically," of shame at being unable to pay their bills, having to shower at other people's homes, or their children smelling bad and being embarrassed at school (Amirhadji et al., 2013). Most of these respondents were women. More broadly, the development literature has leaned on insights from cognitive science to pay more attention to poverty itself as an underlying stressor. This connection has led researchers to argue that basic services, such as water and sanitation, have to be made not only affordable, but also convenient and reliable, for low-income households worldwide (Mullainathan & Shafir, 2013). Relieving stress and mental tension through more readily accessible water supplies can thus be seen as improving both public health and gender equality.

Water for Hygiene

The literature on water for hygiene comprises both hygiene in the "traditional" sense (i.e., handwashing and bathing), as well as the specific subfield of menstrual hygiene management (MHM). While the MDGs included indicators for water and sanitation, the SDGs include hygiene-related indicators as well—specifically for handwashing facilities and sanitation facilities that pay "special attention to the needs of women and girls" (UN, 2015).

The SDG indicators include the presence of handwashing stations with soap and water. Evidence shows that handwashing can significantly reduce diarrheal disease (Curtis & Cairncross, 2003; Freeman et al., 2014), yet an estimated quarter of the global population lacks hand hygiene facilities at home (Brauer et al., 2020). Numerous studies and campaigns have encouraged mothers to wash their hands at critical times (e.g., before preparing food) to reduce illness in their children (Nizame et al., 2013; Scott et al., 2008). Curtis et al. (2009) found that a desire to nurture children could be an effective motivator for mothers to wash their hands. During the COVID-19 pandemic, handwashing was heavily promoted to prevent the spread of SARS-CoV-2 (WHO, 2020) in LMICs as well as in high-income countries, although it was pointed out that women and girls in LMICs could be more exposed because of their water-fetching roles, such as while waiting at crowded water points or touching frequently used taps or handpumps (Freeman & Caruso, 2020).

Notably, SDG 6, Target 2 acknowledges gendered sanitation and hygiene needs (SDGs). While much of the work in the subfield of MHM focuses on the design of safe, private toilets, adequate MHM requires access to water for washing and bathing, in addition to water for cleaning reusable menstrual products. For example, a handful of studies have evaluated the acceptability of reusable menstrual cups, which may offer a more financially and environmentally sustainable alternative to repeated purchases of disposable pads, but which require water for proper cleaning (van Eijk et al., 2019). Poor water access has been linked to increased urogenital infections (Das et al., 2015), and researchers applying a life-course perspective have pointed out that women need water to manage vaginal bleeding for reasons other than menstruation, such as miscarriage or cancers (Sommer et al., 2017). For menstruators, who include transgender and nonbinary persons who menstruate, a lack of latrines with water access poses a significant barrier to gender equality, by restricting mobility and full participation in public life. This lack of appropriate latrine access has been the main entry point through which the needs of transgender individuals have received recognition in the water and sanitation literature (Human Rights Council, 2012). Menstruation is also a time when gender and water access needs can intersect with religion or caste. Research from Nepal, for example, has documented the (officially banned) Hindu practice of *chhaupadi*, which, among other exclusions, can restrict menstruators from touching their normal water source to avoid spreading "impurity" (e.g., Baumann et al., 2021; Nightingale, 2011).

Beyond the Household: Water in Shared Spaces

In the SDG era, water access goals expanded beyond the household, including public spaces in the normative definition of "universal access" (WHO, 2017). In 2019, the UN Special Rapporteur on the Human Rights to Drinking Water and Sanitation released a report clearly laying out how

multiple SDG objectives rely upon equitable access to water in public spaces (Human Rights Council, 2019), a fact acknowledged in General Comment 15, which stated that water "is a prerequisite for the realization of other human rights" (ECOSOC, 2002). Although "public spaces" should expansively cover all spheres on life beyond the household (Human Rights Council, 2019), specific SDG targets for quality healthcare services (Target 3.8) and gender-sensitive and inclusive learning environments (Target 4.A) have motivated particular attention to healthcare facilities and schools (Chatterley et al., 2018). We note that these institutional settings leave out some of the most vulnerable populations—for example, women experiencing homelessness or incarcerated populations.

Schools

In the SDG era, the JMP is tasked with tracking progress in schools toward a "basic" service level for drinking water, sanitation, and hygiene (WHO/UNICEF, 2018). In their 2020 progress report, the JMP reported that nearly 600 million children lacked water at school, with regional estimates of basic water service coverage in schools as low as 44% in sub-Saharan Africa (WHO/UNICEF, 2020). Prior research has shown that safe water provision in schools can reduce both absenteeism and illness across genders (Jasper et al., 2012), but the lack of water to manage menstruation takes a particular toll on girls' attendance. McMahon et al. (2011) found that Kenyan schoolgirls would go home to manage their periods, often missing multiple days of class; the lack of toilets and water for personal hygiene at school made period management difficult and shame-inducing. "Basic" water access on school premises is not enough for gender inclusion—water must also be reliably accessible to girls inside latrines (Jewitt & Ryley, 2014; Mahon & Fernandes, 2010). We note that the timing of these impacts is important—school absence on account of a period is relevant mainly for secondary school attendance, and educational research has shown that additional years of school, beyond primary education, are associated with girls being better able to articulate and advocate for their rights (Unterhalter, 2013).

Healthcare Facilities

Starting in the SDG era, the JMP is also tasked with monitoring progress on WASH goals in healthcare facilities, with an aim toward a "basic" service level (WHO/UNICEF, 2019). Not only are healthcare facilities spaces where women access necessary medical care, they are also important workplaces for women. Although drastically underrepresented in leadership positions, women make up an estimated 70% of the global health workforce (International Labour Organization [ILO], 2017). During the MDG era, there was a big push toward health facility deliveries, rather than home births, with the expectation that this would reduce the high rates of maternal mortality in LMICs (Campbell & Graham, 2006). Yet maternal mortality remained high and vastly unequal across settings: 16 maternal deaths per 100,000 live births in high-income countries versus 230 in LMICs on average (Velleman et al., 2014).

By 2018, health facilities accommodated 76% of births, but poor hygiene conditions continue to compromise potential benefits and can dissuade mothers from delivering at facilities (Bouzid et al., 2018; Velleman et al., 2014). Approximately 10% of pregnancy-related deaths globally are due

to sepsis (Say et al., 2014), and water has long been recognized as crucial for infection control and prevention. In Nepal, where infection is a leading cause of neonatal death, neonatal mortality was reduced by 41% when both birth attendants and mothers washed their hands with soap and water (Rhee et al., 2008). In rural Rwanda, even a single day of water shortages at a healthcare facility more than doubled the likelihood of infection among women following cesarean sections (Robb et al., 2020). WHO guidelines recommend 100 liters/intervention as the minimum water quantity required in a maternity unit (Adams et al., 2008), yet an estimated half of all healthcare facilities in LMICs lack piped water (Cronk & Bartram, 2018). Women about to give birth may even be required to bring their own water (Belizan et al., 2020). Finally, apart from the physical infrastructure, there is increasing recognition of health facilities as strategic settings to educate new mothers in water-related health behavior change, for example by bundling antenatal care with promotion of household water treatment (Wood et al., 2012).

Beyond Participation, Towards Leadership

Based on Dublin Principle 3—"Women play a central part in the provision, management and safeguarding of water"—the early literature called for attention to women's leadership as well as (general) participation. Participation, loosely defined, could range from intense participation, to significant unpaid project work (van Koppen et al., 2012), to token (and silent) attendance at meetings (Prokopy, 2004). Moving more firmly beyond participation and towards leadership, the newer literature is still small, but growing. At times the literature on this theme walks a fine line between analysis and advocacy. Among the more optimistic findings, an early paper by Chattopadhyay and Duflo (2004), drawing on a natural experiment in rural India, found that women political leaders, such as Village Council leaders, tend to increase investments in infrastructure and basic services, such as roads and drinking water. Another study, based on the same experimental conditions, reported that gastrointestinal health outcomes improved in villages with women leaders who invested in better access to drinking water (Dongre, 2010). There is some evidence that gender-equalizing basic services-oriented priorities are also reflected when more women are represented in national-level leadership (Jalal, 2014). Nonetheless, even when women are in leadership positions, many cultural and educational barriers exist to translating these positions into effective or changed practices. Constant negotiations between expected duties at home and expected duties at work make even women leaders in the WASH sector less influential in decision-making (WSUP, 2020). Despite gender-aware national policies and greater awareness of the need for women's leadership in urban and rural water systems, women routinely find themselves occupying lower-rung positions in the water sector (Adams et al., 2018; WSUP, 2020) and even excluding themselves from public or prominent positions in order to remain socially acceptable (Sultana, 2009). On the other hand, researchers have documented cases where women in leadership positions in community-based water governance successfully enhanced their skills and self-confidence, even when project outcomes per se did not measurably improve (Das, 2014).

Mainstreaming efforts have been only partially successful, and mandatory inclusion rules imposed by NGOs and donors do not take into account social barriers and constraints, even when these are well known (Cairns et al., 2017; Cornwall & Rivas, 2015). The critique that broader

political dynamics constrain and shape women's participation possibilities is a key argument in the urban political ecology (UPE) literature. Including women in water-related decisions is not the same as challenging gender-unequal norms, but metrics of inclusion are quantifiable for policies that demand "mainstreaming" (Joshi & Zwarteveen, 2012). In many such efforts, women are expected to be participants and leaders, but little is asked by way of changes in men's behaviors and expectations. Such policies implicitly expect that women will either work for or pay for water systems that are responsive to "their" needs (O'Reilly, 2012). Other efforts at claiming water rights, such as protests by loud groups of low- and middle-income women, are forms of participatory action that are made invisible by approved and "modern" online portals to register grievances (Ranganathan, 2013).

These studies have led some scholars to argue that women as a single category is not the right categorization with respect to water and gender. Women's leadership possibilities in practice depend on class, marital status, age, asset base, and ethnicity; therefore, the potential for and impact of women's leadership in the water sector are not homogeneous across, or even within, study sites. For instance, poor and marginalized men as well as women can be excluded from decision-making authority (Sultana, 2009). Land tenure and land title may determine who gets a voice in water users' associations, thus placing low-income women at a disadvantage, as reported from countries as different as Argentina and Ethiopia (Agarwal, 1995; Imburgia et al., 2021). A rich ethnography from the water wars of Cochabamba, Bolivia, documents the courageous leadership and resistance of respected women but finds that these same women resorted to homophobic taunts to shame their menfolk into confronting state-sanctioned violence (Laurie, 2011). In sum, this body of work shows that women's leadership in water cannot be treated as an apolitical and comforting "good-for-everyone" policy. Many facets, and many enabling and disabling conditions, determine the prospects for women's leadership and potential to effect transformative change. These nuances—with a few exceptional case studies—remain under-researched within the WASH literature (Dery et al., 2019).

Water and Intersectionality

The awareness of gender as but one characteristic among many others, all of which collectively determine women's capacities and opportunities in the (water) world, has led to a small literature analyzing women's experiences in the water sector as not simply gendered, but intersectional. Several examples have already been discussed in earlier sections. Intersectionality recognizes that women (and all genders) hold multiple simultaneous identities: race, Indigenous status, socioeconomic status, marital status, ability status, and so on (Crenshaw, 1989). These identities intersect to make women's water access more or less available, or participation and leadership more or less feasible. If multiple marginalities are represented in one individual, as with low-caste women in India, for instance, their experiences with respect to water access may be even more challenging (Cleaver & Hamada, 2010; Joshi, 2011). Sultana (2020), based on an ethnographic study of Dhaka's largest slum, has argued that struggles for and claims to water are, in effect, struggles for and claims to urban citizenship (see also Appadurai, 2001). She finds that the exclusion of women from equal participation as citizens, and thus as deserving of reliable water as "proper" citizens are, is exacerbated by poverty and migrant status. In a completely

different context, a study on the WASH sector in Kenya found married women managers to be doubly disadvantaged in their careers: On the one hand, if they worked late, their husbands and sons constantly called them, and on the other hand, if they were young, their bosses were reluctant to promote them for fear of future pregnancies (WSUP, 2020). Intersectionality is not invariably about a constellation of "disadvantages." An insightful study of community organizers against water privatization in Bolivia showed the nuances of intersectionality: Indigenous status was often a marginalizing factor with respect to the state, but, within the community, respected women (*supermadres*) became powerful rallying forces and leaders in the movement to preserve water access (Laurie, 2011).

Indigenous scholarship and leadership, while marginalized within WASH policy in general, have offered alternative visions and philosophies to conventional academic and "settler-colonial" views of the relationship of gender, water, and rights. The key point of departure in this body of literature is the reciprocal and inalienable relationship between people and water: a view from the river rather than of the river (Yazzie & Baldy, 2018). This is a literature of struggle and resistance rather than one of participation (Middleton-Manning et al., 2018). In these visions, the work of Indigenous women scholars questions the very notion of safe drinking water "for all" as it is conventionally described, because "the water we drink is the water that salmon breathe" (Todd, 2017). Disability is yet another intersection with gender. The SDGs have argued that disability is a cross-cutting vulnerability across several goals and targets. The WHO estimates that approximately 15% of the global population faces some form of disability (WHO, 2011). Disability prevents easy access to WASH facilities, especially to sanitation, but is also associated with longer times to fetch water from public water sources (Banks et al., 2019), and with greater difficulties in accessing enough water not just for survival but for maintaining productive employment (Wrisdale et al., 2017). These are examples of gender, age, disability, and low-income status co-occurring; pain, incontinence, and other discomforts are also experienced by women fetching water in such circumstances (White et al., 2016). Cross-country comparative research has found that even when households with disabled members do not have lower access than other households, disabled members within their households are disadvantaged (Mactaggart et al., 2018). This finding provides yet another confirmation of the need for disaggregated WASH access data, instead of data that uses the unitary household as a unit of analysis.

The socially constructed and intersectional nature of women's experiences have led UN agencies to call for bundled investments in water, sanitation, and household energy as urgent priorities for health, sustainability, and gender equality (UN Women, 2014). At the same time, feminist scholars such as Cornwall and Rivas (2015) have argued that broader alliances with social justice movements, based on principles of inclusion and nondiscrimination beyond gender, may be more effective and politically salient than an exclusively gender-centric framework for realizing the potential of women's inclusion and leadership in key sectors. Intersectionality in gender and water is also shaped by natural-ecological forces and not by social forces alone (Thompson, 2016). These calls for broader coalitions appear philosophically aligned with the work of feminist geographers and political ecologists, who, working through the lens of water access, have argued that gender itself is socially constructed through access to water, control of water resources, and through its intersections with social status, home ownership, land tenure, and employment status (Harris et al., 2017; O'Reilly et al., 2009).

Part 2 Conclusions

The SDG service ladder, the human right to water, and the gradual recognition of intersectional identities have motivated an increasingly multidimensional understanding of access beyond simply infrastructure coverage. The health literature continues to focus primarily on diarrheal disease among children, but research has begun to unpack causal pathways to identify cost-effective, impactful interventions. Null results from large-scale randomized controlled trials of traditional water quality improvement strategies are opening up a larger conversation about the need for "transformative" or "transformational" WASH, a concept that calls for ambitious interventions—beyond the household and potentially beyond WASH—to improve health. It is yet to be seen how gender norms are incorporated into "transformative WASH" programs, although research on the cumulative burdens on women—both physical and psychosocial—are generating a more nuanced understanding of the true toll of the lack of water access on women and society overall.

With "special attention" to the needs of women and girls in the SDG sanitation and hygiene targets, the subfield of menstrual hygiene management has gained attention, and the expansion of WASH goals into schools and healthcare facilities has directly linked basic infrastructure with women's and girls' education and with participation in public life. WASH programs are using formalized rules and benchmarks to encourage women's leadership, often used synonymously with "empowerment," in water planning; yet, significant barriers remain to meaningful participation and leadership. Finally, the intersectionality of multiple identities held by those who access or struggle to claim access to water is increasingly acknowledged, recognizing that gendered burdens can be mitigated or exacerbated by factors such as ethnicity, class, caste, or marital status.

Conclusion

This review discussed access to water for domestic use through a gender lens, focusing specifically on the literature addressing physical and psychosocial health and well-being impacts of (in)adequate access to safe water, and the effects of women's participation and leadership in water allocation and management decisions. Access, health, and participation have been dominant themes in the academic as well as water policy literatures. The field of gender and water is dynamic, with evolving social movements, forms of resistance, new feminist approaches, and new technologies, in many parts of the globe. Several of these aspects are more comprehensively covered in the irrigation and land-water spaces; this review has focused on the WASH sector. Other aspects are confined to (still) small literatures; this review has prioritized historical and current debates within the themes that dominate gender and WASH research. Important themes within the WASH sector, such as water privatization (e.g., Bakker, 2010), safe water in emergency situations (e.g., Als et al., 2020), and the growth of bottled water (e.g., Cohen & Ray, 2018), have been only lightly touched upon because the existing research on these aspects tends to touch lightly upon gender. This brings up one limitation of this review, however: the literature included was restricted to English-language publications. It is possible that some

themes are better covered in scholarship in other languages, and important contributions to the reviewed fields often come from non-English-speaking scholars. The review and its conclusions reflect this limitation.

The human-rights-based SDGs have put forth ambitious goals for universal water access and gender equality by 2030. It is still true that data are collected by the single unit of "the" household as opposed to by gender, though the need for disaggregated data is widely acknowledged in almost all health and development research. The expansion of water access goals beyond the household recognizes the importance of creating inclusive spaces for women and girls to safely participate in public life. While barriers remain to the realization of gender equality in the water sector, we find that the research literature has internalized the need not only for gender-equal access to water, but for water as a potential vehicle for human rights and dignity in diverse political contexts.

The research literature on water and development has, to some extent, moved beyond a discussion of women as a single category towards a more relational—and complex—understanding of gender in the water domain. Yet, through the instrumentalization of women and the undervaluation of their labor, the global water policy agenda continues to undervalue the benefits of safe water for women, despite acknowledging their "central role" in providing and protecting water. Global water policy still tends to conflate "gender" with "women," seeking changes primarily from women and girls, and primarily within households and small communities. Research on gender and water, particularly in the social sciences, is taking an intersectional turn, however, acknowledging the coexistence of multiple marginalities within the same body, and acknowledging the role of larger political-economic dynamics in intra- and inter-household water access. If justice calls for fairness in interacting with specific groups on their own terms, giving value to their perspectives and positionalities, then we can say that the water and development community is (slowly) moving towards a recognition of gender justice in the pursuit of safe drinking water for all.

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