

Review Paper

WASH and Gender: a critical review of the literature and implications for gender-transformative WASH research

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ABSTRACT

The connections between gender and water, sanitation, and hygiene (WASH) are profound, and the sector is beginning to explore the integration of gender-transformative principles into WASH programming and research. Gender-transformative approaches challenge inequalities and move beyond an instrumentalist approach to gender in development interventions. Through a critical review of academic empirical studies, this paper explores the last decade of WASH-gender literature (2008–2018). Trends were visualised using an alluvial diagram. The reviewed literature was underpinned by a diversity of disciplines, yet was dominated by women-focused, water-focused studies. Although the studies addressed many important gender considerations, few studies engaged with transformational aspects of gender equality. The majority of the studies were based in rural sub-Saharan Africa and South Asia, indicating opportunity to explore contextual dynamics in other areas of the global south. Lastly, the studies primarily focus on women of productive age; only a few studies touched on gender dynamics relevant for a diversity of women, and men and boys were mostly absent. Insights from this analysis can inform future studies at the intersection of WASH and gender. Researchers and practitioners are encouraged to include a diversity of voices, reflect on the strengths and limitations of research disciplines, and incorporate gender-transformative concepts.

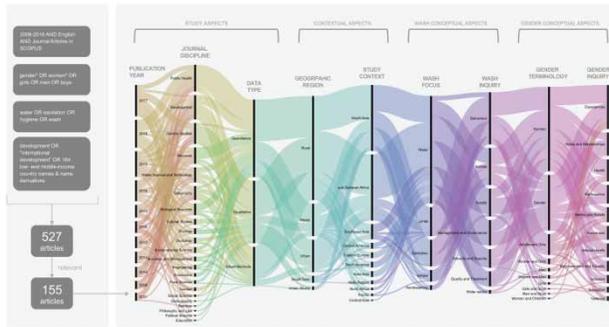
Key words | gender equality, gender-transformative, sanitation, transformative research, WASH, water

HIGHLIGHTS

- Innovative analysis methods explore the last decade of academic literature in the WASH-gender nexus ($n = 155$).
- Literature is water-focused in rural sub-Saharan Africa and South Asia.
- Men and boys feature in just 3% of studies.
- Literature is from 92 journals and 22 disciplines, highlighting the need for interconnections to avoid instrumentalism.
- Future studies can strengthen transformative research through participatory and mixed approaches.

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GRAPHICAL ABSTRACT



INTRODUCTION

This paper explores how empirical studies on water, sanitation, and hygiene (WASH) over the last decade have engaged with gender equality. Although many aspects of WASH have long been acknowledged to be gendered, such as water collection, cooking, cleaning, and childcare (White *et al.* 1972), the historical focus on engineered solutions in WASH has limited the sector's attention to gender (Willets *et al.* 2010). More recently, there is emerging recognition in the sector that bridging practical gender needs (e.g. access to water) with strategic gender interests (e.g. changes in power and roles) is critical to achieving transformational changes in gender equality (Carrard *et al.* 2013). We adopt a phrasing of 'gender equality' to reflect the Sustainable Development Goals (Stephens *et al.* 2018) and conceptualise equity and empowerment as pathways to equality. With growing awareness of the centrality of gender equality in WASH, it is timely for the sector to reflect on the extent and scope of empirical research. In particular, there is opportunity to explore how the sector engages with emerging concepts of gender transformation, which are characterised by themes such as power, roles, and responsibilities in the context of inclusion, accountability, and non-discrimination (Cornwall & Rivas 2015).

Improvements in WASH have important consequences for all individuals but are perhaps even more significant for women and girls (Fisher *et al.* 2017). Aspects such as well-being, status in society, health, education, and safety remain critical to WASH-gender research (Fisher 2006). Literature

speaks to four reasons for engaging with gender in WASH research and programming: the inherent challenges faced by women and girls; the integral role of women and girls in WASH; instrumental objectives; and ideological foundations. Firstly, women and girls have inherent biological challenges when it comes to water and sanitation including the physical acts of urination and defaecation, as well as complexities related to menstruation and pregnancy (Caruso *et al.* 2017; Fisher *et al.* 2017; Hennegan *et al.* 2019). Secondly, the integral social and structural responsibilities for household WASH are closely related to the traditional roles of women and girls including water collection, cooking, cleaning, and childcare (White *et al.* 1972; Fisher *et al.* 2017). Thirdly, gender-focused WASH programming can be seen as helpful for achieving programme sustainability, economic gains, improved health, and improved economic livelihoods (Fisher *et al.* 2017). In such programmes, a focus on women is seen as a means to an end. Lastly, there is a moral imperative to address gender equality in development programming as an objective in itself, which has emerged from feminist, social, and religious philosophies about the significance of gender equality (Kabeer 1994; Willets *et al.* 2010; Carrard *et al.* 2013).

Reflections of the instrumental, integral, inherent, and ideological motivations within the WASH and gender discourse reveals evolution in thinking. There is a growing appeal to move beyond *instrumental* motives, towards a practice that supports *inherent* needs, while aiming to

transform the *integral* roles of women and girls by embracing a transformative *ideological* imperative (Willets et al. 2010; Fisher et al. 2017; Sweetman & Medland 2017). Research-based on an ideological imperative is more likely to be *gender-transformative*, seeking to bridge practical gender needs – such as access to water or sanitation – with strategic gender interests – including changes in power, status, and societal structures (Moser 1989; Kabeer 1994). Leveraging examples from the agriculture and health sectors, gender-transformative thinking asserts that research and practice can and should ‘contribute to change in gender relations in wider society’ (Sweetman & Medland 2017, p. 159). Such research explores transformative *concepts* such as structures, agency and relations; values a diversity of *voices*; and utilises cross-disciplinary, participatory, and change-oriented *approaches* (Mertens 2009; Hillenbrand et al. 2015; Mullinax et al. 2018).

The International Decade for Women (1976–1985) and the International Decade for Water and Sanitation (1981–1990) overlapped from 1981 to 1985, catalysing the first WASH-gender research nexus – a body of work exploring the interconnections between WASH research and studies in gender equality. Early WASH-gender studies focused on women’s roles as users, managers, and change agents within water collection, utilisation, and management (White et al. 1972; Elmendorf & Isely 1981). Re-engaging with this historical interest and focused on gender-WASH dynamics, Fisher et al. (2017) analysed conference proceedings, observing the evolution of the WASH sector with regard to women, gender, and equity, ultimately concluding that the WASH sector has embraced women’s interests. Recently, Dery et al. (2019) also explored empowerment within WASH from global health literature, identifying five WASH-relevant elements of empowerment: participation, decision-making, information, capacity building, and leadership.

This study builds on and extends these analyses by investigating trends over the last decade of published WASH-gender empirical studies, providing an opportunity to review and reflect on the WASH-gender nexus. We present findings from a literature review utilising methods from the digital humanities, namely distant reading and visualisation techniques, to identify trends and themes in the literature. First, we describe the approach and introduce nine analysis

fields used to categorise the reviewed literature. We then present findings in a visual form with interpretive text. Finally, we identify and discuss six insights arising from the analysis that can support future research into, and implementation of, gender-transformative WASH.

METHODS

To examine trends in current gender-related empirical research in the WASH sector, this study mapped and thematically analysed WASH and gender academic articles. Literature from 2008 to 2018 was identified through the Scopus database with a focus on international development contexts (164 low- and middle-income countries), gender (gender OR women OR girls OR men OR boys), and WASH (water OR sanitation OR hygiene OR wash). The database search identified 527 unique articles, of which 155 were selected after removing irrelevant and non-empirical studies.

Drawing from the digital humanities, the study utilised distant reading analysis, a technique for aggregating and analysing a large set of texts by coding titles and abstracts to identify themes and gaps. The digital humanities leverage digital technologies and data visualisation to study literature and culture (Kirschenbaum 2010). Conventionally, distant reading analysis utilises computer processes, including text and topical analysis to help explore patterns of information that are difficult for traditional analysis (Kirschenbaum 2010). It is often used in literature and the arts to study a large corpus of literature. The approach is also useful in exploring a body of academic literature, enabling observation of trends and patterns across a broader set of texts than would be feasible with a closer-reading approach.

We coded trends and themes for nine analysis fields: year of publication; journal discipline; data type; geographic region; study context; primary focus on water, sanitation or hygiene; aspect of WASH investigated; aspect of gender investigated by the study; and terminology used to describe the individuals being considered. These terms are defined in Table 1. The full codebook can be found in the Supplementary Material.

Results from coding were visualised in an alluvial diagram to display a series of relative proportions. Trends

Table 1 | Definitions of key analysis terms

Analysis terms	Definition
Publication Year	Year in which the study was published in an academic journal.
Journal Discipline	The discipline of the journal in which the study was published as per the CiteScore 2017 academic journal metrics. If the journal crossed multiple disciplines, the most relevant discipline was selected.
Data Type	The primary type of data used in the study. For example, qualitative, quantitative, or mixed-methods.
Geographic Region	The global region in which the study is located.
Study Context	The geographic context in which the study takes place. For example, urban or rural.
WASH Focus	The primary focus of the study across water, sanitation, hygiene, and menstrual hygiene management (MHM).
WASH Inquiry	The central aspect of WASH provision or management investigated by the study, for example <i>behaviour</i> , <i>access</i> , and <i>supply</i> .
Gender Terminology	The terminology used by researchers to describe the individuals or groups being studied. For example, men or women. The category of 'gender' is applied when 'gender' is used in the abstract or title, and there is no specific discussion of a particular gender type. In this article, a heteronormative and binary framing of gender is dominant, reflecting terminology used in the 155 articles surveyed.
Gender Inquiry	How gender intersects or impacts WASH. For example, women's <i>health</i> outcomes, <i>participation</i> in committees, <i>experiences</i> of menstruation, or handwashing <i>practices</i> .

identified in the alluvial diagram were then considered with reference to wider gender and development literature, drawing from a parallel review of assessments of a gendered change in international development interventions to identify insights and implications relevant for the WASH sector.

Findings of the study should be interpreted with reference to limitations associated with the distant reading approach and the scope of literature reviewed. First, the analysis explored the English academic literature, excluding grey literature, literature in other languages, and conference proceedings. The decision to focus on the academic literature

was justified to ensure a manageable scope, enable the use of databases with known inclusion criteria, and in the knowledge that academic research plays an important role informing both research and practice. Second, reflecting dominant discourse in the existing literature, the review adopts a binary and heteronormative conception of gender, which we hope will be complemented by more inclusive analyses as the body of literature grows. Third, the distant reading technique is focused on main messages rather than details, which means nuance can be missed. Nonetheless, content highlighted in titles and abstracts reflects dominant themes and drives discourse, justifying a focus on breadth as a complement to in-depth analyses.

RESULTS

The 155 reviewed articles captured the breadth and diversity of the last decade of empirical WASH-gender research as visualised in [Figure 1](#) and described below. The relative proportions of studies within each of the nine analysis fields allow visual identification of the predominant foci of the literature. The analysis fields are grouped into four broad sets of study characteristics, as identified at the top of the figure (reading from left to right): study aspects, contextual aspects, WASH conceptual aspects, and gender conceptual aspects.

Study aspects show publication year, publication journal, and type of data. Within the sample, 72% of the studies were from the second half of the decade, indicating increasing interest in the WASH-gender nexus. Journals were aligned with 22 discrete disciplines. Public Health (15% of total), Development (14%), and Gender Studies (12%) were the most common disciplines represented, with Medicine (9%), WASH Technology (8%), and Geography (8%) also represented. The public health discipline saw a seven-fold increase in studies from 2008 to 2018. Analysis of cross-referencing between journals and authors indicated that 13% of studies had no interconnection within and across the sample. Interest in quantitative studies increased throughout the decade, matched by a decrease in qualitative and mixed-methods studies.

Contextual aspects visualise the geographic region and the type of geography with regard to population density. Studies focused on South Asia (37%) and sub-Saharan Africa (37%), with India (27% of the total sample) and

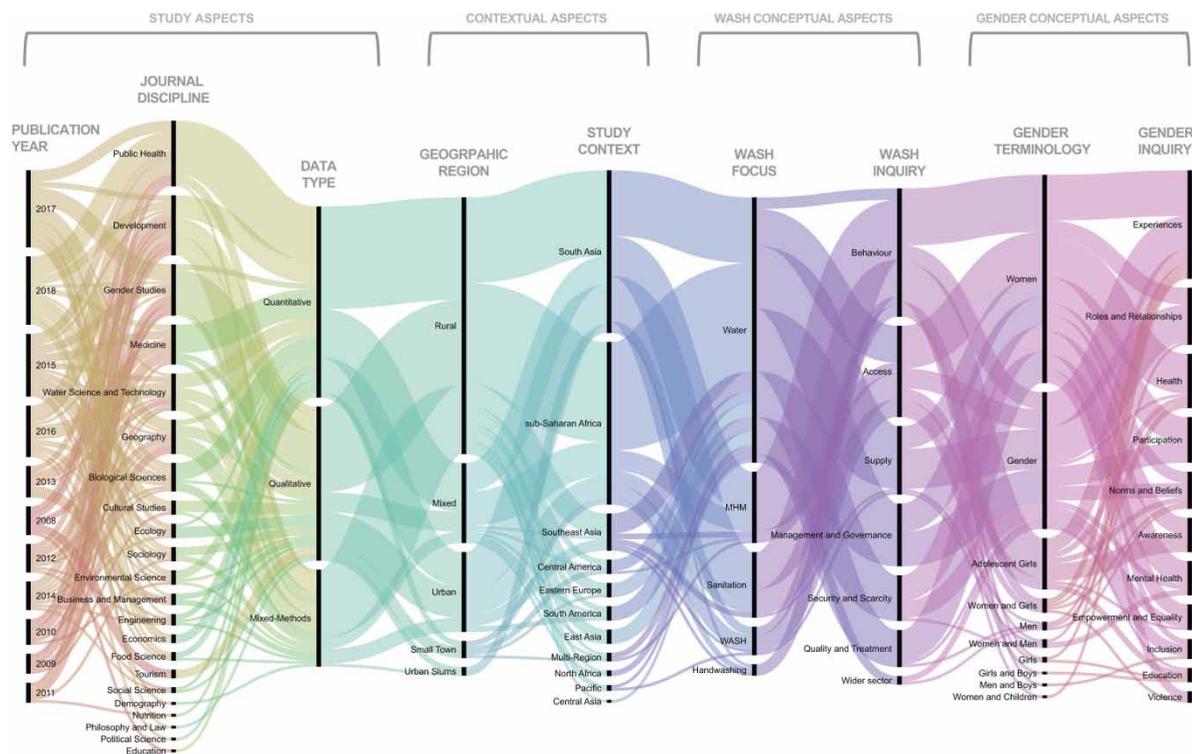


Figure 1 | Alluvial landscape map of WASH-Gender Literature (2008–2018).

Kenya (8%) remaining most common study countries. Studies focused primarily on rural contexts (58%). Mixed and urban settings each had 18% of the sample. A small number of studies were explicitly focused on small towns or urban slums and were coded separately.

WASH aspect fields categorise studies based on what type of WASH and what specific aspect of WASH programming they focused on. Within the sample, 60% focused on water, 16% on menstrual hygiene management (MHM), and 15% on sanitation. The remainder of the studies addressed handwashing (3%) or multiple aspects of WASH together (7%). Of the MHM and handwashing studies, the majority explored the behavioural practices of individuals: 84 and 100%, respectively. Within mixed WASH studies, 60% investigated access and 30% focused on behaviour. Within sanitation studies, 39% investigated access and 56% behaviour. Water-focused studies were distributed in emphasis across access (14%); management and governance (24%); quality and treatment (14%); and supply (24%).

Analysis of gender conceptual aspects found that studies primarily focused on women (47%) and gender (31%). Of

the women-focused studies, 21% explored experiences of WASH and 19% addressed personal health. Gender-focused studies explored themes of individual experiences (25%) and roles/relationships (27%). Adolescent girls (12%) were the focus of the next largest group of studies, which addressed awareness (33%) and experiences (27%). Men and boys only appeared in 5% of article titles and abstracts.

DISCUSSION: SIX INSIGHTS FOR STRENGTHENING WASH-GENDER STUDIES

Situating this analysis with reference to wider gender and development literature, including the emerging body of work on gender transformation, we present six insights and implications for strengthening the gender-transformative potential of future WASH-gender studies.

1. With increasing interest and disciplinary diversity in WASH-gender studies, researchers should actively build interconnections and seek multidisciplinary research teams to avoid siloed thinking.

Interest in the WASH-gender nexus continues to grow. Studies were published in 92 unique journals across 22 identified disciplines. Historically, the WASH literature has been located in technical fields such as engineering, which have viewed gender narrowly and instrumentally in relation to efficiency and effectiveness of WASH interventions and outcomes (Willetts *et al.* 2010). The increase in disciplinary diversity over the last decade has significant potential to enrich the sector's understanding. However, it comes with challenges of divergent syntax and conceptual simplification, a particular risk where there are low levels of interconnection between some authors and journals. For example, researchers from technical disciplines (e.g. engineering or medicine) exploring the functionality of water filters may inadvertently adopt instrumental approaches to engaging women if social science perspectives are not considered (e.g. Sheth *et al.* 2010; Freeman *et al.* 2012). This highlights the importance of multidisciplinary (Mertens 2010) or transdisciplinary (Fam *et al.* 2017) collaborations, which are common in transformative research. By prioritising collaboration, the risks of inadvertent siloed thinking can be reduced, leading to richer investigations and findings.

2. Limited use of participatory and mixed-methods reveals an opportunity to foster more transformative research approaches.

Of the selected studies, 43% used quantitative data, 35% used qualitative data, and only 21% explicitly engaged with mixed-methods. The use of qualitative and mixed-methods also declined throughout the decade, while quantitative studies increased. Furthermore, only 6% of the studies actively highlighted a participatory component. Given that any inquiry has the capacity to instigate a positive change (and the risk of catalysing negative change) in gender equality (Willetts *et al.* 2013), there is opportunity to move away from assigning research participant roles as 'research subjects', so that participants can have an active part in shaping the studies and their own futures (Mertens 2010; Mullinax *et al.* 2018). Studies that leverage both technical and social data through participatory data collection can capture valuable insights into the social relations within a technical sector. For example, the use of participatory methods to explore microbial contamination (Khatibi & Yamakanamardi 2010), system functionality (Sterling *et al.*

2014), and supply (Shonsey & Gierke 2013) shaped the research to be contextually relevant and empowering for participants. Additional examples of transformative engagement of WASH programme staff are explored in Cavill *et al.* (in press). As journals endorse and researchers expand the application of participatory and mixed-method approaches, there is an opportunity for engaging in social transformation through the process of research itself – a fundamental principle of gender-transformative research (Mertens 2009).

3. The number of studies focused on menstruation, sanitation, and hygiene have increased in recent years and lay the foundations for further investigations on intersections with gender equality.

Reviewed articles focused much more on water than sanitation and hygiene, reflecting a historical dominance of water over sanitation and hygiene more generally in the sector (Cairncross & Valdmanis 2006). Recent attention on MHM (Budhathoki *et al.* 2018; Hennegan *et al.* 2018) is a welcome trend. However, MHM-focused research was primarily from medicine and public health journals; was 72% quantitative in approach; and was almost solely focused on sub-Saharan Africa and South Asia. There is scope for growth in mixed-methods and qualitative research on MHM and for social science inquiries into how MHM links to wider aspects of gender equality. The review also found an emerging body of work focused on psychosocial stress, violence, and trauma, which offer an important lens into the psychological impacts of inadequate sanitation across life stages (e.g. Hulland *et al.* 2015; Sahoo *et al.* 2015). There is still much to be explored regarding the intersection of gender with sanitation and hygiene, including consideration of roles, practices, experiences, and social norms.

4. There is opportunity to move from 'participation' to 'power' in exploration of gender equality concepts in WASH.

Gendered concepts such as roles, relationships, participation, and experiences were commonly mentioned within the studies. However, the inclusion of such concepts was not always reflected in the way studies were framed. The lines of inquiry were typically framed in an instrumental

(17%) or neutral (59%) manner. Examples can be drawn from studies focused on water access. Neutral studies, for example, reported on who in a family collects water (e.g. [Graham *et al.* 2016](#); [Emenike *et al.* 2017](#)), without discussing implications for gender equality. Instrumental studies framed findings in terms of how they might make a supply system more efficient (e.g. [Mommen *et al.* 2017](#); [Gross *et al.* 2018](#)). These contrast with transformative studies, which explored water collection roles in the context of gendered power dynamics (e.g. [Hawkins & Seager 2010](#); [Van Houweling 2016](#)). Instrumental or neutral framings can be avoided by investigating both the connections between practical aspects of health, sustainability, and efficiency as well as strategic interests such as power, respect, confidence, and gender norms ([Moser 1989](#)).

5. A strong regional focus on sub-Saharan Africa and South Asia leaves room for future research in other less studied regions.

Geographies such as sub-Saharan Africa and South Asia are important for the WASH sector due to high rates of open defaecation, low water access, and challenging WASH-related gender norms. However, while studies often find similar strategic gender interests across geographic contexts ([Cairns *et al.* 2017](#); [Schmitt *et al.* 2017](#)), there is cultural nuance in how gender roles, dynamic and power relations function (as explored by [Carrard *et al.* \(2013\)](#) and [Leahy *et al.* \(2017\)](#)). [Sultana \(2009\)](#) reiterates this notion in her descriptions of how gender dynamics are inextricably linked to culture and space in Bangladesh, and [Winter *et al.* \(2018\)](#) argue that ‘context matters’ in their exploration of women’s sanitation use across 14 sub-Saharan countries using Demographic and Health Survey data. Studies which explore multiple geographical contexts also offer an opportunity to compare and contrast contextual factors (e.g. [Carrard *et al.* 2013](#); [Graham *et al.* 2016](#); [Cairns *et al.* 2017](#); [Schmitt *et al.* 2017](#)). Given a current lack of evidence from some regions, a broadening of geographic focus as well as cross country comparisons is much needed.

6. Current literature dominantly focuses on women of productive age, indicating a need for studies considering women’s different life stages, men and boys, and sexual and gender minorities.

Reviewed literature dominantly focused on women, which aligns with trends in wider gender research ([Cornwall 2000](#)), with particular representation of women at productive age, as young mothers. Although 30% of articles used ‘gender’ terminology, 47% of the articles focused solely on women rather than gender equality per se. Only four articles (3%) focused explicitly on the experiences of men or boys, exploring: increased workload for men after piped water installations in Kenya ([Crow *et al.* 2012](#)); the role of men and boys in menstruation programming ([Mahon *et al.* 2015](#)); and masculine identities in water management in Peru ([Rap & Oré 2017](#)). While women are integral within WASH, a narrow view of gender continues to place the burden of overcoming WASH and gender challenges on women. Studies which engage women from a life-cycle perspective (e.g. [Hulland *et al.* 2015](#); [Sahoo *et al.* 2015](#); [Baker *et al.* 2017](#)); engage men and boys (e.g. above examples and [Cavill *et al.* 2018](#)), and engage with sexual and gender minorities (e.g. [Boyce *et al.* 2018](#)) offer valuable opportunities to explore people in all their diversity. Gender-transformational research creates opportunities to engage a diversity of people across age, gender, ethnicity, and status for a more systemic approach ([Stephens *et al.* 2018](#)).

CONCLUSIONS

Drawing from the last decade of WASH-gender literature, this review critically examined sectoral trends and opportunities. Using a process of distant reading, we visualised bibliographic, contextual, and conceptual aspects to identify areas of convergence and divergence within the literature. An increasing interest in quantitative research was matched by a focus in sub-Saharan Africa and South Asia, and a focus on women. Building on these trends, we identify insights for WASH researchers seeking to embed gender-transformative approaches, concepts, and voices in their work. Transformative *approaches* often engage across disciplines and methodologies to explore and transform the lived experiences of participants through participatory or mixed-methods ([Mertens 2010](#)) [Insights 1 and 2]. Transformative studies engage with feminist *concepts* such as agency, relations, and structures that speak to power dynamics in the home, community, and broader public sphere ([Kabeer](#)

1994) [Insights 3 and 4]. Finally, gender-transformative research promotes a diversity of *voices* by recognising different groups related to age, class, gender, and economic status (Stephens et al. 2018) [Insights 5 and 6].

By exploring the last decade of WASH-gender literature, we have reflected on the growing interest in gender-transformative approaches in research, evaluation, and interventions. Although gender-transformative approaches may not be appropriate for all WASH-gender research, the Sustainable Development Goals highlight the profound interconnections between gender equality and global WASH targets. Gender-transformative WASH programming requires evidence beyond technical and health impacts – evidence that critically examines gender dynamics inherent in WASH and the contexts in which WASH services are delivered and experienced.

DATA AVAILABILITY STATEMENT

All relevant data are included in the paper or its Supplementary Information.

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