

WASHed in Stereotypes: A Rigorous Review of Water-Gender Narratives in LMICs

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Abstract

Over the past few decades, water programs have positioned women as primary beneficiaries, aiming to empower them through improved access and participation. In doing so, several gendered narratives have emerged, widely circulated but seldom interrogated, that continue to shape water, sanitation, and hygiene (WASH) policy and practice. Despite a growing body of literature on WASH and gender, there is a lack of critical investigation of such narratives and its underlying assumptions.

A rigorous systematic review was conducted across five databases to identify peer-reviewed empirical studies published in English between 2015 and 2024 (SDG era). 48 studies from Low- and Middle-Income Countries (LMICs) were included to assess the assumptions underpinning three dominant water-gender narratives: that gender quotas enable women's active participation in water committees, that lack of household water facilities puts women at violence risk, and that improved water access leads to time savings enabling economic empowerment. Using thematic analysis grounded in the Gender and Development (GAD) approach, this review takes a deep dive into the empirical basis of the included studies, complemented with wider discussions.

Findings revealed a disjuncture between popular narratives and women's lived realities. Gender quotas often increased nominal representation but rarely translated into active participation or efforts for power redistribution. Narratives that linked water to gender-based violence oversimplified complex issues, while reinforcing patriarchal controls, neglecting women's right to public spaces and male accountability. Time savings from water fetching linked to economic opportunities rested on several flawed assumptions, ignoring intra-household dynamics and resource gaps.

This review contributes to reframing that language by interrogating persistent gender myths and challenging oversimplified, instrumentalist narratives. By critically unpacking these narratives, it calls for more context-sensitive, intersectional, and transdisciplinary approaches to water and gender, reframing expectations from the WASH sector as well as recentering the focus on structural inequalities and lived experiences.

1. Introduction

'Women and girls bear the brunt of water and sanitation crisis' stated the 2023 WHO and UNICEF Joint Monitoring Report with a special focus on gender [1]. The report highlighted that in 7 out of 10 households where water is collected off-premises, women and girls were primarily responsible, drawing attention to a widespread burdening reality for the estimated 1.8 billion people living in such households [1].

While such statistics are critical for raising awareness of gendered inequalities, they are based on broad estimates meant for global monitoring and comparability. It is important to recognize that, like most aggregate data, they carry underlying assumptions and methodological limitations. The concern is not the data itself, but rather how these figures are interpreted and mobilised in advocacy and policy.

For example, the same JMP report links long water collection to physical safety risks and loss of time for education, work, or leisure [1]. A following UN Water article further asserts that *'WASH is critical to eliminating violence against women and girls,'* also arguing that *'water fetching leaves women and girls vulnerable to attack and often precludes them from school or earning an income'* [2].

It is undisputed that improving access to water has the potential for strong gender impacts, particularly when the majority of women and girls are made responsible for it. However, this discourse rarely interrogates the very gendered division of labour itself that has made women *'responsible'* for it. Instead, it tends to adopt a linear problem-solution frame, without accounting the complexities of social transformation including that of gender, caste, class power relations, that shape both water access and gendered labour.

Claims linking water interventions to women's empowerment have long been challenged within the water sector. Kulkarni's [3] two-year study in India, for example, found that while water programs improved hygiene, they failed to address women's broader well-being in the context of entrenched patriarchal divisions of labour. Time saved from fetching water was simply diverted to unpaid domestic tasks, agricultural work, or committee responsibilities, offering little real shift in agency or power [3].

Doss et al. [4] in their paper uncovering myths in agriculture, argue that myths, often containing a kernel of truth, are not based on sound empirical evidence and should not be dismissed as harmless inaccuracies. She calls for deeper investigation as they tend to reinforce gender disparities and mislead policy, research, and practice [4].

This dynamic is evident in India's *Swachh Bharat Mission*, which positioned itself as a behavioural change campaign rather than merely a toilet-building programme. Scholars argue that in its pursuit of quickly achieving an 'open defecation free' status, the campaign tapped into existing gender stereotypes to promote its agenda. Pandey [5] critiques how the sanitation discourse in India constructed the female subject, often using narratives that framed household toilets as a symbol of female empowerment, offering protection against sexual violence, while completely depoliticizing violence and overlooking male accountability [5]. Such framings, as Krishnan [6] notes, risk promoting patriarchal ideals of honour, reinforce ideals of victim-blaming, ultimately curbing women's autonomy [6].

It is important to note that gendered stereotypes are not limited to the WASH sector and appear widely across development sectors. For instance, while the link between girls' education and the lack of WASH facilities is well known, similar narratives are found in sectors like electrification [7] and digital learning [8]. Cornwall et al. [9], in their seminal work 'Gender Myths and Feminist Fables', critique the simplistic slogans that dominate gender and development discourse. They note that such representations often serve to legitimize the reflections of larger individual and institutional powers, and rally to challenge the depoliticization of gender by reclaiming how gender issues are framed and discussed within development contexts [9].

One of the earliest such representations in the water sector can possibly be traced to World Bank-influenced reforms in the 1990s, where women were not only repositioned from users to clients, but their roles were also formally reinforced with inclusion in water committees under the banner of 'women's empowerment' [10]. These reforms failed to address unequal gender roles, or engage men to share domestic water work [10]. As Kim et al [11] warns, this cycle of 'empowerment without power', will make it impossible for us to achieve gender equality even by the next century.

While gender mainstreaming is receiving increased attention across the Sustainable Development Goals (SDGs), with 11 out of 17 goals involving gender dynamics [4], WASH as a sector too has responded by prioritizing women's and girls' well-being [12]. The concern, however, lies not in the lack of attention, but in how gender is often depoliticized, with limited engagement in gender-power relations or intersectionality.

It is therefore essential to critically examine how gendered narratives are produced and used, and explore the underlying assumptions, especially in the context of SDGs and post-SDGs. Recent reviews have advanced the WASH-gender discourse in important ways, but only a few have critically engaged with nature of evidence and

its underlying assumptions. For instance, scoping reviews that have helpfully categorized dimensions of empowerment [13], WASH-related gender-based violence [14], or systematic reviews that mapped data determining which WASH interventions work as intended for Gender and Social Inclusion (GESI) outcomes [15] or summarized WASH-related gender equity and empowerment outcomes [16]; yet none engaged in critical assessment of the quality of included studies leaving any narratives or assumptions unchallenged. A large-scale review of 1,280 studies makes an impactful contribution that women when compared to men, and in relation to water, have poor decision-making ability and political power, and limited employment opportunities outside of household duties related to water [16]. However, their abstract summarized that ‘women had fewer decision-making responsibilities...’, risking misunderstanding.

Caruso et al.’s [17] large-scale systematic review synthesized evidence on how studies engaged with empowerment. Their massive review engaged in the coding of the results section line-by-line and critical appraisal of studies. Among all, only MacArthur et al. [18] explicitly aimed for a critical review of empirical WASH-gender literature. However, their distant-reading methodology focused on main messages rather than nuance. Lastly, Dickin and Caretta [19] challenged four dominant water-gender myths, calling for continued narrative scrutiny. While impactful, their work was not structured as a formal review.

Together, these studies reflect an evolving field with substantial contributions. Our goal is to further enrich the debate by conducting a rigorous systematic review of dominant water-gender narratives in LMICs. To that end, this review had three main objectives: a) to identify and examine key gendered knowledge claims in the water sector across Low- and Middle-Income Countries (LMICs); b) to critically appraise the quality and assumptions underpinning these claims; and c) to synthesize findings and highlight gaps to inform future empirical research. It also lays the groundwork for a broader inquiry into gender portrayals in the WASH sector.

In doing so, this review considers why certain water-gender myths persist and whose agendas they serve. It also raises critical questions about the expectations placed on the water sector to drive gender equality, and whether it is driving attention away from water service delivery. By engaging with relevant theories and wider discussions, this review contributes to a more in-depth understanding of how narratives function and what they obscure in practice.

2. Methods

This review was guided by Hagen-Zanker and Mallett's [20] toolkit on conducting a rigorous and evidence-focused literature review. These authors developed an approach that provides a reflexivity space required for social science while adhering to core principles of systematic reviews, usually widely used in medical studies [20]. Further, this review also aimed to go beyond a description of findings and provide a new interpretation of existing data thus taking the form of a critical review as well, and as such inform the next phase of empirical research [21].

It was decided to focus on the academic literature to ensure a manageable scope and with the understanding that academic research informs both research and practice [18]. Also, reflecting the dominant discourse of binary and heteronormative conception of gender, this review too adopts the same, with the hope of seeing more inclusive analyses in the future [18].

2.1 Conceptual foundation

This study is motivated by the primary author's (SK) decade-long experience in the Indian development sector, and further influenced by the underpinnings of 'Gender and Development' and 'Feminist Political Ecology'. While Gender and Development (GAD) is a concept that recognizes the role of gender in shaping development outcomes and emphasizes addressing gender power relations and challenging gender norms and narratives [9,22,23], Feminist Political Ecology (FPE) provides a framework that examines the interconnections between environment and gendered power relations across a range of scales: between intra-household and intra-community processes, and from local to global, while challenging the gendered knowledge popularizations [24,25]. The research questions, literature review, subsequent analysis and discussions were all guided by these conceptual foundations.

2.2 Review protocol

A study protocol was developed before the searching process began and was peer-reviewed by co-authors (S1 Text). The protocol ensured transparency and guidance and covered all important elements such as research methodology, eligibility criteria, data retrieval strategy, analysis explanation, and timeline.

2.3 Search strategy

Systematic searches were conducted on five main electronic databases - PubMed, Scopus, Web of Science, Wiley, and PLOS journals, using search terms mentioned in Table 1. Specific search strings and notes are available in S1 Table. The databases were selected based on the guidance on suitable databases for a systematic review which assessed databases on 27 test criteria and showed the capability of searching efficiently [26].

Table 1: Search concepts and keywords

#	Concept	Search terms
1.	Water related terms	“water security” OR “water supply” OR “drinking water” OR "water management" OR sanita* OR toilet* OR watsan* OR WASH OR “water and sanitation”
2.	Gender	women OR girl* OR boy* OR men* OR gender* OR transgender

2.4 Eligibility criteria

The inclusion and exclusion criteria, presented in Table 2, were established at the beginning of the process to identify relevant material for the review.

Table 2: Eligibility criteria

#	Indicator	Inclusion criteria	Exclusion criteria
1.	Language	English	Any other language.
2.	Study population	Rural areas of LMICs (Low-Middle Income Countries).	- Slums/ informal settlements, conflict/ fragile/ humanitarian or disaster-related settings. - Studies focused on girls and not women.
3.	Time period	The Sustainable Development Goals (SDGs) time period, i.e. January 2015 to September 2024 [till the study start date].	
4.	Study interventions	- Only piped water supply within premises, with a focus on gender. - Also, those studies whose primary focus may not be on-premise piped water or gender, but have been considered in analyzing relationships/ correlations/ differences.	- Other forms of water (irrigation, watersheds, water resources, etc.) or whose primary focus is community/ collective action/ social cohesion. - WASH in institutions (water and schools, health centres, etc.) - No evidence/ claim generated on drinking water and gender.
5.	Study design/ publication type	Peer-reviewed empirical literature with primary focus on rural drinking water supply and gender.	- No editorials/ opinions/ perspectives/ commentaries/ newsletters, or single case studies. - No reviews of any kind. - No big/ national surveys like census/ MICH/ DHS/ NFHS - Not available through institutional subscription.

Only studies published in English were included due to following reasons: 1) the authors have a working language proficiency only in English; 2) the need to maintain a manageable scope and ensure consistency in data extraction and interpretation; 3) Practical constraints regarding translation and resource availability; and 4) the focus of the review on LMICs where English is most likely a common language in global development. This decision was further informed by a preliminary scoping exercise indicating that English-only inclusion criteria is a common approach in recent systematic, scoping, or critical reviews [14,16–18], particularly when most peer-reviewed research around this topic is published in English.

2.5 Screening

For assessing the relevance of literature, Rayyan AI [27], a web-based application was used for title and abstract screening based on eligibility criteria [27]. For those that met the criteria, full text was exported to EndNote [28], a reference manager tool, to check for institutional access and conduct a full-text review ensuring only those studies were retained that had both water and gender components relevant to the study’s objective. To ensure methodological rigor and transparency, Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidance was employed. The first author (SK) first removed all the duplicates before proceeding with title and abstract screening. Any uncertainties were resolved by discussing with other authors (PH and AM).

2.6 Classification of studies

Once the final number of included studies were finalised, basic descriptive information was tabulated, see S2 Table, with citation, year published, time-period of the study, geographical coverage, intervention, methods, key findings and other indicators. This classification was essential to understand the contexts of different studies. Additionally, the table also summarizes the ‘trustworthiness’ and ‘usefulness’ ranking based on the quality appraisal.

2.7 Quality appraisal

This study acknowledges that the process of assessing research quality through relevance and trustworthiness is inherently subjective. While trustworthiness was dependent on the rigor of research design and methods, relevance was related to the aspects of the use of concepts or theories as study guides, especially the lens of

gender-power relations, ensuring sample disaggregation, breadth and depth of findings, reflections on limitations, and its links to wider discussions.

Unlike systematic reviews which are stringent in their process, rigorous reviews allow space for reflexivity [20] needed for this study's objectives. Hence, a newer way of appraising the quality of studies has been presented, especially on overall usefulness or relevance.

The quality appraisal template (S3 Table) has been adapted by criteria originally laid out by EPPI centre [29] which was further developed using a ranking system by Hennegan et al. [30] and Robinson and Barrington [31]. Additionally, trustworthiness criteria were also referenced from [32]. The ranking of high, medium, and low were subject to the studies' ability to fulfill the criterion specific to this review's focus on gender and water. The included studies were carefully investigated looking for coherence among its methods, results, discussion, and conclusion sections, and were ranked with the relevant colour (green for high, yellow for medium and red for low), and remarks explaining the same (S4 Table. Quality appraisal of included studies). This intense exercise also enabled the authors to get deeply familiarized with the included studies.

2.8 Thematic content analysis

Inductive approach was undertaken using NVivo 12 [33] which allows the findings to emerge from frequent or dominant themes inherent in data [34]. The publications were read multiple times keeping the research objectives in mind and marking initial codes. They were then characterized into sub-groups based on any connections or similarities between them. Finally, themes were developed by outlining these categories. One water-gender narrative from each theme that is relevant with the wider sector discourse, was identified and examined for the review.

3 Results and discussion

A total of 48 studies were included in this rigorous review. The initial database search yielded 17,721 studies of which 1,121 duplicates were removed resulting in 16,600 studies. While the title review excluded 15,319 studies, abstract review excluded 1,030 studies, leaving a total of 251 studies for full-text review, of which 48 were finally included in this study. Fig. 1 outlines the full screening process.

Figure 1: PRISMA flow diagram outlining the literature compilation process.

3.1 Nature of evidence base

The year 2020 (the year of first global Covid-related lockdowns) had the highest number of publications at 10 and year 2022 had the least with just one. Fig. 2 shows year-wise publication trends.

Figure 2: Publication Trends Over Time: Number of studies per Theme (by Year of Publication)

The evidence base of the 48 publications was spread across five continents covering 26 LMICs. Together, these countries were studied 54 times considering there were two multi-country studies and several focusing on the same country. Ghana was the highest with 7 studies. The overall spread too was quite overwhelmingly uneven with majority of research from Africa (65%; 35 studies) followed by Asia (24%; 13 studies), South America (5%; 3), Central America (4%; 2) and Oceania (2%; 1) (S1 Figure Geographical coverage of studies). A map showing the geographical spread of studies is at Fig. 3.

Figure 3: Map showing geographical spread of studies.

A total of 22 qualitative studies, 14 mixed methods, 10 quantitative and 2 RCTs were included. Fig. 4 shows the number of publications that employed different methods, by its quality as well. There is no discernible difference in quality of studies and methods used.

Figure 4: Methods-wise publication trends (by quality)

3.2 Characterizing water and gender-related themes and narratives

Four inter-related themes were identified from the results, comprising community governance (n=18), gender dynamics (n=14), livelihoods (n=9), and health and well-being (n=7). S5 Table shows a summary of thematic focus, methods used by the included studies under each theme, and its quality. However, the final results and discussions will be around the identified water-gender narratives and not themes.

3.3 Narrative 1: Gender quotas in local water committees enable women's participation.

In the early 1990s, global development discourse shifted from large-scale, supply-driven projects to community-based, demand-driven approaches. These were influenced by neo-liberal ideas of decentralization that the Bretton Woods institutions promoted [10]. As such, 'participation' emerged as a central strategy for promoting sustainability and addressing poverty [35]. Two conferences in 1992, the International Conference on Water and the Environment (ICWE) in Dublin and the 'The Earth Summit' in Rio transformed these discourses from an intellectual agenda to policies by explicitly establishing the importance of participation and its link to gender in

natural resource management, leading to the adoption of gender quotas in local water committees [36]. Gender quotas are numerical targets that prescribe the number or percentage of women to be included in a public body [37]. These targets continue to be emphasized, as evident in the United Nations Sustainable Development Goals (SDGs), which seek to promote women's leadership in the public sphere.

It is observed that despite gender analysts distinguishing the notion and content of gender as being related to social constructs and identities, gender was and continues to be misinterpreted as sexual identities in water policy and planning, and as such gender is reduced to women [35].

So, what does the evidence say about the success of quota system?

The short answer is that the quota system has neither fully achieved its desired goal nor has fostered a shift in attitudes to enable female leadership in local water governance in rural areas. The assumption that representative participation improves broader governance and distribution remains unproven. Even if equal participation were to be achieved in representative spaces, there is no evidence that it is transformational in isolation. The aim of this section is to untangle the different myths surrounding the narrative of quota system.

A total of 21 studies looked at the participation of women in water governance systems [36–57]. These studies are based in 11 countries across four continents covering parts of Bangladesh, Bolivia, Ghana, India, Kenya, Lesotho, Malawi, Namibia, Nepal, Nigeria, Solomon Islands, and Uganda. A crucial disclaimer is that references to countries in this paper specifically pertain to the study sample within those contexts. This distinction is made to avoid contributing to the homogenization of populations or perpetuating myths, which this paper seeks to critique.

We found that despite the adoption of gender quotas varying significantly across countries, the results however were similar in falling short of intended objectives. Only one study was an exception to this which briefly described how women in rural Malawi were actively involved in decision-making, recordkeeping, and maintenance of water systems. But, this study was led by a team from a prominent development organisation and was more of a commentary and less empirical in its nature. They recognized women as 'primary caretakers' with water-related responsibilities and thus motivated them to take leadership roles allowing for 'better sustainability'. It was unclear how 50-70% women's representation in Borehole User Associations (BUAs) is a marker of their active participation [43].

To put ‘participation’ into context, Hannah et al. [37] share a definition by Agarwal as that which enables women to influence decisions, contribute to the overall governance system, and go beyond group membership [58–60]. The process of participation in different activities remains as important as its outcomes. Critical to the process is how women represent other women’s interests, whether they can speak up, and if anyone listens [37].

To help visualize the variations or similarities in water committees across LMICs, we compiled a table (S6 Table Country-wise water committees and quota compliance) showing country-wise different names of the water committees, its quota stipulations, whether the quota was met, and if the study contradicted or supported the narrative.

3.3.1 Myth 1: Gender quota ensures a minimum number of women in water committees

The quota system in rural water policy has largely failed to achieve its intended outcomes, in both achieving numerical representation, as well as improved water governance, thus challenging the implicit assumptions that having equity in representation would produce better outcomes. Evidence shows that women’s representation in water committees remains inadequate. Despite explicit legislation formalizing women’s rights to participate, most quotas—whether 33% or 50%—remained unmet, except in limited cases like all-women groups or minimal representation like two women per committee. Without addressing underlying gender power dynamics and internalising the need for gender equality, women’s participation continues to face significant structural and cultural barriers, as evidenced across multiple countries.

A few positive outcomes of the quota system were noted such as the fact that explicit legislation acknowledged women’s rights to participate in natural resource governance [37], which is seen to have gained some traction [41], and is a way of formalizing and ensuring women’s participation in decision-making spaces that are otherwise traditionally male-dominated [55]. Such policies with affirmative action were also interpreted to challenge the traditional gender roles of domestic water managers to more formal public water managers [41]. Women in WASH leadership positions were also found to have the potential to bring and inspire other women’s voices to the policy space [50], which was contended elsewhere as shown later. Just like women taking positions can inspire other women, similarly women withdrawing too can discourage other women from accepting such public leadership positions [61].

Women’s representation in water committees seemed to be successful only when it was either all-women groups [54] or when it was limited to two women per committee [46]. In the case of all-women groups, the existing Self-

Help Groups (SHGs), primarily created for microfinance were given added water-related tasks. Everywhere else that stipulated 33% or 50% representation failed in its achievements [36–38,40–43,51,55]. One instance of a brief gender quota success was documented where young women felt heard, and respected to be counted among community leaders, and that opportunities opened up for other women in the community to participate, attend trainings/ meetings, etc. [46]. Contrastingly, another study found that women were under-represented in committees and their suggestions mostly ignored [50].

Some nominal representation success with at least one woman serving on the committees was attributed to government oversight and external reviews as reinforcements [37]. Despite such external measures, only 69% of committees were able to meet the quota here. Even with increase in women’s representation, the study found that women did not appear to participate as meaningfully as men. The gender quota vision was thus conditional not only on women’s representation but also on how they participated in committee activities [37]. Even if a woman was elected, her spouse would be the actual one in the role [38]. In some places, the 50% rule was relaxed to make 40% acceptable but even then, communities failed to meet the quota [42]. In an instance that observed eight of the nine villages achieving 50% women’s representation, the other paid positions of water attendants, however, such as guard, pump, and tank attendant went to men [61].

In a few occasions, forget meeting the quota, entire committees were found to be non-functional [51,55]. Sometimes, women participated only in the initial meetings, with a decline as time passed [55]. The representation of women and marginalized communities will remain nominal without adequately internalizing the need for gender equality in committees [55].

One of the most striking observation is from Uganda with the same author publishing two papers with presumably about a decade’s gap in data collection [40,41]. The evidence shows that there’s been no significant improvement with women’s participation continuing to remain low and with not a single village in the latter study meeting the quota stipulation.

Gender quotas have not been fully successful in ensuring minimum representation of women. However, it has increased women’s spaces in public water committees with an equal chance to leadership and decision-making. But, how equal are the opportunities?

3.3.2 Myth 2: Gender quotas enable women on committees to perform roles equally to men.

This myth was challenged by evidence from various contexts. Studies revealed that while quotas may ensure women's nominal representation in water committees, entrenched gender hierarchies and local socio-cultural norms often limited their actual influence. Leadership positions, such as chairperson, were predominantly held by men, with women typically relegated to roles perceived as less influential, such as treasurer, often justified by gendered assumptions around trustworthiness and domestic responsibility. The persistence of patriarchal norms in role allocation and decision-making processes calls for a critical re-evaluation of how gender quotas are implemented. We are also critical of the scale of influence and the function of voluntary committees, challenging assumptions around decentralization and service delivery.

The structure of a committee, typically, had an executive body with key positions such as chairperson, secretary, and treasurer with variations including added positions of vice-secretary in Kenya [37], vice-chair in Kenya and Uganda [37], vice-treasurer and cluster chair in some villages of Kenya [37], a caretaker in Namibia [36], sub-contracting a private operator in Tanzania [61]. The number of people in each committee too varied between villages and countries such as 5-13 members in Kenya [37] and 4-12 members in Solomon Islands [51].

Villages had a completely different approach with almost every committee having a different composition such as no secretary or additional positions such as technical officer, two vice-chairs, or even volunteers [51]. In a few cases, they also had a unique approach of 'everyone is in the water committee' making everyone responsible for the maintenance and repair of their water pipes and stands.

A process of institutional bricolage is observed, defined as the process whereby stakeholders of natural resource management institutions do not always strictly adhere to formal institutional rules but instead reject or reformulate them to suit their needs based on their local socially rooted beliefs [55].

We also found that the most important leadership position of chairperson typically was occupied by men [36,37,41,46,51,61]. It was mostly occupied by so-called upper-caste men in some places, and in a few instances of women's leadership in other executive positions, such as treasurer, the women came either from influential families or had a history of leadership in previous community groups [55].

The role division was often based on the patriarchal gendered division of labour or local gendered

assumptions. It remained a hierarchical male-dominated structure with only nominal female representation. Men perceived women as subordinates to carry out their instructions rather than equals. Even when appointed to key positions such as treasurer, women weren't given a chance to perform them [46]. Roles were often along gender lines with women made responsible for cleanliness and hygiene, and mobilizing other women and children while men were deemed responsible for planning, design, and construction [46] [42]. Cleaning water point surroundings were considered 'feminine' whereas repairing was 'masculine' [61]. Women were usually relegated to treasurer positions which are seen as likely less influential [37]. Hannah et al. [37] developed a model and found that gender was a statistically significant predictor for serving in the chair and treasurer positions, with men more likely to serve as a chair and women more likely as a treasurer [37]. Women were almost always appointed treasurer based on local belief that they are less likely to misuse public funds [55]. Age became a factor with often older women being preferred as treasurers but the position itself was not recognized locally as a key role [36]. Women took care of household money here and were often seen as responsible ones who didn't spend unnecessarily or give into 'temptation'. So rather than accounting skills, someone locally deemed trustworthy was elected as treasurer [36].

In oddity to elsewhere trends on treasurer roles, one study found men to serve as treasurers which was considered a key position. Only one out of the nine villages studied had a female in the post and attendance of women generally too was very poor at village meeting assemblies where key water deliberations were made [61].

Caretaker tasks were assigned to men as they required physical strength and were associated with their pastoral labour [36]. Several women noted that they rarely were engaged in water management except for cooking for workers during the installation of water system [51]. Scuderi et al. [56] reveal that civic participation tends to reproduce the structure of society, in societies where women's progress is restricted, their participation in community activities is often similarly constrained [56]. Therefore, this sort of nominal representation in committees only serves a tick-marking purpose [55] and it does not automatically ensure women's influence [61].

The election process for these committees too seemed a bit compromised with local gender power relations coming into play. Schnegg and Linke [36] describe the process as more of a '*negotiation*' or '*consensus-seeking effort*' [36], with usually one or two people deciding and others supporting it [39]. In contradiction,

Akwataghibe et al. [42] found it as a fairly open process where members were selected based on merit and respect at a local meeting [42]., however, they don't take into account how such attributes are prescribed in the first place in a patriarchal society where older men by default are considered to be most respected figures. Some positives were observed in Anderson et al. [48] study in Nepal enabled women's leadership to promote positive WASH behaviours, with the support from local development organizations, other community leaders, and families to get accepted, especially by other men who were abusive and disrespectful initially [48]. However, none of the men ever faced such emotional challenges or had to seek companionship support to deliver their tasks. It was also unsurprising to see women more commonly in unpaid positions than men. Involvement of women in committees evidently varied across locations and committee roles and responsibilities were often on the gender lines.

3.3.3 Myth 3: Quota system automatically ensures acceptance and support for women in water committees.

Basically, in most instances, even if committee members or the wider community expressed support for women's participation and leadership, it frequently reflected social expectations rather than any active efforts to foster women's involvement in water committees.

The duality between intent and reality was evident. During FGDs with 210 committee members across 27 committees in Kenya, Hannah et al. [37] found that women's contributions were valued for their ability to resolve issues, have a 'cooling effect' in helping bring group consensus, work well with other members and officials, and have a better understanding of water issues. In individual interviews with 105 of them, about 80% respondents seemed content with women's contributions to the committee. The remaining 20% seemed discontent as women were inactive or weren't doing enough, and a few were simply discontent with the current quota and wanted even more women on the committees [37]. However, survey results with the same members revealed a leadership gap with women less frequently reporting to have led meetings or addressed complaints raised by fellow members. Not only was there a statistically significant difference between women's and men's self-reported frequency of participation in committee activities, women were also less willing to lead meetings [37].

In a study in Bolivia, over 99% of respondents said women had an equal chance of serving on the committee.

Still, women were stymied in their ability to participate due to pressure from their personal lives [38]. In a study in Nepal though, men from the study not only decided who would attend water committee meetings in their household but often attended themselves [55]. In a study in Tanzania, the study found that it was generally considered unacceptable for women to speak in public and the wider community too did not participate much in water management [61].

In a study in Uganda, women's participation in activities seemed to increase their social awareness, willingness to contribute, and were twice more likely to be aware of local water user rules than men [41]. There was an overwhelmingly positive recognition of the role of women as crucial during construction and collective action towards its maintenance. But, when it came to community contribution, in-kind was mostly preferred, and unsurprisingly again, women seemed to contribute the most through cleaning [40]. Shockingly, Naiga et al. [41] survey results found that male community members were less likely to trust committees with women, while female members showed higher trust and were more willing to contribute when women were included [41]. However, qualitative results couldn't explain the gender bias with both men and women sharing similar sentiments of trusting women because they have stronger feelings of shame, do not drink or smoke, and value water more than men [41].

Another aspect of women's empowerment projects was emphasizing sole decision-making, which was critiqued by Leder [39], arguing that in many local contexts, women seek support and acceptance from husbands and in-laws rather than make independent choices. Support from families was seen as essential in Ghana, Bolivia, and Nepal if women were to participate [38,39,50]. A pattern of feminisation of roles is observed. Nevertheless, women seemed to face additional issues even to contribute to those roles.

3.3.4 Myth 4: Women everywhere experience similar barriers

We found that women's participation and leadership in water governance are shaped by complex, intersecting identities and gender power relations that are highly household and location specific. Across diverse contexts, their roles and agencies were influenced by household characteristics, local norms, social power relations, and structural inequalities.

Two different studies in Kenya found different things reaffirming that context matters. While gender was not a significant predictor of participation frequency in committee activities in one study [37], another found that it

was indeed the unequal gender power dynamics that limited women's autonomy in resolving WASH issues, despite their understanding and knowledge of it [47].

Elsewhere, quota did not necessarily allow the nuance required to navigate the complexities surrounding gender equity [51]. Here, women's participation was not just about having nominal representation on committees, but also which clans/ tribes they represent, their kin relationship to other committee members especially those holding key positions, and if they have the agency to voice concerns. Women could exert some influence on community decision-making indirectly or passively through male relatives such as husbands, brothers, and sons. However, their degree of agency varied based on where they'd be situated, with more respect and right to voice at the tribal level when surrounded by extended family members, rather than village level [51].

Multiple intersecting identities of the committee members affected the ways they participated and benefitted such as gender, class, caste, geographical location, and others [55]. In addition, it was also impacted by household characteristics such as position within the family and multiple responsibilities at home as well as social factors such as kinship, social hierarchy and capital, and elite control [55].

Even attitudes prescribed to women were not same across countries emphasising the importance of context. While some women were labelled 'impossible' or 'macho', an attitude that could further discourage them from public participation [41], elsewhere, if a woman speaks up, not only does she spoil marital prospects for other women but the entire family too gets labelled for having 'bad and 'noisy' women [61]. There were variations in comments for speaking up too as their social positions mattered. Where one woman was nicknamed 'brave and fearless' for speaking up at community meetings, another who was a board member got excluded from meetings for doing the same [50] which reveals power issues within committee members.

Women's limited leadership experience too was not similar between villages [46]. For instance, despite communities preferring women as treasurers in a study in Ghana, only two of five actually handled money while others simply accompanied male counterparts in collecting and maintaining revenue. In one village, a woman assumed oversight of the committee when it was reduced to two members and not only collected the water fee but kept the bank book and hand pump locked [46].

Age and marital status were specific criteria applicable only to women, and varied depending on the village [61]. Married women or older widows were preferred over single ones with their rationale based on permanent residence in the village, spouse interference, and bias against younger women [61].

Bisung and Dickin [49] examined household decision-making in Ghana related to WASH expenditures, community planning, and water collection [49]. Their findings implied that WASH decision-making is gendered and contextual with more women reporting high autonomy in water-related decisions and participation in comparison to men, unlike sanitation where more women reported no input [49].

We also find that it is not just women on committees who participate and benefit differently, it's also the wider community. Leder et al. (2017) show that the relationship between water and women's empowerment is highly location and household-specific and complex [39]. Women's agency depended on family support and household composition while their gender relations dictated if they could participate. They had to seek permission and arrange for others to do their gender-ascribed household chores in their absence. The study urges project implementers not just to limit the use of gender as a category but instead adopt intersectionality by taking gender relations into account, which would also avoid the reproduction of simplistic and apolitical narratives of women's empowerment [39]. Meanwhile, in Lesotho, participation in any local collectives depended on class and social position, reflected in the micro-politics involved with local collective action [38].

Thus, women's participation in committees must be understood within the sociocultural context in which the committees exist and function. As Cairns et al. [38] summarize that ensuring attention to full gendered relationships is paramount and not just the rote inclusion of women [38]. Participation is not a silver bullet for women's empowerment in rural areas and rather its effect depends on context and type of participation [56]. Women don't always act in other women's interests when they occupy positions of power and neither can it be assumed that the participation of a few will lead to better outcomes for other [61].

Overall, it raises pertinent questions around women's participation in water governance. Is the participation just for 'empowerment' and if so what is that anyway? Or wasn't the participation supposed to be about better and more equitable service delivery?

3.3.5 What are the other constraints to women's participation in committees?

We found that women's participation in water committees is constrained by a combination of cultural norms, patriarchal attitudes, household-gendered responsibilities, economic limitations, and structural barriers. Limiting factors such as location-specific patriarchal socio-cultural norms, lack of confidence, discriminatory perceptions of women's capacities, and significant household workloads and time constraints were recurring challenges. Structural challenges like poor monitoring and enforcement of gender policies, lack of education and training, lack of experienced trainers, delayed payments, irregular meeting schedules, and a lack of response to demands made, dictated their ability to engage. In addition, women's participation depended on their confidence, ability to negotiate, social and household position, land ownership, kinship ties and other social relations, age, marital status, children's age, and support from family, the lack of which further hindered meaningful participation. Important here to note is that sometimes women simply did not want to participate either. Abu et al. [45] found the barriers to participation in WASH decision-making were not only interlinked but reinforced each other.

Socio-cultural norms and patriarchal attitudes persistently limited women's roles, where local norms influenced committee roles which reinforced gender stereotypes and restricted their participation and contribution [37,39,41,42,45,46,55,61]. Women struggled to assert their decision-making roles to avoid interpersonal strife within their families and communities [38,55], their opinions and roles were of secondary importance [37], made men less likely to trust a committee with women on it [41], and elsewhere, both men and women generally thought that women must prioritize their household tasks and then participate in activities to earn money [44].

A pattern of women withdrawing from committees was observed because of husband's objections who cited religious dictum of what is acceptable and not. Just like women taking positions can inspire other women, similarly women withdrawing too can discourage other women from accepting such public leadership positions [61].

Women's social position as well as their household position mattered as women couldn't speak up in the presence of older men from the family [50,55]. Similarly, women's age, their children's age, and their social relations too played a role in whether they could participate [39].

Household workloads and time constraints left little time for committee work with women balancing multiple domestic and agricultural responsibilities [37,38,50,55,61]. Interestingly, some men engaged in domestic tasks to support women's engagement in community activities [50]. Economic limitations too, where women's inability to meet monthly financial contributions for participation in self-help groups or their disbelief in money-saving restricted their involvement [38]. Women refrained from attending gatherings where decisions were made because they didn't have the financial independence to make any commitments [45]. Shyness and lack of confidence further constrained their willingness to participate [37,38,41,50]. Lack of education/capacity further limited women from participating [37,41,45,61]. Finally, some women simply didn't want to serve on the committee [37].

Structural issues such as lack of response to demands made by the community, lack of experienced trainers, delayed payments, and irregular meeting schedules, impeded women's effective engagement [54]. Irregular schedules, untimely information and disappointment in water project were some other barriers [61]. Women had no support for their opinions [37], and sometimes, without any action on their suggestions [50]. Poor monitoring and enforcement of gender policies was also a hindrance. Women's limited control over land limited their participation in committees or any water-related decisions with land being a crucial in-kind contribution towards water infrastructure [41].

Overall, the context-specific and intersectional nature of women's participation in rural governance, revealed significant variation across districts, shaped by economic disparities, public good endowment, and ethnic tensions, reflecting complex socio-political settings. Civic participation, particularly through religious and charity activities, emerged as a vital mechanism for fostering participation in some places, improving governance and raising awareness. However, these activities' effectiveness depended on concurrent societal progress, including gender equality and women's emancipation. In areas with severe gender inequality, civic participation alone was insufficient to shift perceptions or empower women meaningfully, pointing to the need for locally tailored interventions [56].

3.3.6 What happens when these challenges are not sufficiently addressed?

We found that when challenges to women's participation were not adequately addressed, interventions often led to unintended or negative outcomes or reinforced stereotypes. Efforts to include women without

accounting for local contexts, power dynamics, and structural barriers frequently resulted in tokenistic and coerced participation or ineffective outcomes. This once again highlights the critical importance of understanding intersectional identities, addressing systemic inequalities, and ensuring that initiatives are genuinely empowering rather than merely symbolic.

Gender mainstreaming without accounting for gender power relations inadvertently drove negative outcomes for women in a local watershed committee [38]. Instead of creating spaces where women could meaningfully engage and represent themselves, they were often coerced into attending meetings mandatorily without considering their migrational work arrangements and inability to make monthly monetary contributions. The NGOs became fluent in ‘gender talk’ enforcing women’s participation but were unable to describe why and ended up governing women rather than empowering them [38]. While the projects were meant to counterbalance the entrenched gendered roles through women’s participation, without addressing the local cultural biases, they made it even more burdensome [38].

Even when women were on committees, they waited for men to arrange for pump repairs while they and their children reverted to fetching water from long distances [46]. Instead, providing pump technician training had far better impacts. However, intriguingly, the reason for training women primarily was because the previously trained men migrated away from their locations along with the provided tools, and history suggested that women were less likely to migrate away [46].

An RCT study looking at using the existing all-women groups to train women on Health, Nutrition, and WASH topics to increase better health outcomes for them had interesting observations [54]. At the end of the year, while there was some positive impact on household water storage and treatment, the study did not find the expected impact on the health outcomes, also strikingly only 11% of the treatment group ever heard of the project! This again suggests that local politics influence who is engaged and how [54]. A similar intervention elsewhere however had different results where women caregivers strengthened their social capital and received knowledge on WASH behaviours through cluster meetings and household visits [53].

In a few instances, participation worsened community standing for female treasurers due to money conflicts [36], where women despite serving the role for decades often doing additional chairperson tasks such as leading meetings, eventually resigned due to accusations. Although respected in the village, a local village

member reflects *'you cannot work with money when you are hungry yourself'* indicating how rumours stem from just being in a certain social position [36]. Women engaged in public spaces were often met with unfair criticism and humiliating stereotypical assumptions such as accusations of extramarital affairs [61]. Despite an increased number of women in water committees in a few places, there have been contradictory effects on water supply improvement for some users as it reinforced existing inter and intra-village inequalities [52]. Old committees collapsed and new ones were formed, while it remains unclear if previous challenges for collapse were adequately addressed [51].

Another emerging issue of rote inclusion on committees is increasing the workload of those already active in the community. Over 94% women and 83% men were also part of groups other than the water committee in a study [37]. Such significant multiple responsibilities raise questions about the effectiveness of their contribution as well as their unpaid labour.

Concerns around community-based and committee-based collective action are aptly summarized by Archambault and Ehrhardt [62]. They identify 'committeefication' as a process in which committees have become central to development interventions [62]. While highlighting the potential of the function of committees, they bring attention to the danger they present in weakening existing forms of local collective action *'in the guise of democracy and deliberation'* [62].

A lot of these findings are not new and have been highlighted decades before the SDG era itself, for instance, as noted in Cleaver's [63] seminal 'Paradoxes of Participation'. However, despite such evolved feminist research and advocacy, WASH research and interventions continue to be highly technocratic even when it comes to implementing gender-responsive/ transformative processes. It doesn't seem that SDG implementation has learned from evidence and continues to promote stereotypical narratives.

3.4 Narrative 2: Lack of water facilities at home puts women at increased risk to violence

The second narrative that women and girls face violence due to inadequate water supply services is widespread and often uncritically perpetuated. Variations on this claim are common with lack of water facilities at home frequently linked to increased risks of violence for women and girls, for instance, "Every step a girl takes to collect water is a step away from ... safety" [64], and "Without safely managed WASH services, women and girls are vulnerable to abuse, attack, and ill-health" [2] ([UN Water](#)). These messages are reinforced

by development actors in their work by claiming that women accessing WASH facilities outside the home, particularly at night, are at heightened risk of violence and harassment [65].

While such narratives effectively draw attention to the issue of WASH-related Gender-Based Violence (GBV), they are overused and often conflate risk with causation, further limiting women’s access to public spaces. The oversimplification of these narratives reinforces patriarchal messaging as seen in India’s *Swachh Bharat Mission* (SBM), a behavioural change program to end open defecation along with the construction of toilets. Several campaigns and speakers ended up presenting toilets as either a solution to prevent rape and harassment of women and girls or reinforced the patriarchal ideas of women’s seclusion rather than addressing the structural issues that limit women’s freedom of movement [66]. For instance, a senior politician in 2022 claimed that “...the rate of rape has come down because the prime minister gave women ‘izzatghar’ (toilet)...” despite there being no evidence of any correlation between the two. Funnily enough, a factchecker site found that the States with highest number of rapes or attempts had higher access to toilet facilities [67].

As Srivastav and Gupta [66] argue, “Our response should be to create a society where women can move freely without fear, not eliminate the need for women to go outside their homes altogether”. They add findings from another sanitation survey, noting that more women faced harassment while going to the market (7.6%) than while defecating in the open (4.3%), and make a rhetorical argument that if toilets are promoted as a solution to sexual violence, then by the same logic, e-markets should replace rural markets for women to prevent harassment—highlighting the flawed assumption that infrastructure alone solves gender-based violence. Some may argue that reduced risk to GBV is an additional outcome, rather than intended, but which messaging takes precedence is evident in the above examples.

Also interesting to note how this messaging has shifted over the years. A 2008 study uses a careful language “Other direct benefits (of improved water and sanitation access) include enhanced dignity, and less exposure to hazards associated with water fetching such as opportunistic gender-based violence” [68]. This is an example of narratives that don’t promote outright problematic statements but rather attempt to reveal a reality. We have no objections to such claims. It is only with those that are exaggerated or invariably reinforce patriarchal gender norms.

Before delving further, it is worth understanding the typology of violence. Challenging the common misconception of equating GBV solely with sexual violence or harassment, Sommer et al. [69] and Nunbogu et al. [70] provide four broad categories offering valuable guidance in water-related GBV discussions.

1. **Physical violence** (Beatings, stoning, or fights, at home or water points, leading to injury or death);
2. **Psychosocial violence** (Emotional abuse such as stress, fear, public embarrassment, verbal harassment, bullying, threats of divorce, and disrespect);
3. **Sexual violence** (Acts like rape, molestation, assault, or groping, which are often handled in secrecy);
4. **Structural violence** (social arrangements and power relations that shape people's experience and vulnerability to gender violence, political marginalization/ discrimination).

Despite the significance of water supply-related GBV, research on the topic remains underexplored. Of the ten studies on this topic in the last decade (see S7 Table. Water related GBV), only two focused on water-supply-related GBV. One of which makes compelling arguments of assaults being directly attributable to inadequate wash, framing gender violence as a WASH-related risk [71]. However, it ranked low in quality appraisal due to methodological and sampling concerns. For instance, it was unclear why Masters students (previous social and health professionals) at a Ugandan university were taken as a surrogate sample and women in villages were dismissed as hard-to-access [71], probably as it was a Masters' dissertation, remains unclear. It also failed to clarify whether these professionals had direct accounts from the women they served, raising questions about the validity of its findings. Its methodological shortcomings notwithstanding, this study was the most cited paper in this review, likely due to its oversimplified narrative. Additionally, while the study suggested that women faced a risk of abuse from men when leaving their homes, regardless of whether they were seeking WASH access [71], it largely overlooked male behaviour, accountability, and the role of power dynamics.

The utter lack of documentation of survivor experiences of water-related sexual violence is starkly notable. Only three studies provided direct accounts of individuals who faced other types of violence: Physical [70,72,73], Psychosocial [70], and Structural [70,73]. Sommer et al. [69] attribute the gaps in survivor documentation to cultural sensitivities around shame, risks to survivors if their experiences are made public, and the lack of training among WASH practitioners to handle such sensitive topics. One of the issues is also treating GBV as disaggregated by sector rather than as part of broader socio-economic relations.

3.4.1 Do improvements in water supply reduce women's distress?

Although not explicitly framed as psychosocial violence, six studies reported psychological distress linked to water insecurity [45,72,74–77]. Houweling [74] draws attention to women's emotional burden when faced with terrible choices between fulfilling roles as wives or mothers, leading to anxiety, shame, and guilt. They advocate for moving away from externally imposed frameworks and instead adopting locally rooted ones that incorporate emotions, values, and household relationships to better capture water's gendered impact, beyond conventional rhetoric [74]. We further ask, who would these measures be for? Are they to meet reporting requirements of donors or to help rural communities reflect and work on the complex gender-power relations?

Predictably, a study found that living in a water insecurity hotspot significantly increased depressive symptoms among women but not men [76]. However, what was more striking was the evidence challenging the assumption that water supply improvements automatically reduce women's distress. Stevenson et al. [75] examined community water supply improvements in Ethiopia and found that while household water insecurity declined, there was no direct impact on women's psychological distress. Another study in Ethiopia too found no difference between men and women in emotional responses to water insecurity, despite formative research showing highly gender-differentiated water-labour [78].

Instead, improved harvests emerged as the strongest predictor of women's reduced distress [75], which makes more sense as part of a holistic view of livelihoods. This emphasizes the need to move beyond narrow water-focused narratives and consider the entire local context.

3.4.2 On freedom of movement

Framing household water access as a solution because the "outside" is unsafe for women fundamentally clashes with broader gender equality efforts that advocate for women's right to public spaces. Phadke et al. [79] in their book 'Why Loiter?' ascertain why "the right to loiter is a fundamental right to everyday life, a strategy of dissent against gendered spatiality."

Though rarely explored, some WASH studies highlight the social benefits of water collection. Caruso et al. [17] systematic review notes that in Bangladesh, young women enjoyed fetching water from distant sources as it

provided opportunities to leave home and socialize. In rural Odisha, even women with household latrines sometimes preferred defecating in the open to meet friends and escape chores and mothers-in-law. Another study showed how water-fetching en route offered young women unsupervised time to secretly date potential partners [71].

Development actors and implementing agencies frequently emphasize the safety risks women face when fetching water outside. However, what remains largely absent are the voices of diverse women themselves — their perspectives, experiences, and critiques of these narratives — as well as platforms that enable their critical reflection.

3.5 Narrative 3: Piped water supply saves women time that they use for income-generating activities

The third widely popular narrative is that improved water supply saves women time, enabling their economic empowerment. While several variations of this claim exist, it is yet another demonstration of women's water labour and why interventions need to target them.

For instance, this narrative is exemplified in India's rural water supply program, Jal Jeevan Mission (JJM), which suggests that "... (women's) saved time can be used for their livelihood which will bring dignity to them" [80], reflecting the broader development tendency to equate time savings with economic participation. Although, some other parts of the same report does mention that the newfound time by women "...may be used in learning a new skill or other income generating activities, support children's education, or even for leisure" [80], the overall sense is towards more economic aspects.

These presumptions often oversimplify lived realities and it remains unclear whether these economic opportunities stem from improved water access itself (e.g., more water for gardening, livestock farming) or merely enable women to extend existing activities such as farming or sewing, as the availability of new job opportunities remains questionable in regions with persistently high unemployment rates, especially in Low- and Middle-Income Countries (LMICs). Also, the question of whether income-generating activities necessarily generate additional income. For instance, farming outputs are dependent on several market factors. And where does the capital come from to initiate gardening/ farming, such as seed costs.

The empirical evidence around the claim that time savings translate into economic opportunities is both sparse and complex, once again drawing attention to the importance of context-specific interventions and research. This review synthesizes findings from nine studies [38,39,44,45,74,77,81–83] that studied the relationship between women’s time savings from piped water supply and their economic engagement.

Overall, time savings through improved water access is a boon for women regardless of income generation [74]. It remains questionable if they can make strategic choices of what to do with the saved time themselves. Time savings also do not automatically lead to opportunities for economic empowerment, challenging the mainstream development narrative that assumes women are eager to escape domestic roles and enter the market economy. As Indarti et al. [82] note that women not necessarily being motivated to pursue economic benefits from their involvement in WASH activities is worth reflecting upon. Additionally, previous studies too have shown that women's overall workload does not necessarily decrease despite successful water interventions, nor do most engage in activities considered 'empowering' by development actors [68]. Not to forget that economic participation also requires resources—technological, financial, and social—that many households (HHs) lack [77].

3.5.1 Time Savings and Economic Utilization

Empirical research suggests that while piped water access reduces time spent on water collection, the assumption that this automatically leads to economic empowerment is overly optimistic.

Winter et al.’s [77] study in Zambia showed a 70% reduction in time spent collecting water (fetching time decreased from 13 to 2 mins.), with saved time primarily reallocated to HH chores (52%), followed by gardening (39%) and roadside vending (35%), where women could select multiple options. This highlights the precedence that domestic responsibilities continue to hold in women's lives, even when time is saved through infrastructure improvements. The economic gains too were uneven between women, favoring wealthier HHs with resources for larger gardens [77].

However, their conceptual model warrants scrutiny as it rests on a series of optimistic and linear assumptions that don’t account for power dynamics and contextual constraints. It begins by presuming that improved access will enable HHs to use more water and spend less time collecting it [77]. These time and water inputs are then assumed to support productive activities such as farming, which are then expected to increase income and savings [77]. This, in turn, is projected to enhance the quantity, diversity, nutritional value, and reliability of

food access, with further suggestions that these improvements may positively influence child development [77]. In particular, the model suggests that, the benefit from a reduced time burden, enables them to reallocate time to income-generating work, education, caregiving, and leisure [77]. These linear theories of change urgently call for increased transdisciplinary collaborations with social scientists who can enrich study designs to better reflect complex lived realities, and caution through existing literature that no single intervention can serve as a magic bullet for achieving development goals.

While the above study showed that more HHs preferred reallocating time to chores, Bisung and Elliott's [81] study in Kenya showed a contrast with more HHs (43%) using the saved time (avg. 50 mins) for income-generating activities than chores (29%) or leisure (28%). It was interesting to note that although HHs with piped water access generally saved more time than those without, the difference in the amount of time savings between HHs with piped water outside the home vs. inside was not substantial.

Another interesting study was by Magbonde et al [83], which used a panel dataset to look at the difference in economic impacts between public and community-led piped water supply projects and found that HHs with either piped water access, on average were found to have higher total and food expenditure per capita. However, while employment was greater in HHs with public piped water supply, those HHs receiving community-led supply saw no employment difference. Particularly, they find that improved water services has an even higher impact when complemented with other infrastructure interventions such as roads [83].

3.5.2 Structural constraints and the vicious cycle

Multiple structural barriers limit the extent to which women can convert time savings from improved water access into meaningful empowerment. One key issue is land ownership: women often lack direct control over land, and joint ownership does not guarantee equal decision-making power [4]. Even when women farm, they may do so on their husband's land under his directive [68].

Intra-household dynamics also shape how time savings are used. Women's labor is frequently directed by male family members, who maintain control over income and resources [68], a sentiment echoed by women and men alike elsewhere [44]. Previously held strong objections against women venturing out to generate income were overcome for many reasons such as NGOs sensitization, eventual financial contribution by women to HH maintenance, economic hardships and higher cost of living demanding multiple incomes [44]. This may have expanded women's participation in the public sphere, but not necessarily their autonomy. In some cases, men

had to *accept* their wives *help* in farming as labour costs increased, enabling women's access to the so-called public space [44].

Ivens [68] notes that a deeper look into women's and men's roles and time use provides an indication of women's limited negotiation power in the HH, which influences what is done with the time saved. Hence, it cannot be assumed that increased water access reduces women's workload or strengthens their empowerment. Moreover, exact figures on time use vary widely between and within regions, per person, over time with considerable seasonal variations, once again cautioning against the nature of claims that homogenizes women's experiences [68].

Another major issue is wage inequality, with women often paid less than men for the same work [44]. Even when improved water access enabled women to do small-scale commercial horticulture, these gains did not lead to any transformation in status for women, especially for young daughters-in-law, who rarely saw improvements in bargaining power [39].

Without being financially independent, women's contribution to specific types of WaSH infrastructure that meets their needs continues to be limited [45]. But, social expectations and cultural norms have an influence women's motivations. Indarti et al. [82] examine the complexity by sharing the motivations behind economic engagement. While some women had to support families in the event of their unmarried status or a spouse's death/ disability, others lacked interest due to conflicting social expectations, lack of support from family/ community, or religious norms [82].

Echoing critiques of the 1980s 'smart economics' model, scholars like Chant and Sweetman [84] argue that women were often expected to fill service provision gaps left by state withdrawal during failed economic restructuring, reinforcing rather than reducing gendered burdens, with women now responsible for both health and other services while struggling under circumstances of rising male un- and under-employment.

3.5.3 Smart economics vs feminist economics

This distinction matters because it reflects two fundamentally different approaches to women's economic empowerment. While smart economics rationalizes investing in women, leveraging its gains for effective development goals, and using '*women and girls to fix the world*' [84], feminist economics recognizes that

‘gender is relational and gender relations are power relations’ [38], taking into account men’s roles and whether women’s right, choices, and aspirations are represented [84].

Waring [85] made a scathing observation, decades ago, which seems relevant even today. She cautioned that the standards of national economic accounting were a scheme to ‘*keep women in their place*’ by conveniently not recognizing the economic value of household (non-market) labour, women’s volunteer services, their investment in caregiving, and reproduction activities [85]. These pointers continue to be ignored as we see organizations like World Bank tout about dismal female labour force participation rate [86], and promote smart economics because ‘*it enhances productivity and improves other development outcomes, including prospects for the next generation and social betterment*’ [87].

The 'smart economics' approach assumes that infrastructure improvements like piped water will free up women’s time for income-generating activities, enhancing both HH welfare and economic growth [38]. In Lesotho, however, Cairns et al. [38] found that despite relief from water collection burdens, few women showed interest in initiating businesses or gardening cooperatives. Constraints included unequal access to resources, class divisions, varying social positions, and husbands returning from migrant work reclaiming agricultural work [38]. Moreover, women often avoided income opportunities to preserve interpersonal relationships at the risk of appearing well-off than others, reflecting how entrenched gender norms shape economic behaviour [38].

In contrast, a feminist economics lens challenges the misplaced focus of women’s economic empowerment for the interests of development rather than promoting women’s rights for their own sake [84]. It recognizes that gender relations are power relations that informs the nature of women’s relationships with water development projects [38]. It further recognizes unpaid domestic and care labor as critical economic contributions and draws attention to the fallacy of assuming that simple generation of income can empower women. This framework helps unpack the social and economic impact of water work done within and outside the market economy and encourages this understanding in water projects [38].

This is not to say there’s been no success so far. Several previous studies compiled by Houweling [74], demonstrated that when small enterprise training and support are integrated into water projects, women are more likely to enter economic activities using their time saved. However, their study contradicted this

dominant development discourse showing that women did not typically take on new roles or initiate income-making activities but rather spent the saved time in existing agricultural, domestic, and social activities [74].

3.5.4 Reframing Unpaid Work

Development interventions must recognize the unpaid, undervalued nature of domestic labor as central to a feminist economics framework. However, these calls remain under-addressed. For instance, a popular UK-based charity documented that water fetching meant women were "...less able to work" [88]. While well-intentioned, these seemingly harmless few words continue to invisibilize HH work, perpetuating the myth that only paid labor constitutes economic contribution. As scholars note, women's unpaid domestic work is key to supporting both the paid economy and the household itself [89] and simply expecting women to use improved water access for generating tangible income or take up leadership roles (sometimes, if not mostly, voluntarily) in water governance, without alleviating existing constraints, risks creating additional unpaid burdens [38]. Additionally, extra income could also mean extra physical burden including long walks to markets that are time-consuming, tasks that men in the study area of Nepal deemed degrading for them and refused to do [39].

Overall, the 'feminization' of employment and increase in number of women in paid employment has not always translated into improved incomes or exercise of power [90].

4 Discussion on why myths persist?

Distorted gender narratives are neither a recent trend nor a water sector challenge alone. Hirschman [91], in his powerful analysis of development, as noted by Cornwall et al. [9] argued that for development actors to grapple with the otherwise insuperable obstacles faced in transforming miserable conditions, they need something to believe in that would give them a sense of purpose [9]. They assert that '*development needs its own myths to guide and motivate action*', and the nature of its truth remains immaterial [9].

However, these motivations were at odds with the very conditions they sought to transform. Cornwall et al. [9] observed that what gives these myths power to spur people into action were the familiar images of the deeply held beliefs about women, the very values and norms that feminists sought to transform.

International development too, with their own politics of agenda-setting, produces pressures for sloganizing [9], as observed in a 2013 report on funding for women's rights that identified a trend of using 'women and girls' as a rhetorical priority in almost every funding sector [90]. As aptly noted by Mukhopadhyay [92], these

myths have contributed to reducing the political project of gender and development into something that is
'ahistorical, apolitical, and decontextualized' [9].

Amusingly, studies that use a critical feminist lens too are sometimes prone to overhyping the transformative potential. For instance, this paper, which started its conclusion critiquing the very expectations of sanitation or women to 'fix' every problem from public health to economic conditions, ends with a grand argument that prioritizing women's toilet security by eliminating gender inequality *'will promote state security and world peace'* [93].

4.1 Limitations

The review also has some limitations. Our academic literature searches were limited to English language and also to empirical literature focused on piped water supply, published between 2015-2024. Research could be expanded to include a broader time frame and non-English materials. Incorporating grey literature, national surveys, and other domains like sanitation or health could uncover commonalities and further enrich the analysis. Increasing literature on water and sanitation insecurities in high-income countries [94,95], creates an opportune moment for reviews examining WASH stereotypes in the so-called Global North as well.

4.2 Critical reflections on way forward

4.2.1 Addressing gender inequality is beyond just water sector alone

Gender myths are common in other sectors too such as agriculture [4]. Gender inequality is a relational issue that needs addressing directly, not just by the water sector, not only by women, but by different actors and wider society [84]. There is an opportune moment for cross-sectoral research collaboration on commonalities of myths, and why they continue to persist, as well as further examination of other water-gender narratives. There is also a need for research that centres the voices and experiences of diverse water users, particularly their perspectives on these narratives.

4.2.2 Bringing back attention to State capability and responsibility in service delivery

We believe that water service delivery must be assessed for its actual capability to meet universal needs, not burdened with unrealistic gender goals, but if it claims to promote women's empowerment in its process, it must be held accountable to do so meaningfully. We observe a pattern of misunderstood causality that hints at assumptions like 'if only women can participate better', to 'if only women from all social positions', to 'all

genders' - then water systems would function better. But, the attention is being diverted away from state capability and responsibility in service delivery. Capability of the State in service delivery is the primary issue, gender roles come later. While water engineers alone cannot be expected to solve gender inequality, gender experts too cannot be expected to resolve technical water challenges, necessitating collaborative and interdisciplinary approaches.

There needs to be a clarity of who needs to do what and an enabling environment that can bring these two 'experts' together. Most LMICs don't have a separate department for gender equality but have a dedicated department for primary sectors like water. Hence, it becomes the responsibility of such departments to do their bit for gender equality and they must be held accountable in doing so rather than building a rhetoric. Rather than inflating what water can fix, it is time to better recognize and report what it already offers, and embed feminist ethics and economics to inform more just and grounded interventions.

4.3.2 Ensuring 'universal and equitable access to water' duly acknowledges the power struggles

In a post on Water Alternatives Forum, Schreiner and Van Koppen [96] share how this phrase has become an empty slogan without substance. They raise pertinent questions on whether change in water sector can support other struggles and vice versa, such as struggles for land rights [96] or struggle for interpretive power around what languages, narratives and stories can be used for mobilizing change [9].

All in all, the popularity of these myths reveals not only the relevance of water and gender issues but also how deeply entrenched and emotionally resonant such narratives are. The persistence of these narratives, despite limited empirical evidence, reflects the affective power they hold in shaping development discourse. This often obscures the need for disaggregated, context-specific data that captures the diverse realities of user needs and experiences, particularly in rural and marginalized settings. Some take the form of stylized facts, which contain a kernel of truth, but largely reinforce generalizations and divert attention from the complexities that more granular evidence could reveal.

5 Conclusion

This rigorous review critically examined three widely promoted narratives linking gender and water: women's participation through gender quotas, water-related gender-based violence, and time-saving linked to economic

empowerment. These narratives were unpacked, examining the empirical foundations of studies published since 2015, the SDG era, and complemented with wider discussions.

In summary, a persistent disjuncture was revealed between the widely popular narratives vs. the complex lived realities of women; where representation does not guarantee power, risk is conflated with causality, and time savings are extrapolated to economic empowerment. This review calls for an intersectional lens to counter the tendency to homogenize women's experiences and instead highlights the need for context-specific analysis and practice.

Narratives around gender quotas overstated the transformative potential of women's inclusion in local water committees. While quotas have improved nominal representation, they rarely ensured meaningful participation or leadership. Without addressing entrenched gender norms and structural barriers, efforts remain tokenistic and performative. Quotas have often become a symbolic checkbox rather than a mechanism for power redistribution, reproducing inequalities instead of challenging them.

The portrayal of water scarcity as a source of violence against women simplified a complex issue. While some risks exist, the dominant discourse often reinforces patriarchal ideas of women's seclusion and vulnerability. Fear-based narratives discount women's agency and their rights to public spaces, often overlooking systemic and male accountability. Survivor voices remain largely absent, and popular research on WASH-related GBV lacks methodological rigour and feminist grounding.

Similarly, claims that time savings lead to economic empowerment rested on flawed assumptions. Studies reveal that several factors define if time is saved, how women choose to use it, and whether they have the power to choose. Without control over land, assets, access to markets, or decision-making, time alone does not translate into income or empowerment for all.

Overall, this review offers three original contributions. It is the first rigorous review to critically analyse water-gender narratives across empirical literature. Second, it advances the literature on quality appraisal methodologies in the context of water-gender-focused rigorous reviews. Third, it enhances the reproducibility of conducting rigorous feminist reviews ensuring methodological transparency. Together, these contributions aim to inform more reflective, evidence-based gender analyses in water-related and other similar development policies.

All actors carry preconceived notions of gender relations and by hardening such preconceptions through the recurring use of myths, it gets difficult to grasp the nuance, especially the ones that seem to contradict it [4].

Bringing attention to Cornwall et al's [9] reminder that '*the language of development frames our understanding of contemporary problems*', this review contributes to reframing that language by interrogating persistent gender myths and challenging oversimplified, instrumentalist narratives.

We invite water sector professionals, policymakers, implementers, researchers and development actors alike to reflect and challenge the use of such narratives in their work, show restraint and take caution in not perpetuating gender myths, and raise questions of 'who are these narratives benefitting'? In a development era dominated by top-driven gender-talk where grassroots too often mimic the same language, and externally imposed frameworks have little local meaning misleading water evaluations [74,97], we must find ways to use a feminist ethics approach and socio-ecological justice lens [97] to capture the complex everyday experiences of domestic water users and managers. Finally, we seek to advance the water-gender discourse by advocating for more transdisciplinary collaborations, that challenge the structural inequalities embedded in service delivery and explore the powerful potential of the water sector in advancing gender equality.

Author Contributions

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Formal analysis: SK

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Methodology: SK, PH, AM

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References

- [1] UNICEF and WHO. Progress on household drinking water, sanitation and hygiene 2000-2022: special focus on gender. New York: 2023.
- [2] UN Water. Water and Gender n.d. <https://www.unwater.org/water-facts/water-and-gender> (accessed March 30, 2025).
- [3] Kulkarni S. Gender, Water and Well-being. 2013.
- [4] Doss C, Meinzen-Dick R, Quisumbing A, Theis S. Women in agriculture: Four myths. *Glob Food Sec* 2018;16:69–74. <https://doi.org/10.1016/j.gfs.2017.10.001>.
- [5] Pandey S. Producing women through toilets and sanitary products n.d. <https://blogs.lse.ac.uk/gender/2020/06/18/producing-women-through-toilets-and-sanitary-products/> (accessed March 30, 2025).
- [6] Krishnan K. Fearless Freedom. Penguin Random House India Private Limited; 2020.
- [7] Clark L. Powering Households and Empowering Women: The Gendered Effects of Electrification in sub-Saharan Africa. *Journal of Public & International Affairs* 2021.
- [8] Frey M, Pokkiyarath M, Mohan R, Shibu N B S, Gracia VC, Mohan V, et al. 2017 IEEE Global Humanitarian Technology Conference (GHTC). IEEE; 2017.
- [9] Cornwall A, Harrison E, Whitehead A. Gender Myths and Feminist Fables: The Struggle for Interpretive Power in Gender and Development. *Dev Change* 2007;38:1–20. <https://doi.org/10.1111/j.1467-7660.2007.00400.x>.
- [10] Joshi D. Women, Water, Caste, and Gender: The Rhetoric of Reform in India's Drinking Water Sector. 2013.
- [11] Kim NY, Bang Y, Kim EM. Women's Empowerment Without Power: Strategic v. Practical Interests in SDGs and the Voluntary National Reviews. *Glob Policy* 2022;13:371–89. <https://doi.org/10.1111/1758-5899.13107>.
- [12] Fisher J, Cavill S, Reed B. Mainstreaming gender in the WASH sector: dilution or distillation? *Gend Dev* 2017;25:185–204. <https://doi.org/10.1080/13552074.2017.1331541>.
- [13] Dery F, Bisung E, Dickin S, Dyer M. Understanding empowerment in water, sanitation, and hygiene (WASH): a scoping review. *Journal of Water, Sanitation and Hygiene for Development* 2020;10:5–15. <https://doi.org/10.2166/washdev.2019.077>.
- [14] Nunbogu AM, Elliott SJ. Characterizing gender-based violence in the context of water, sanitation, and hygiene: A scoping review of evidence in low- and middle-income countries. *Water Secur* 2022;15. <https://doi.org/10.1016/j.wasec.2022.100113>.
- [15] Macura B, Foggitt E, Liera C, Soto A, Orlando A, Del Duca L, et al. Systematic mapping of gender equality and social inclusion in WASH interventions: knowledge clusters and gaps. *BMJ Glob Health* 2023;8:e010850. <https://doi.org/10.1136/bmjgh-2022-010850>.
- [16] De Guzman K, Stone G, Yang AR, Schaffer KE, Lo S, Kojok R, et al. Drinking water and the implications for gender equity and empowerment: A systematic review of qualitative and quantitative evidence. *Int J Hyg Environ Health* 2023;247. <https://doi.org/10.1016/j.ijheh.2022.114044>.

- 968 [17] Caruso BA, Conrad A, Patrick M, Owens A, Kviten K, Zarella O, et al. Water, sanitation, and
969 women's empowerment: A systematic review and qualitative metasynthesis. *PLOS Water*
970 2022;1:e0000026. <https://doi.org/10.1371/journal.pwat.0000026>.
- 971 [18] Macarthur J, Carrard N, Willetts J. Wash and gender: A critical review of the literature and
972 implications for gender-transformative wash research. *Journal of Water Sanitation and*
973 *Hygiene for Development* 2020;10:818–27. <https://doi.org/10.2166/washdev.2020.232>.
- 974 [19] Dickin S, Caretta MA. Examining water and gender narratives and realities. *Wiley*
975 *Interdisciplinary Reviews: Water* 2022;9. <https://doi.org/10.1002/wat2.1602>.
- 976 [20] Hagen-Zanker J, Mallett R. How to do a rigorous, evidence-focused literature review in
977 international development: a guidance note. 2013.
- 978 [21] Grant MJ, Booth A. A typology of reviews: an analysis of 14 review types and associated
979 methodologies. *Health Info Libr J* 2009;26:91–108. [https://doi.org/10.1111/j.1471-](https://doi.org/10.1111/j.1471-1842.2009.00848.x)
980 [1842.2009.00848.x](https://doi.org/10.1111/j.1471-1842.2009.00848.x).
- 981 [22] Kabeer N. Gender, poverty, and inequality: a brief history of feminist contributions in the field
982 of international development. *Gend Dev* 2015;23:189–205.
983 <https://doi.org/10.1080/13552074.2015.1062300>.
- 984 [23] Chant S. The “feminisation of poverty” and the “feminisation” of anti-poverty programmes:
985 Room for revision? *Journal of Development Studies* 2008;44:165–97.
986 <https://doi.org/10.1080/00220380701789810>.
- 987 [24] Elmhirst R. Feminist Political Ecology. *The Routledge Handbook of Political Ecology*, 2015.
- 988 [25] Leach M. Earth mother myths and other ecofeminist fables: How a strategic notion rose and
989 fell. *Dev Change* 2007;38:67–85. <https://doi.org/10.1111/j.1467-7660.2007.00403.x>.
- 990 [26] Gusenbauer M, Haddaway NR. Which academic search systems are suitable for systematic
991 reviews or meta-analyses? Evaluating retrieval qualities of Google Scholar, PubMed, and 26
992 other resources. *Res Synth Methods* 2020;11:181–217. <https://doi.org/10.1002/jrsm.1378>.
- 993 [27] Ouzzani M, Hammady H, Fedorowicz Z, Elmagarmid A. Rayyan-a web and mobile app for
994 systematic reviews. *Syst Rev* 2016;5. <https://doi.org/10.1186/s13643-016-0384-4>.
- 995 [28] EndNote 2013.
- 996 [29] Rees R, Woodman J, Thomas J. Children's views about obesity, body size, shape and weight: a
997 systematic review. 2009.
- 998 [30] Hennegan J, Shannon AK, Rubli J, Schwab KJ, Melendez-Torres GJ. Women's and girls'
999 experiences of menstruation in low-and middle-income countries: A systematic review and
1000 qualitative metasynthesis. *PLoS Med* 2019;16.
1001 <https://doi.org/10.1371/journal.pmed.1002803>.
- 1002 [31] Robinson HJ, Barrington DJ. Drivers of menstrual material disposal and washing practices: A
1003 systematic review. *PLoS One* 2021;16:e0260472.
1004 <https://doi.org/10.1371/journal.pone.0260472>.
- 1005 [32] Clark T, Foster L, Sloan L, Bryman A. Bryman's social research methods. Oxford university
1006 press; 2021.

- 1007 [33] NVivo 2017.
- 1008 [34] Thomas DR. A general inductive approach for qualitative data analysis. 2003.
- 1009 [35] Joshi D. The Rhetoric and Reality of Gender Issues in the Domestic Water Sector - A Case
1010 Study from India. University of Southampton, 2002.
- 1011 [36] Schnegg M, Linke T. Travelling models of participation: Global ideas and local translations of
1012 water management in Namibia. *Int J Commons* 2016;10:800–20.
1013 <https://doi.org/10.18352/ijc.705>.
- 1014 [37] Hannah C, Giroux S, Krell N, Lopus SE, McCann LE, Zimmer A, et al. Has the vision of a gender
1015 quota rule been realized for community-based water management committees in Kenya?
1016 *World Dev* 2021;137. <https://doi.org/10.1016/j.worlddev.2020.105154>.
- 1017 [38] Cairns MR, Workman CL, Tandon I. Gender mainstreaming and water development projects:
1018 analyzing unexpected enviro-social impacts in Bolivia, India, and Lesotho. *Gender, Place and*
1019 *Culture* 2017;24:325–42. <https://doi.org/10.1080/0966369X.2017.1314945>.
- 1020 [39] Leder S, Clement F, Karki E. Reframing women’s empowerment in water security programmes
1021 in Western Nepal. *Gend Dev* 2017;25:235–51.
1022 <https://doi.org/10.1080/13552074.2017.1335452>.
- 1023 [40] Naiga R, Ananga EO, Kakumba U. Gendered Participation in Water Governance: Implications
1024 for Successful Communitybased Water Management and Women Empowerment.
1025 *International Journal of Rural Management* 2024;20:255–70.
1026 <https://doi.org/10.1177/09730052231202567>.
- 1027 [41] Naiga R, Penker M, Hogl K. Women’s Crucial Role in Collective Operation and Maintenance of
1028 Drinking Water Infrastructure in Rural Uganda. *Soc Nat Resour* 2017;30:506–20.
1029 <https://doi.org/10.1080/08941920.2016.1274460>.
- 1030 [42] Akwataghibe N, Wegelin M, Postma L, Fajemisin W, Banda MM, Khan F, et al. Exploring equity
1031 focus of the shawn wash programme in Nigeria. *Journal of Water Sanitation and Hygiene for*
1032 *Development* 2018;8:546–55. <https://doi.org/10.2166/washdev.2018.020>.
- 1033 [43] Allen E, Maria Morazan I, Witt E. Actively engaging women is helping solve the global water
1034 crisis. *Journal of Water Sanitation and Hygiene for Development* 2018;8:632–9.
1035 <https://doi.org/10.2166/washdev.2018.025>.
- 1036 [44] Bahauddin KM, Huq H. Cinderella and the missing slipper: Gender dynamics in water
1037 management in the coastal region of bangladesh. *Journal of Water Sanitation and Hygiene for*
1038 *Development* 2018;8:660–7. <https://doi.org/10.2166/washdev.2018.087>.
- 1039 [45] Abu TZ, Bisung E, Elliott SJ. What if your husband doesn’t feel the pressure? An exploration of
1040 women’s involvement in wash decision making in Nyanchwa, Kenya. *Int J Environ Res Public*
1041 *Health* 2019;16. <https://doi.org/10.3390/ijerph16101763>.
- 1042 [46] Sam JM, Todd SK. Women as hand pump technicians: empowering women and enhancing
1043 participation in rural water supply projects. *Dev Pract* 2020;30:357–68.
1044 <https://doi.org/10.1080/09614524.2019.1703904>.
- 1045 [47] Varickanickal J, Bisung E, Elliott SJ. Water risk perceptions across the life-course of women in
1046 Kenya. *Health Promot Int* 2020;35:639–48. <https://doi.org/10.1093/heapro/daz055>.

- 1047 [48] Anderson DM, Gupta AK, Birken S, Sakas Z, Freeman MC. Successes, challenges, and support
1048 for men versus women implementers in water, sanitation, and hygiene programs: A
1049 qualitative study in rural Nepal. *Int J Hyg Environ Health* 2021;236.
1050 <https://doi.org/10.1016/j.ijheh.2021.113792>.
- 1051 [49] Bisung E, Dickin S. Who does what and why? Examining intra-household water and sanitation
1052 decision-making and autonomy in asutifi North, Ghana. *Journal of Water Sanitation and*
1053 *Hygiene for Development* 2021;11:794–804. <https://doi.org/10.2166/washdev.2021.039>.
- 1054 [50] Dery F, Bisung E, Dickin S, Atengdem J. ‘They will listen to women who speak but it ends
1055 there’: examining empowerment in the context of water and sanitation interventions in
1056 Ghana. *H2Open Journal* 2021;4:231–43. <https://doi.org/10.2166/h2oj.2021.100>.
- 1057 [51] Love MW, Beal C, Gonzalez D, Hagabore J, Benjamin C, Bugoro H, et al. Challenges and
1058 opportunities with social inclusion and community-based water management in Solomon
1059 Islands. *Development Policy Review* 2022;40. <https://doi.org/10.1111/dpr.12597>.
- 1060 [52] Masanyiwa ZS, Niehof A, Termeer CJAM. Users’ perspectives on decentralized rural water
1061 services in Tanzania. *Gender, Place and Culture* 2015;22:920–36.
1062 <https://doi.org/10.1080/0966369X.2014.917283>.
- 1063 [53] Malolo R, Kumwenda S, Chidziwisano K, Kambala C, Morse T. Social outcomes of a
1064 community-based water, sanitation and hygiene intervention. *Journal of Water Sanitation and*
1065 *Hygiene for Development* 2021;11:483–93. <https://doi.org/10.2166/washdev.2021.264>.
- 1066 [54] Bogler L, Bommer C, Ebert C, Kumar A, Subramanian S V., Subramanyam MA, et al. Effects of a
1067 large-scale participatory learning and action programme in women’s groups on health,
1068 nutrition, water, sanitation, and hygiene: a cluster-randomised controlled trial in Bihar, India. *J*
1069 *Dev Effect* 2024;16:246–63. <https://doi.org/10.1080/19439342.2023.2217164>.
- 1070 [55] Raut M, Varady RG, Rajouria A. Gender and social inclusion in community water resource
1071 management: lessons from two districts in the Himalayan foothills and the Terai in Nepal.
1072 *Water Int* 2023;48:547–66. <https://doi.org/10.1080/02508060.2023.2213962>.
- 1073 [56] Scuderi R, Tesoriere G, Pedrini G. Social capital and women’s willingness to pay for safe water
1074 access: Evidence from African rural areas. *South African Journal of Economics* 2023;91:161–
1075 85. <https://doi.org/10.1111/saje.12344>.
- 1076 [57] Leahy C, Winterford K, Nghiem T, Kelleher J, Leong L, Willetts J. Transforming gender relations
1077 through water, sanitation, and hygiene programming and monitoring in Vietnam. *Gend Dev*
1078 2017;25:283–301. <https://doi.org/10.1080/13552074.2017.1331530>.
- 1079 [58] Agarwal B. Conceptualising environmental collective action: why gender matters. vol. 24.
1080 2000.
- 1081 [59] Agarwal B. Participatory Exclusions, Community Forestry, and Gender: An Analysis for South
1082 Asia and a Conceptual Framework. 2001.
- 1083 [60] Agarwal B. Does Women’s Proportional Strength Affect their Participation? *Governing Local*
1084 *Forests in South Asia*. *World Dev* 2010;38:98–112.
1085 <https://doi.org/10.1016/j.worlddev.2009.04.001>.
- 1086 [61] Mandara CG, Niehof A, Van Der Horst H. Women and Rural Water Management: Token
1087 Representatives or Paving the Way to Power? 2017.

- 1088 [62] Archambault C, Ehrhardt D. The committeeefication of collective action in Africa. *World Dev*
1089 2022;153. <https://doi.org/10.1016/j.worlddev.2022.105825>.
- 1090 [63] Cleaver F. Paradoxes of participation: Questioning participatory approaches to development. *J*
1091 *Int Dev* 1999;11:597–612. [https://doi.org/10.1002/\(SICI\)1099-1328\(199906\)11:4<597::AID-](https://doi.org/10.1002/(SICI)1099-1328(199906)11:4<597::AID-)
1092 [JID610>3.0.CO;2-Q](https://doi.org/10.1002/(SICI)1099-1328(199906)11:4<597::AID-JID610>3.0.CO;2-Q).
- 1093 [64] UNICEF-WHO. Women and girls bear brunt of water and sanitation crisis – new UNICEF-WHO
1094 report 2023. [https://www.who.int/news/item/06-07-2023-women-and-girls-bear-brunt-of-](https://www.who.int/news/item/06-07-2023-women-and-girls-bear-brunt-of-water-and-sanitation-crisis---new-unicef-who-report)
1095 [water-and-sanitation-crisis---new-unicef-who-report](https://www.who.int/news/item/06-07-2023-women-and-girls-bear-brunt-of-water-and-sanitation-crisis---new-unicef-who-report) (accessed March 30, 2025).
- 1096 [65] BMGF. GENDER AND THE SANITATION VALUE CHAIN: A Review of the Evidence. 2018.
- 1097 [66] Srivastav N, Gupta A. Why Using Patriarchal Messaging to Promote Toilets is a Bad Idea 2015.
1098 [https://science.thewire.in/culture/why-using-patriarchal-messaging-to-promote-toilets-is-a-](https://science.thewire.in/culture/why-using-patriarchal-messaging-to-promote-toilets-is-a-bad-idea/)
1099 [bad-idea/](https://science.thewire.in/culture/why-using-patriarchal-messaging-to-promote-toilets-is-a-bad-idea/) (accessed March 30, 2025).
- 1100 [67] Dubey D. Has Building Toilets Brought Down Rate of Rape as Sambit Patra Claims? 2022.
1101 [https://www.factchecker.in/fact-check/has-building-toilets-brought-down-rate-of-rape-as-](https://www.factchecker.in/fact-check/has-building-toilets-brought-down-rate-of-rape-as-sambit-patra-claims-822504)
1102 [sambit-patra-claims-822504](https://www.factchecker.in/fact-check/has-building-toilets-brought-down-rate-of-rape-as-sambit-patra-claims-822504) (accessed March 30, 2025).
- 1103 [68] Ivens S. Does increased water access empower women? *Development* 2008;51:63–7.
1104 <https://doi.org/10.1057/palgrave.development.1100458>.
- 1105 [69] Sommer M, Ferron S, Cavill S, House S. Violence, gender and WASH: spurring action on a
1106 complex, under-documented and sensitive topic. *Environ Urban* 2015;27:105–16.
1107 <https://doi.org/10.1177/0956247814564528>.
- 1108 [70] Nunbogu AM, Elliott SJ, Bisung E. I feel the pains of our past water struggles anytime I turn on
1109 the tap: Diaspora perceptions and experiences of water, sanitation, and hygiene (WaSH)
1110 gendered violence in Ghana. *Soc Sci Med* 2023;317.
1111 <https://doi.org/10.1016/j.socscimed.2022.115621>.
- 1112 [71] Pommells M, Schuster-Wallace C, Watt S, Mulawa Z. Gender Violence as a Water, Sanitation,
1113 and Hygiene Risk: Uncovering Violence Against Women and Girls as It Pertains to Poor WaSH
1114 Access. *Violence Against Women* 2018;24:1851–62.
1115 <https://doi.org/10.1177/1077801218754410>.
- 1116 [72] Jeil EB, Abass K, Ganle JK. “We are free when water is available”: gendered livelihood
1117 implications of sporadic water supply in Northern Ghana. *Local Environ* 2020;25:320–35.
1118 <https://doi.org/10.1080/13549839.2020.1744118>.
- 1119 [73] Shekhar S, Dwivedi A. Gendered Disparities in Water and Sanitation through an Intersectional
1120 Lens: Emphasising Women’s Perspectives. *Space and Culture, India* 2024;11:20–39.
1121 <https://doi.org/10.20896/saci.v11i4.1410>.
- 1122 [74] Van Houweling E. “A Good Wife Brings Her Husband Bath Water”: Gender Roles and Water
1123 Practices in Nampula, Mozambique. *Soc Nat Resour* 2016;29:1065–78.
1124 <https://doi.org/10.1080/08941920.2015.1095377>.
- 1125 [75] Stevenson EGJ, Ambelu A, Caruso BA, Tesfaye Y, Freeman MC. Community water
1126 improvement, household water insecurity, and women’s psychological distress: An
1127 intervention and control study in Ethiopia. *PLoS One* 2016;11.
1128 <https://doi.org/10.1371/journal.pone.0153432>.

- 1129 [76] Cooper-Vince CE, Arachy H, Kakuhikire B, Vořechovská D, Mushavi RC, Baguma C, et al. Water
1130 insecurity and gendered risk for depression in rural Uganda: a hotspot analysis. BMC Public
1131 Health 2018;18:1143. <https://doi.org/10.1186/s12889-018-6043-z>.
- 1132 [77] Winter JC, Darmstadt GL, Davis J. The role of piped water supplies in advancing health,
1133 economic development, and gender equality in rural communities. Soc Sci Med 2021;270.
1134 <https://doi.org/10.1016/j.socscimed.2020.113599>.
- 1135 [78] Hutchings P, Cooper S, Butterworth J, Joseph S, Kebede A, Parker A, et al. Water and Emotion:
1136 Testing a New Approach for Monitoring Water Security Among Afar Pastoralists in Ethiopia.
1137 Frontiers in Climate 2022;3. <https://doi.org/10.3389/fclim.2021.753888>.
- 1138 [79] Phadke S, Khan S, Ranade S. Why Loiter? Women and Risk on Mumbai Streets. Penguin Books
1139 India; 2011.
- 1140 [80] JJM - Reforms in Rural Drinking Water Supply. n.d.
- 1141 [81] Bisung E, Elliott SJ. Improvement in access to safe water, household water insecurity, and time
1142 savings: A cross-sectional retrospective study in Kenya. Soc Sci Med 2018;200:1–8.
1143 <https://doi.org/10.1016/j.socscimed.2018.01.001>.
- 1144 [82] Indarti N, Rostiani R, Megaw T, Willetts J. Women’s involvement in economic opportunities in
1145 water, sanitation and hygiene (WASH) in Indonesia: Examining personal experiences and
1146 potential for empowerment. Development Studies Research 2019;6:76–91.
1147 <https://doi.org/10.1080/21665095.2019.1604149>.
- 1148 [83] Magbondé KG, Thiam DR, Wagner N. The Economic Impacts of Rural Water Supply
1149 Infrastructures in Developing Countries: Empirical Evidence from Senegal. Environ Resour
1150 Econ (Dordr) 2024. <https://doi.org/10.1007/s10640-024-00897-4>.
- 1151 [84] Chant S, Sweetman C. Fixing women or fixing the world? “Smart economics”, efficiency
1152 approaches, and gender equality in development. Gend Dev 2012;20:517–29.
1153 <https://doi.org/10.1080/13552074.2012.731812>.
- 1154 [85] Waring M. If Women Counted: A New Feminist Economics n.d.
- 1155 [86] World Bank. Female labor force participation 2022.
1156 <https://genderdata.worldbank.org/en/data-stories/flfp-data-story> (accessed March 30, 2025).
- 1157 [87] World Bank. No Economy Can Reach Its Full Potential Where Women Do Not Have Equal
1158 Opportunities 2022. [https://www.worldbank.org/en/news/opinion/2022/03/08/no-economy-](https://www.worldbank.org/en/news/opinion/2022/03/08/no-economy-can-reach-its-full-potential-where-women-do-not-have-equal-opportunities)
1159 [can-reach-its-full-potential-where-women-do-not-have-equal-opportunities](https://www.worldbank.org/en/news/opinion/2022/03/08/no-economy-can-reach-its-full-potential-where-women-do-not-have-equal-opportunities) (accessed March
1160 30, 2025).
- 1161 [88] Lascelles A. “A WaterAid tap changed my life” 2024. [https://www.ft.com/content/919642d9-](https://www.ft.com/content/919642d9-adeb-4c84-80fb-ebfa67df1eb6)
1162 [adeb-4c84-80fb-ebfa67df1eb6](https://www.ft.com/content/919642d9-adeb-4c84-80fb-ebfa67df1eb6) (accessed March 30, 2025).
- 1163 [89] Ahlers R, Zwarteveen M. The water question in feminism: Water control and gender inequities
1164 in a neo-liberal era. Gender, Place and Culture 2009;16:409–26.
1165 <https://doi.org/10.1080/09663690903003926>.
- 1166 [90] Calkin S. Feminism, interrupted? Gender and development in the era of ‘Smart Economics.’
1167 Progress in Development Studies 2015;15:295–307.
1168 <https://doi.org/10.1177/1464993415592737>.

1169

[91]

Hirschman A. Development projects observed. Brookings Institution; 1967.

1170

[92]

Mukhopadhyay M. Mainstreaming Gender or “Streaming” Gender Away: Feminists Marooned

1171

in the Development Business. The Palgrave Handbook of Gender and Development , n.d.

1172

[93]

O’Reilly K. From toilet insecurity to toilet security: creating safe sanitation for women and

1173

girls. Wiley Interdisciplinary Reviews: Water 2016;3:19–24.

1174

<https://doi.org/10.1002/wat2.1122>.

1175

[94]

Sylvester R, Hutchings P, Mdee A. Defining and acting on water poverty in England and Wales.

1176

Water Policy 2023;25:492–508. <https://doi.org/10.2166/wp.2023.253>.

1177

[95]

Phiri G, Roaf V, Hutchings P, Evans B. Legislative influence on the decline of public toilet

1178

provision in the UK: a case study of Leeds city. Journal of Water, Sanitation and Hygiene for

1179

Development 2024;14:1277–90. <https://doi.org/10.2166/washdev.2024.380>.

1180

[96]

Schreiner B, Van Koppen B. What is ‘equitable access to water’? 2025. [https://www.water-](https://www.water-alternatives.org/index.php/blog/equity)

1181

[alternatives.org/index.php/blog/equity](https://www.water-alternatives.org/index.php/blog/equity) (accessed March 30, 2025).

1182

[97]

Narayanaswamy L, Ferritto R, Hillesland M, Anker V, Singhal S, Maysels RM, et al. Why a

1183

feminist ethics of care and socio-ecological justice lens matter for global, interdisciplinary

1184

research on water security. Frontiers in Human Dynamics 2023;5.

1185

<https://doi.org/10.3389/fhumd.2023.1212188>.

1186

1187 [Supplementary information captions](#)

1188	S1 Text	Protocol
1189	S1 Figure	Geographical coverage of studies
1190	S1 Table	Specific search strings across databases
1191	S2 Table	Classification of studies
1192	S3 Table	Quality Appraisal Template
1193	S4 Table	Quality appraisal of included studies
1194	S5 Table	Summary of themes, methods, and quality
1195	S6 Table	Country-wise water committees and quota compliance
1196	S7 Table	Water-related GBV

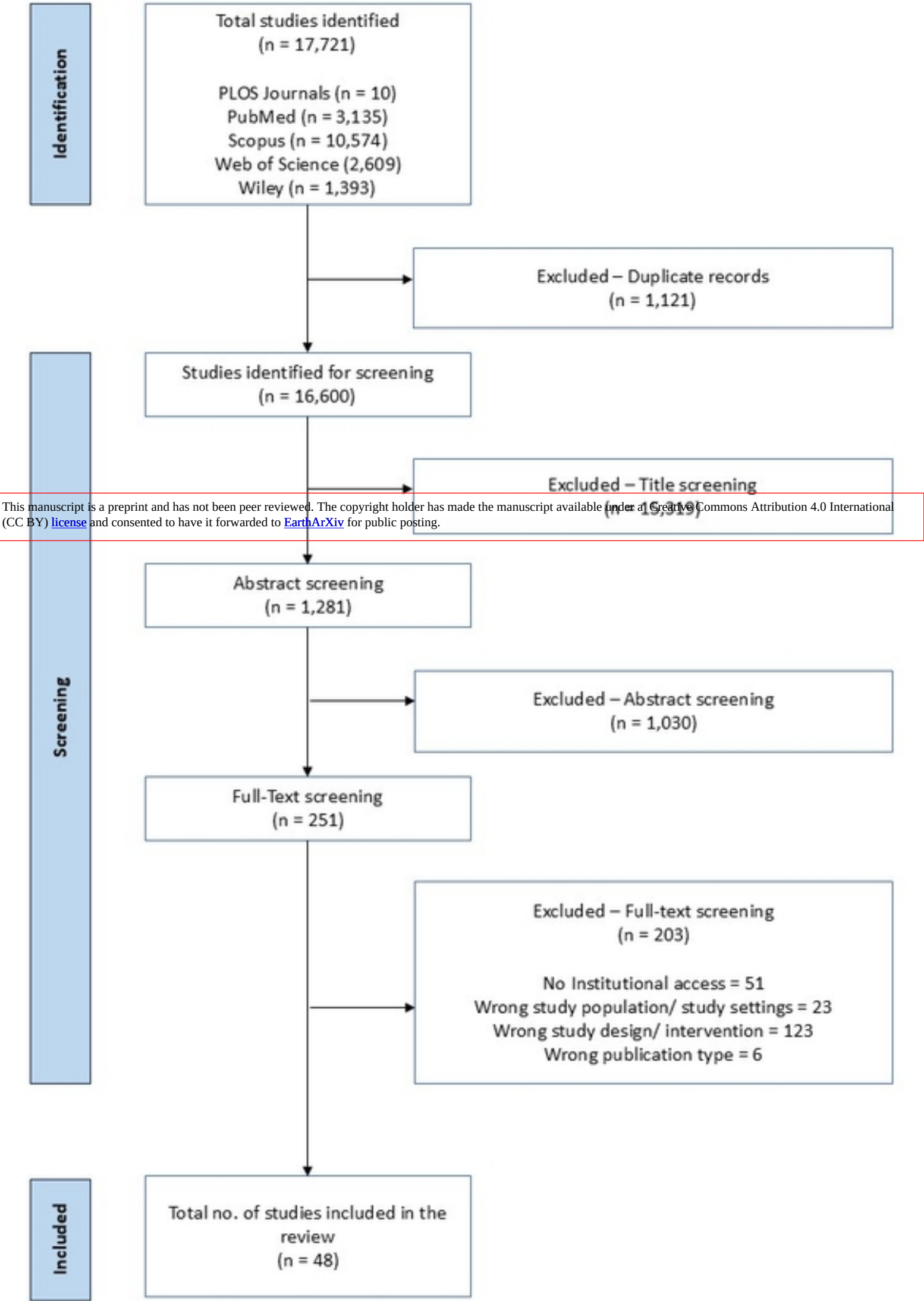


Fig 1. PRISMA flow diagram outlining the literature compilation process

Fig 1

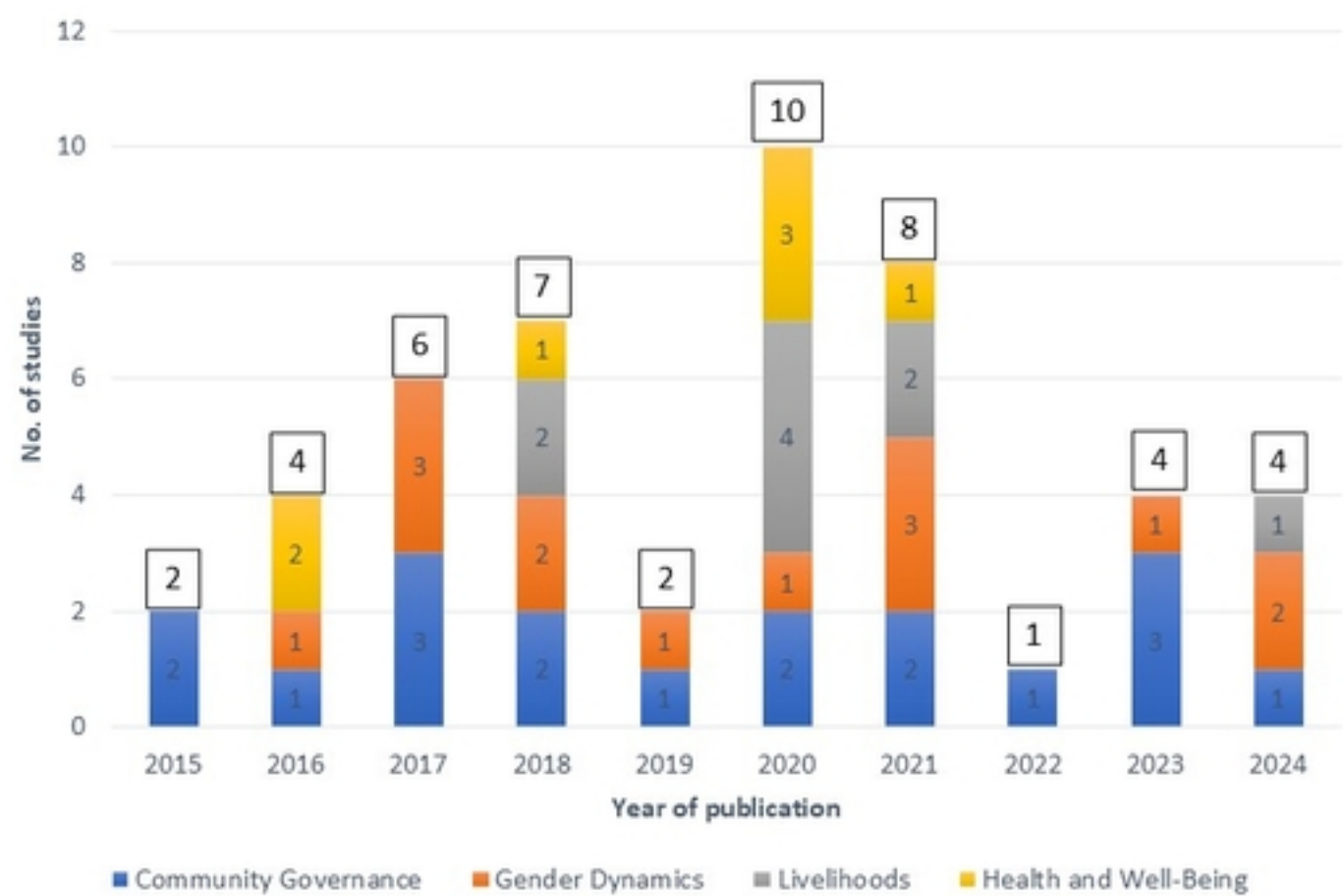
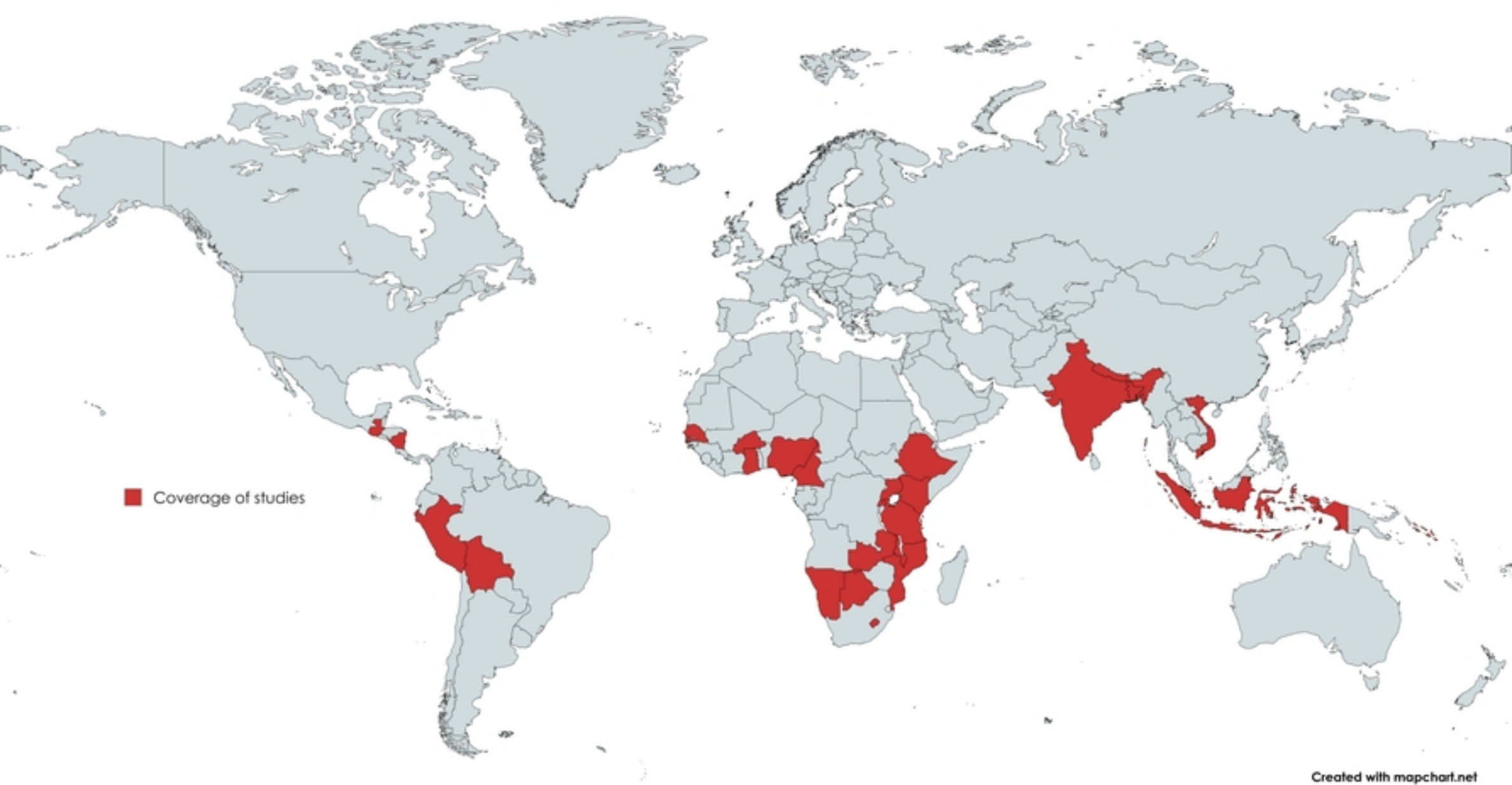


Fig 2



Created with mapchart.net

Fig 3

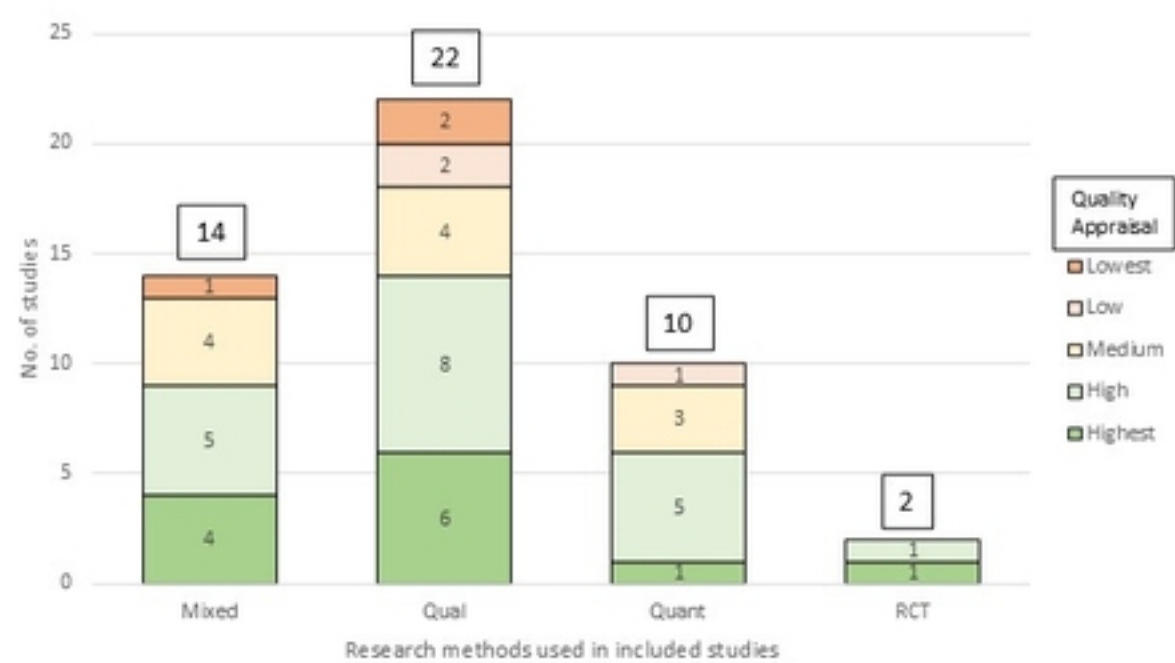


Fig 4