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EDITED BY

Elias Dimitriou,
Hellenic Centre for Marine Research
(HCMR), Greece

REVIEWED BY

Alfred Owuor Opere,
University of Nairobi, Kenya
Christina Papadaki,
Hellenic Center for Marine Research, Greece
Daniel Nzengya,
St. Paul's University, Kenya

*CORRESPONDENCE

Gideon Walter Mutanda
✉ mutangw@unisa.ac.za

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Gendered perspective on water security, rights and conflicts in sub-Saharan Africa: a systematic review

Gideon Walter Mutanda* and Godwell Nhamo

Exxaro Chair in Climate and Sustainability Transitions, University of South Africa, Pretoria, South Africa

The 2017 Global Risk Report ranked water crisis third among the top six global risks that greatly impact society. While the water crisis is disproportionately distributed worldwide, sub-Saharan Africa (SSA) has more people (most of whom are women) who face water problems compared to other regions worldwide. Through the application of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) protocol version 2020, a systematic review examining the connection between gender and water security, rights, and water conflicts in SSA was done. A total of 24 out of 229 articles made it into the final analysis. Previous research studies on gender politics in the water sector have done so in a fragmented way, focusing on specific water security parameters. The emerging findings show that 14 years after the adoption of an enforceable human right to water and about 6 years prior to the cut-off date for the 2030 Agenda for Sustainable Development, matters of gender and water in SSA are far from being addressed. Rural people, especially women, still face multiple water-related challenges and conflicts, including discriminatory practices upholding male hegemony in water governance. It is recommended that actors in the water sector precede the implementation of water projects by understanding contextual settings that influence gendered water security. Furthermore, the implementation of the water Sustainable Development Goal (SDG 6) should be done in the context of SDG 5 (Gender Equity) and the prioritization of procedural water justice and governance, access to technical skills, and water conveyance technologies.

Systematic review registration: <https://www.prisma-statement.org/>.

KEYWORDS

gender, SDG 5, SDG 6, sub-Saharan Africa, water rights, water security

1 Introduction

In 2017, the Global Risk Report placed the water crisis in third place among the top six global risks that greatly impact society (Santos et al., 2017) including weapons of mass destruction, extreme weather events, food crises, natural disasters and climate change. Globally, between 780 and 884 million people lack access to safe water due to economic and/or physical water scarcity (Hlahla, 2022). Up to 400 million of these are from South Asia and sub-Saharan Africa (SSA), two thirds being women (Peña-Ramos et al., 2022). Only 30% of the SSA population, compared to 96% in Europe and North America had access to safe drinking water in 2020 (Dogoli et al., 2023). This is an indication that the realization of the human right to water and attainment of the water Sustainable Development Goal (SDG 6) is still far in many countries (Nhamo et al., 2019).

The [United Nations Children's Fund and World Health Organisation \(2023\)](#) bring up a figure of 2.2 billion people still lacking safely managed drinking water globally as of 2022. However, this figure is said to underestimate the true scale of the problem since crucial elements of the water security are not yet measured. Therefore, a 6-fold increase in current progress rates for safe drinking water is needed to achieve SDG 6 by 2030. Given the multi-dimensional nature of water security and components of the human right to water, water availability alone cannot guarantee the realization of other water security parameters affecting human rights to water and water security. There exist differentiated relationships with water access, use, governance, and experience along gender lines ([Ngarava et al., 2019](#)). According to [Zwarteveen and Meinzen-Dick \(2001\)](#), men are much more likely to have ownership or control rights over resources than women. This is typical of old settler colonies, where the 'land question' is a 'water question', and by extension, a "gender question" ([Tekwa and Adesina, 2023](#)).

However, measuring if a society is water (in)secure is problematic as the term embodies a complex, multi-dimensional and interdependent set of issues ([Mishra et al., 2021](#)) and the conceptualization differs from discipline to discipline ([Gain et al., 2016](#); [Hoekstra et al., 2018](#)). [Hoekstra et al. \(2018\)](#) highlight that studies on water security typically concentrate on: (i) water security and protection from water-related hazards and infrastructure (engineering studies); (ii) access to safe water and assessment of water contamination (public health studies); (iii) power structures, equity issues and conflicts over water, water rights and governance (political and legal studies); and (iv) water demand and supply, water pricing and market mechanisms (economics). Although many definitions exist on water security, this work uses one from UN Water, which says it is "the capacity of a population to protect sustainable access to adequate quantities of acceptable quality water to sustain livelihoods, human wellbeing and socioeconomic development, to ensure protection against waterborne pollution and water-related disasters, and to preserve ecosystems in a climate of peace and political stability" ([MacAlister et al., 2023](#) p. 13). To this definition is added selected indicators for SDG 6 like water "availability," "accessibility," "affordability" "safety and quality," and "water governance" ([Gain et al., 2016](#)).

Women in SSA also carry burdens of exploitation and sexism in their quest to access water supplies, land, and other resources needed for productive roles ([Schreiner and Van Koppen, 2003](#)). In addition to being used to (de)legitimize water knowledge and authority, gender is one of the primary but often implicit criteria for allocating rights and power in water ([Zwarteveen and Meinzen-Dick, 2001](#)). Hence, in the water context, politics and power are deeply gendered, with knowledge and authority linked to masculinity and maleness. These variables play an important role in determining SSA's gendered access to water, sanitation and hygiene services (WASH; [Dogoli et al., 2023](#)), thereby limiting the achievement of SDGs 6.1 and 6.2. These targets call for attention to the special needs of women and girls in all WASH activities and ensure that women have equal access to leadership opportunities (SDG 5).

Limited access to water in SSA disproportionately affects women and girls as they are mainly responsible for collecting water,

impeding the girl child to participate fully in schooling (SDG 4; [Nkiaka et al., 2021](#); [Dogoli et al., 2023](#)). While these challenges have been chronic due to socio-cultural and political factors, climate change as a crisis multiplier is expected to magnify gendered water access problems, thus affecting water and sanitation targets. Conflict over access to water has existed for centuries in SSA, but due to climate change and droughts, water-related conflicts are predicted to worsen ([Nkiaka et al., 2021](#)). Since the risks are not evenly distributed across individuals and gender, there is a particular need to understand how gender influence water security and water-related conflicts in the context of socio-cultural, political factors and hydro-climatic changes in SSA.

Although many researchers have examined different dimensions and factors that contribute to the water crisis and gendered water rights in SSA, limited studies have done a systematic review of gendered water security and associated conflicts. The United Nations Educational Scientific and Cultural Organization argues that a variety of topics related to water security have not been researched in depth (including gendered water security); therefore, there is an urgent need to conduct extensive research on these water security issues in the context of the SDGs framework and its internationally agreed goals and targets, document these studies and disseminate the information ([United Nations Educational Scientific Cultural Organisation and UNESCO International Centre for Water Security Sustainable Management, 2019](#)) on the progress toward meeting the development objectives and water security ([Wegerich and Warner, 2010](#)). Furthermore, water security assessments at national and regional scales mask water security variability at fine scales as they rarely capture the experience of the household of water security, worse still gendered water security experiences ([MacAlister et al., 2023](#)).

Given the foregoing, this paper seeks to answer the following research question: "How does the politics of gender in the water sector influence water security, rights, and water-related conflicts in SSA?" To this end, the work unravels the nexus between gender, water security, and gendered water conflicts in SSA through a systematic literature review framework.

2 Background information

2.1 Gender and the human right to water

The politics of gender in the water sector led to the promulgation of a series of international legal frameworks to ensure the realization of the human right to water for "all." According to [Singh \(2016\)](#) water was first recognized as a right at the 1977 United Nations Water Conference, which declared that all people have the right to access quality drinking water in right quantities to meet their basic needs. In 1992, the Dublin International Conference on Water and Environment presented the Dublin Principles stating that there should be gender equality in access to "all" waters (domestic or commercial water), in "all" aspects of water governance, regardless of how they are conceptualized and practice ([Derman and Prabhakaran, 2016](#)).

The beginning of the millennium saw the promulgation of the Millennium Development Goals (MDGs), with MDG 7c focusing on halving the proportion of people without access to WASH services. Two years after the adoption of the MDGs, the Committee on Economic, Social and Cultural Rights (CESCR) adopted an implicit right of all to sufficient, safe, acceptable physically accessible, and affordable water for personal and domestic use (Singh, 2016). An important step forward was the adoption of a legally binding resolution (A/Res/64/292) by the United Nations General Assembly (UNGA) in 2010, which explicitly recognized the right to water (Singh, 2016). Recognizing water as a human right grants individuals, particularly women procedural rights such as access to information, non-discrimination, accountable institutions, and meaningful participation in decision-making in this sector, in addition to substantive rights such as water itself (Earle and Bazilli, 2013). The adoption of legally binding UNGA resolution (A/Res/64/292) was meant to bolster support for MDG 7c, which sought to halve water-insecure populations.

2.2 Linkages between gender, SDGs, and the human right to water

The adoption of the SDGs and their targets, especially SDG 6.1 and 6.2 in 2015 was a consolidation of the recognition of the legally binding 2010 human right to water for everyone and the rights of women. The 17 global goals embedded in the 2030 Agenda for Sustainable Development and the human rights frameworks are connected, with the former seeking to ensure the realization of human rights for all (Singh, 2016). Human rights are seen as a precursor to development objectives, as the former provides concrete guidance on how goals and targets for the development agenda should be framed. Work by the Danish Institute for Human Rights show that human rights are reflected in 156 of the 169 SDGs targets, meaning more than 92% of the targets (Kalterborn and Markus, 2020). The intricacy between women and water is seen by the adoption of a stand-alone goal for women (SDG 5), the inclusion of SDG 5b calling for women's ownership, control and access to natural resources (water included), and the integration of gender issues in water security SDG 6.

The SDGs framework, together with the Agenda 2063 of the African Union (AU), addressed the weakness of MDG 7c, which did not use the "difference approach" to water security as it "homogenized" the issue despite gender differences. "Aspiration 6" of the AU Agenda 2063 calls for development that is people-driven, takes into account the poor, women, and youth, and embeds a goal that urges development actors to promote equal access to productive assets and full gender equality in all spheres of life (African Union Commission, 2015) that include the water sector. However, the water and sanitation for all (SDG 6) has not been achieved (Nhamo et al., 2019). This observation mirrors earlier findings by Earle and Bazilli (2013), who state that the global picture of access to water for "all" remains gloomy.

SSAs water security scores based on the ten components (developed by the United Nations University Institute for Water Environment and Health) ranged from 29 (critically insecure) to 58 (insecure; MacAlister et al., 2023). Regardless of gender, the

impoverished in the least developed regions such as SSA, are not only water insecure but pay more for water because they cannot access public water supplies, forcing them to rely on expensive alternative sources like water vendors, transport water from distant sources, raising costs and relying on unofficial markets that exploit them by charging exorbitant water prices (United Nations Children's Fund and World Health Organisation, 2023). The SSA region is further plagued by gender disparities in the water sector, as men and women do not have equal access to water resources and water governance, leading to different impacts (Seri, 2023). Tekwa and Adesina (2023) further argue that in former settler colonies such as South Africa, disparities in access to (agricultural) water use are more severe than differences in access to productive land. Earle and Bazilli (2013) ask: What makes gender disparities so grim more than a decade after the recognition of a justiciable and enforceable right? Six years before the cut-off date for the 2030 Agenda, Oxfam reports that the intrinsically linked SDGs on gender equality, water, and sanitation are far from being achieved.

2.3 Contextual settings that influence the implementation of WASH services

Singh (2016) observes that the realization of the human right to water for all is a product of the implementation of the right within contextual settings (population growth, cultural factors, climate change, and poor institutional governance), which may promote or hinder its enjoyment by right holders. Some contextual settings that contribute to the lack of realization of the human right to water for all, especially women in the SSA, are part of hydro politics in the region. Turton and Henwood (2002) defines hydro politics as the authoritative allocation of values in society with respect to water. The society has a vertical dimension with scales ranging from the individual to the household, village, city, provincial, national and international level, while the horizontal dimension of hydro politics involves a variety of issues that include gender and water (Turton and Henwood, 2002). Those "responsible" for the allocation of values with respect to water exist by default or by appointment influence who access water, how it is accessed, when it is accessed and for what it is accessed. The lack of realization of the right to water for all, especially women in developing countries, is not only linked to water scarcity only but also to contestable allocation decisions of abundant water (Wegerich and Warner, 2010), gender insensitive water governance structures. Hydro politics together with contextual settings influence the human right to the core parameters of water (Singh, 2016) and water governance issues such as institutional accountability, access to information, access to water-related training, and meaningful participation in decision-making. This has the potential to cause women to experience violence and engage in intrapersonal, interpersonal, and intragroup conflicts.

3 Materials and methods

The systematic literature review was performed following the PRISMA 2020 protocol, a research methodology that uses systematic and explicit methods to identify, select, evaluate and

TABLE 1 Keywords and search string.

Search type	Search criteria	Documents yielded
Generic	TITLE-ABS-KEY ((gender* AND (water AND right*) OR (water AND security) OR (water AND conflict*))	1,730
Refined	TITLE-ABS-KEY ((gender* AND (water AND right*) OR (water AND security) OR (water AND conflict*)) AND PUBYEAR > 2014 AND PUBYEAR < 2025 AND (LIMIT-TO (OA, "all")) AND (LIMIT-TO (PUBSTAGE, "final")) AND (LIMIT-TO (DOCTYPE, "ar")) AND (LIMIT-TO (LANGUAGE, "English")) AND (LIMIT-TO (SUBJAREA, "ENVI") OR LIMIT-TO (SUBJAREA, "AGRI") OR LIMIT-TO (SUBJAREA, "SOCI") OR LIMIT-TO (SUBJAREA, "MULT"))	212

synthesize studies to answer a formulated research question (Page et al., 2021). It lessens the impact of the bias of reviewers and promotes openness throughout the review process by crafting a comprehensive protocol that specifies and directs the literature review procedure (White and Schmidt, 2005). When conducting a systematic review, PRISMA facilitates transparent reporting of the review's purpose, methods, and findings by the authors. However, systematic reviews do present certain methodological and practical challenges, such as the low precision of systematic search strategies, as only about 2% of the abstracts screened for the review are ultimately included (Lame, 2019).

3.1 Keywords, database, inclusion, and exclusion criteria

Given the advantages of PRISMA as a systematic literature review approach, this paper chose peer-reviewed papers from the Scopus and Google Scholar database. Both search criteria, the generic and refined are presented in Table 1. Both searches were done on 10 June 2024. Table 2 show additional information that led to the exclusion and inclusion of other articles.

It should be noted that the search for peer-reviewed papers using the PRISMA tool is associated with some limitations. Some relevant papers may be excluded, and some papers are now downloadable depending on one's library subscriptions.

3.2 Abstracts and full text screening

The 229 articles (212 articles from Scopus and 17 from Google scholar) were exported into Covidence for screening. Duplicates from the two databases were removed and a total of 218 articles emerged. Abstract screening was performed to determine if the papers met the inclusion criteria, with 45 articles retained for full text screening. Eventually, a total of 24 articles were considered for full paper review. The summary of the search, the selection protocol, and the reasons for the removal of some full papers are provided in Figure 1.

3.3 Data extraction and copyright issues

The authors performed manual quotation creation and coding, and no embedded artificial intelligence coding component of Atlas.ti 24 software was used. The authors

TABLE 2 Inclusion and exclusion criteria.

Inclusion	Exclusion
Full text available	Full text unavailable
English	Non-English
Available via Scopus	Not available via Scopus
Peer-reviewed journal articles only	Publications outside peer-reviewed articles
Articles focusing on gender and water	General articles gender or gender and other issues
Focus on Sub-Saharan countries.	Outside SSA

had to read through each of the articles, generate quotations, assign codes based on the water security components, and presence of information showing gendered water conflicts. The quotations from the 24 articles were then rephrased and cited accordingly both in text and in the reference list.

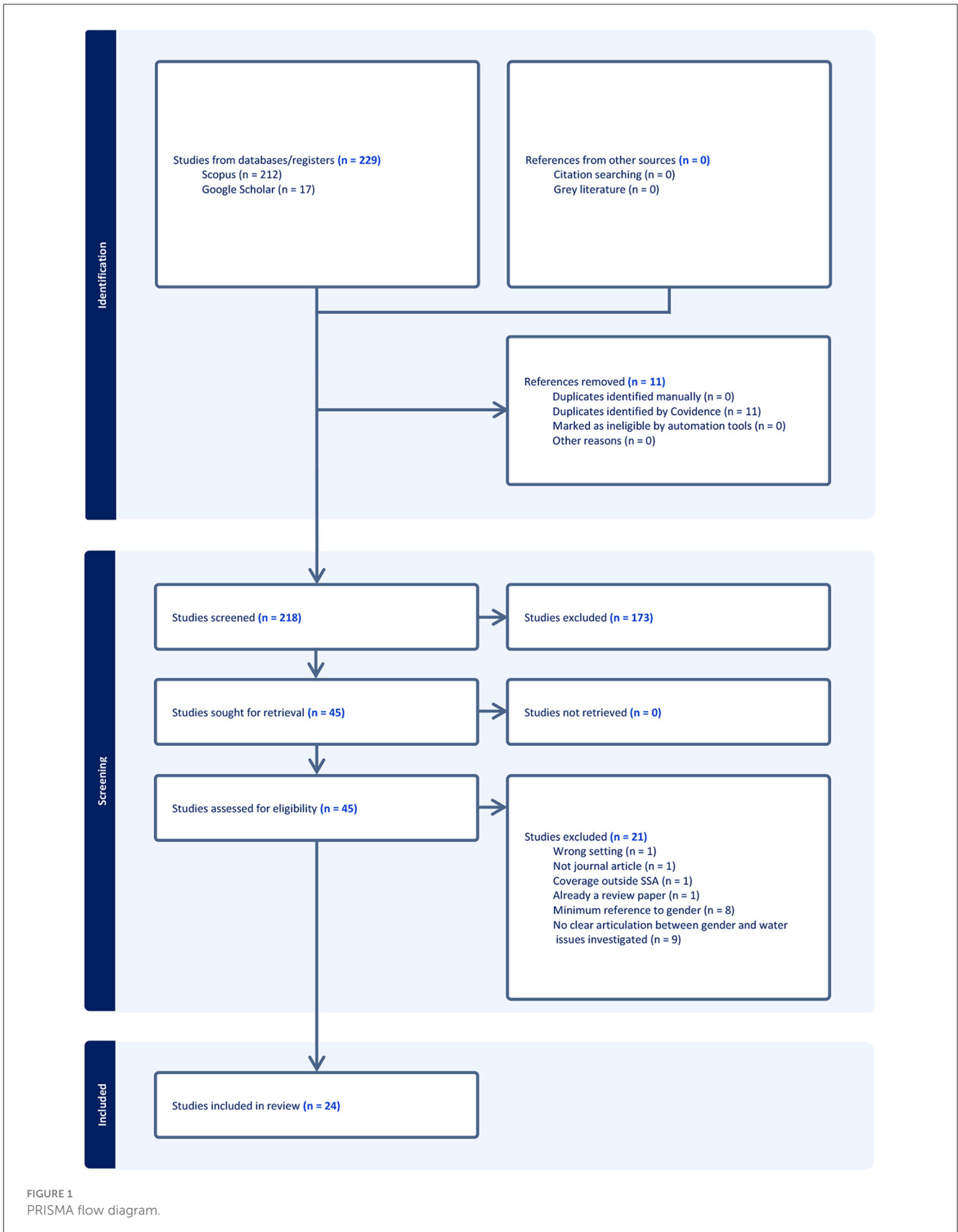
3.4 Data analysis

Data obtained from the literature review was analyzed using ATLAS.ti software. Both predetermined and "in vivo" codes and/or themes (those emerging from the articles) based on water security/human right to water parameters and water-related conflicts were used. These codes and/or themes were based on components of water security and water conflicts. Following ATLAS.ti protocols, quotations were created for each of the 24 articles, and codes were assigned to the quotations. This was followed by the network and co-occurrence analysis based on the adopted codes. Since most of the codes were based on the parameters of water security and human right to water, these became the themes in the results section.

4 Results

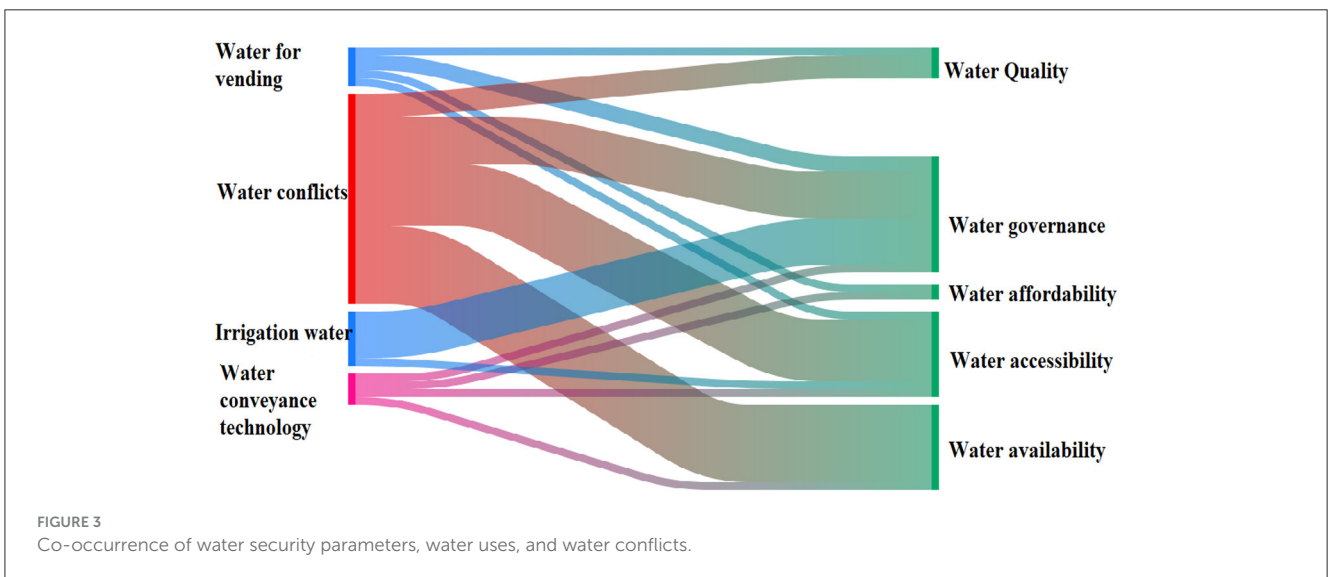
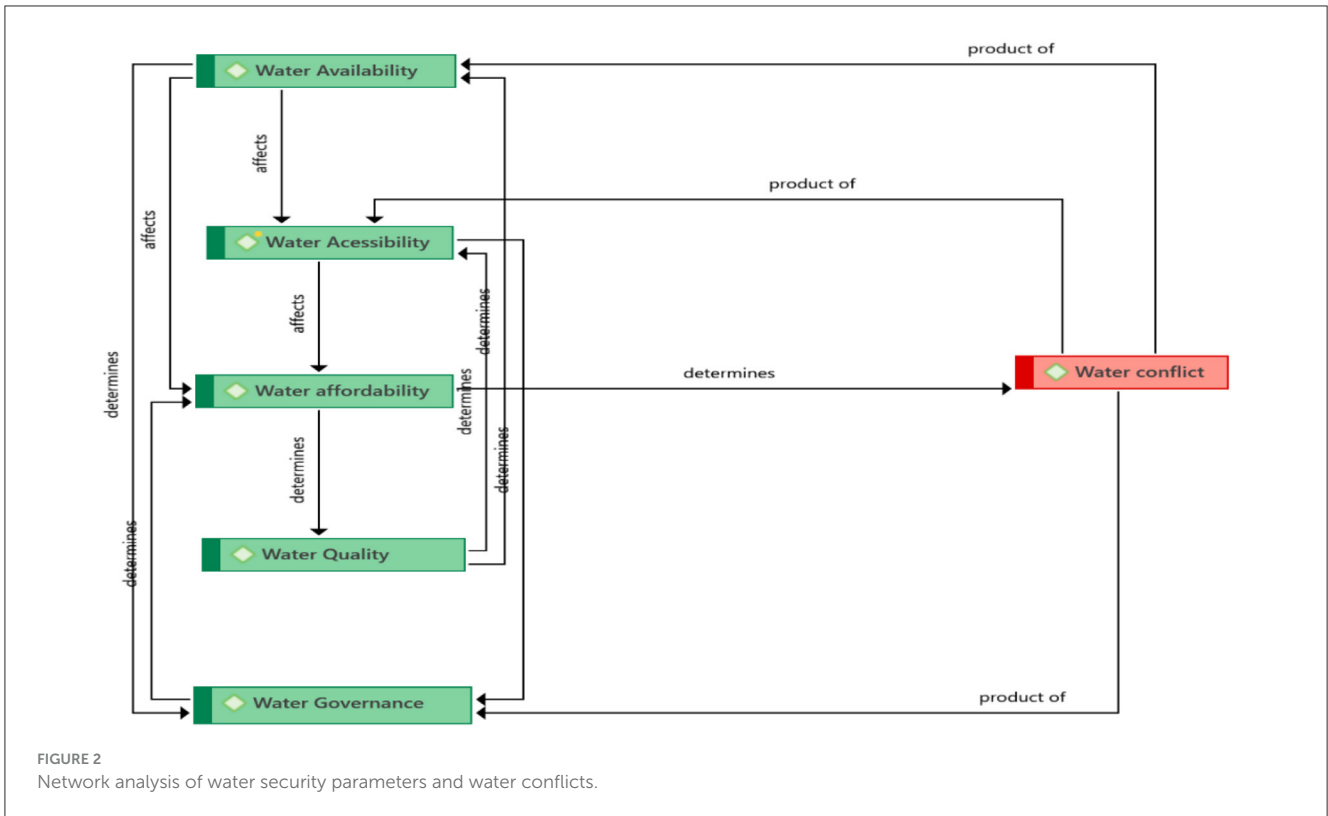
4.1 Presentation on relations of themes

Figure 2 shows the semantic relationships between key water security parameters and water-related conflicts. Almost all the water security parameters have an asymmetric relationship except



for water quality and governance which are not directly linked. Water conflicts are the product of water governance, water

availability, water accessibility, and water affordability. This shows a cause-and-effect type of relationship.



4.2 Synergies (co-occurrence) between water security and conflicts

Figure 3 shows the co-occurrence of water security parameters, water uses, and water conflicts. Co-occurrence shows the number of times two codes/themes co-appear on a quotation, hence the magnitude of their relationship. Water governance was the most discussed water security component, as shown by the broadest connection link, followed by water availability, accessibility, and

lastly water affordability in all the 24 documents. Gendered water conflicts had the highest co-occurrence/relationship with water availability, followed by water accessibility, water governance, and lastly water quality. Women’s access to water for agricultural and vending purposes is mainly influenced by water governance, with other parameters of water security showing lower influence. Discussions of other components of water security, such as water quality and affordability from a gender perspective, were not given much attention in all the reviewed articles.

4.3 Links between gender, water accessibility, and water availability

The articles reviewed in the study show that water availability and accessibility had a very strong relationship, as they had the highest co-occurrence (20 times). This is an indication that one indicator has very high chance of representing the two water security parameters, hence findings on gender- water accessibility and water availability are presented in a composite (Table 3).

Meyiwa et al. (2014) and Bachwenkizi et al. (2023) report that in many SSA countries, the majority of women walked long distances to access water, making them exposed to sexual and physical violence. Another study revealed that in Malawi, Mozambique, Katsina State (Nigeria), and Ethiopia, up to 1.1, 1.5, 2.9, and 4.7 million adult women, in that order, spent more than 30 min collecting water and standing in a queue at water sources (Graham et al., 2016; Sani and Scholz, 2022). Women in Center-East, Burkina Faso reported an increase in water conflicts at water points between women or with men (Dickin et al., 2020), jumping of queues at water points (Kurebwa, 2017), and reliance on water vendors with modern water conveyance technologies (Bukachi et al., 2021). Water accessibility and availability of water by women was further worsened by the lack of ownership and control of modern water conveyance technologies to collect water for domestic and/or commercial purposes. In the Mbarara District, Uganda, Mushavi et al. (2020) women reported using unsafe water in the local area, while in Panganai basin, Tanzania, they took rotational turns to collect water and were limited in the number of containers (Van Koppen, 2023). Women in Kutui county in Kenya relied on social capital such as befriending men who owned shallow wells, paying in kind using cash crops or labor on men owned water points (Bukachi et al., 2021).

4.4 Water governance and women participation in water user associations

Water scarcity in many areas of SSA has driven the state, non-governmental organizations and/or communities to establish Water User Associations (WUA) where contributions are made to manage local water infrastructure, address problems relating to water, and carry out management decisions agreed by association. Water governance is a very critical parameter of water security, as it determines water availability and accessibility. Table 4 shows the findings on gender and water governance structures and processes in the 24 articles reviewed.

Table 4 shows that women face several challenges that prevent them from accessing procedural water governance rights in WUAs. Women can be members of WUAs, but their participation is symbolic, as they do not control the levers of power. For example, women who were members of the Tanzania Arusha Water and Sanitation Project from planning, implementation, operation, and maintenance remained as implementers, while men became decision makers of the project (Buor, 2004) due to cultural reasons. In the Mkoji and Pangani basins of Tanzania, the WUA that oversee gravity water systems is dominated by men who change established rules and priorities in favor of men in times of water shortage

TABLE 3 Findings on gender, water availability, and accessibility in SSA.

Findings	References
Women in SSA spent many hours a day fetching water.	Angoua et al., 2018
Women walked long distances to access water	Bachwenkizi et al., 2023
Reliance on water vendor with fetching water.	Bukachi et al., 2021
Conflicts at water points between women and men and/or women	Dickin et al., 2020
Girls' absenteeism as they fetch water or late ness to schools	Färber et al., 2022
Violations of rules, jumping of ques at water points	Kurebwa, 2017
Use of unsafe water in the local area	Mushavi et al., 2020
Rotational turns and limits to number of containers	Van Koppen, 2023
Violence and attacks on women as they collect water	Meyiwa et al., 2014
Evidence of drying of local water sources	Tantoh and McKay, 2020
Women walked long distances to access water	Bachwenkizi et al., 2023
Reliance water vendor with fetching water.	Bukachi et al., 2021
Conflicts at water points between women or men and women	Dickin et al., 2020

(Van Koppen, 2023). Women who are part of Ghana's Water and Sanitation Committees (WATSAN) and rural water projects in northwest Cameroon occupy less important roles, provide manual labor such as cleaning water sites, and educating members of the community on hygiene. This is so, while technical and managerial roles (decision making issues) are for males (Abu et al., 2019). The scholars further report that men in Nyanchwa, Kenya use English or Swahili in their meetings to exclude illiterate women. In northwest Cameroon, the few women in water committees are just mere nominal representatives, as their roles remain more supportive of men who remained de facto leaders as dictated by tradition (Tantoh and McKay, 2020).

There is also a lack of recognition and/or equal representation of women in modern and traditional community structures that manage natural resources such as water in rural community water systems in Mozambique, Northwest Cameroon and Gutu Zimbabwe (Kurebwa, 2017; Tantoh and McKay, 2020; Morita et al., 2024). This is a challenge also associated with state managed water management structures at local to the basin level. Were et al. (2008) and Derman and Prabhakaran (2016) report that most of the members of the Manyame Catchment Council and the Manyame Sub-catchment Council in Zimbabwe, Chesilot, and Maimur WUA in Kenya were men. In the Kisii area of Kenya and water projects in Ghana, women can only participate in WUAs if they are allowed by a male head of the household (Tsekleves et al., 2022; Van Koppen, 2023) or transmit ideas given to them by the male "head" of the family. In the few instances mentioned above, where women were represented on committees of water projects, their participation in decisions on water governance was restricted or manual work (Tsekleves et al., 2022). While the aforementioned studies revealed gender insensitive water governance in the studied countries of

TABLE 4 Findings on gender and water governance in SSA.

Findings	References
Limited access to leadership positions in water and sanitation structures	Derman and Prabhakaran, 2016; Angoua et al., 2018; Coulter et al., 2019; Dickin et al., 2020; Van Koppen, 2023
Ownership of water points mostly by men and male dominated traditional structures	Bukachi et al., 2021; Van Koppen, 2023
Exclusion of women common in state-owned water management structures.	Were et al., 2008; Derman and Prabhakaran, 2016
Women's lack of knowledge about the existence, activities, and meetings of WUAs	Harris et al., 2017; Lefore et al., 2019
Lack of recognition or equal representation of women in community structures managing natural like water resources	Kurebwa, 2017; Tantoh and McKay, 2020; Morita et al., 2024
Women part of committees are excluded from meetings by their male counterparts or denied chance to express their views	Abu et al., 2019; Tseklevs et al., 2022
No statistical gender difference in terms of civic participation, as majority of the women participate in WUAs in South Africa.	Harris et al., 2017

SSA, Harris et al. (2017) report that in South Africa, there is no statistical gender difference in knowledge about water governance and activities of water structures, as the actual participation of women was 52%.

4.5 Gender, water affordability, and water safety in SSA

Women as primary water users in SSA are the first to identify water shortages and quality problems. Table 5 shows the findings on the sources of water for women in some SSA countries.

Unsafe water use in some SSA countries leads to gendered differences in disease vulnerability among men and women. According to Grasham et al. (2019), women and children are prone to waterborne diseases, while men are more prone to other infectious diseases due to differences in their daily activities. Rural Ugandan women reported using unsafe water and rusty water from wells and boreholes respectively (Mushavi et al., 2020). Water scarcity in rural municipalities of Yethu and Emakholweni, KwaZulu-Natal, South Africa, forced some women to move to villages near rivers or pool resources to channel water from a nearby river (Meyiwa et al., 2014). The initiative addressed water availability, accessibility, and access to water for their gardens, but the water was unsafe for consumption.

In the Mbengwi, Njinikom, and Ndu districts of northern Cameroon, climate change-induced seasonality of streams and springs incentivised women to make financial and non-financial contributions toward piped water (Tantoh and McKay, 2020). Dickin et al. (2020), Sani and Scholz (2022), and Ngarava et al. (2019) further report that between 85 and 86% of women in center east region of Burkina Faso, 55% of rural women in the low income group in Katsina State, Northern Nigeria, used safe sources of drinking water and no female-headed households in South Africa use unsafe water, respectively. However, Figure 3 shows a thin connection bar for water quality, an indication of limited research on this water security parameter, its relationship with other parameters, and gendered water conflicts. Edifying this observation, Nkiaka et al. (2021) note that there are a few studies on water quality in SSA countries as water quality was

not considered in water security assessments until water pollution became a significant factor impacting sustainable development in many countries.

In areas where water availability and accessibility are a challenge, access to water is premised on engaging water vendors, private owners of water sources, and/or joining water user associations. This has implications on water affordability, especially for women who are primary water collectors but are among the poorest in SSA. Table 5 further shows the finding on gender and water affordability in SSA. According to Bukachi et al. (2021), women in Kutui County, Kenya, had to pay water vendors due to climate change-induced water stress. In addition, those who were closely connected to male owners of earth dams or water points had to pay cash, in installments, or in kind to access water. Stranger or indebted women were excluded from the programme and had to pay a higher price without the option of paying in installments. In Laikipia, Kenya, women identified financial constraints as the biggest obstacle to their participation in the activities of the WUA, surpassing lack of awareness of the WUA, gender issues, and time constraints (Coulter et al., 2019). Dickin et al. (2020) report that in Center-East, Burkina Faso, men oversaw the payment of annual user fees for the organizations of communal water users, but wives in polygamous households were responsible for covering their own expenses, making them more vulnerable to frequent breakdowns.

4.6 Gendered access to water for commercial and/or agricultural purposes

Although women are the main water handlers, their access to water is diminished when it is destined for commercial and/or productive purposes. Access to water for irrigation and/or vending takes a gendered perspective. Studies on SSA, including Mozambique revealed that women are associated with domestic water supply, while irrigation farming is for the better off, and younger men (Derman and Prabhakaran, 2016; Lefore et al., 2019). Were et al. (2008) note that all water projects in the Kenyan Highlands, Chesilot, Kiptegan, and Maimur, areas that support dairy and tea cultivation are exclusively owned by men, except one, which a woman was included as she owns the land that feeds the

TABLE 5 Findings on water sources, water quality, and water affordability.

	References
Water quality	
Women collect water from rivers, swamps, men owned shallow wells, and earth dams.	Dickin et al., 2020; Bukachi et al., 2021; Bachwenkizi et al., 2023
Women are prone to waterborne diseases, while men are more prone to infectious diseases.	Grasham et al., 2019
Well and borehole water made cooked food to turn dark. Boreholes produced muddy water in the dry season	Dickin et al., 2020; Mushavi et al., 2020
Drying of streams and springs led women to make the necessary contributions to a community water system.	Meyiwa et al., 2014; Tantoh and McKay, 2020
Majority of the respondents use safe water for drinking	Ngarava et al., 2019; Dickin et al., 2020; Sani and Scholz, 2022
Lack of water quality data in SSA countries studies	Nkiaka et al., 2021
Water affordability	
Women had to pay water vendors or owners of water points in cash or kind.	Bukachi et al., 2021
Financial reason was the most mentioned barrier to participation in water associations.	Coulter et al., 2019
Men had control of payment of water user fees for WUAs while in wives in polygamy had to pay for themselves.	Dickin et al., 2020

spring with water being tapped. Access, ownership, and control of irrigation infrastructure used to harness water is also gendered. Lefore et al. (2019) and Van Koppen (2023) report that women in Zambia, Ghana, Kenya, and Tanzania own small-scale, cheaper, and more labor-intensive irrigation infrastructure, while men more often own mechanized infrastructure to access water.

Resettled and self-allocated farmers who had garden land in water-rich areas, like wetlands and riparian strips in the Mid-Zambezi Rural Development Project in Mhondoro, Zimbabwe, and the Makuleke area of South Africa, were given marching orders by the local leadership (Derman and Prabhakaran, 2016; Van Koppen, 2023). In the latter, the land was given to male livestock owners for easy access to pasture and water. Like many women in SSA, Lefore et al. (2019) state that Ghanaian women face not only financial restrictions when it comes to using water for irrigation, but also cultural obstacles that affect their land ownership and subsequently access to irrigation water.

In places where water scarcity is an acute problem, water vending complements have become a lucrative business opportunity mainly for men for two reasons. Findings from Tanzania, Kenya, and Ghana reveal that males entered water vending as owned advanced conveyance technologies such as hand push carts, motorbikes, bicycles, cars and tankers to distribute water to their consumers (Van Koppen, 2023; Dery et al., 2024). Dickin et al. (2020) further report that women in Center-East Burkina Faso do not have access and control over family income, affecting acquisition of such motorized assets that allow them to transport water over large distances to clients. Women must carry it on their heads to their consumers, limiting the number of women involved and income from this commercial activity. According to Dery et al. (2024) of the all the informal water vendors in Kenya and Ghana, roughly 55% were men and earned more money than women because they employed pricey conveyance methods that were beyond the reach of low-income women. Secondly, in some places, men who owned water points converted them into “cash cows” for desperate neighbors, the majority of whom were women. Bukachi et al. (2021) report that women in Kutui County, Kenya,

paid in cash or kind for the supply of water by men who owned earth dams or shallow wells.

4.7 Gender and water conflicts

Water scarcity leads to competition for the precious resource to meet diverse needs, resulting in conflict between users. Table 6 shows that women experienced some conflicts in their quest to access water and participate in WUA and that the conflicts between males and females were the most dominant.

Women who collect water in public wells and taps in rural Uganda, Burkina Faso, and Katsina state in Nigeria frequently engage in verbal and physical disputes (Mushavi et al., 2020), and also experience sexual harassment and physical attacks by wild animals when traveling long distances searching for water (Sani and Scholz, 2022; Tseklevs et al., 2022). Meyiwa et al. (2014) and Abu et al. (2019) further report that women in Nyanchwa, Kenya, and selected rural communities in the eastern Cape and KwaZulu-Natal, South Africa, respectively, experience rape, abduction, and murder when collecting water at strange hours as they try to avoid long queues and water-related conflicts at communal water sources during the day. Conflicts can also arise in cases where men try to monopolize a water source that is being used by the community, especially women. In Kenya Highlands, Kiptegan water groups clashed with women for trying to access the spring without consulting them, while in Chesilot, non-beneficiaries including women vandalized laid (Were et al., 2008). Conflict also goes beyond divergent actions to include differing opinions, beliefs and concepts, in this case it can be associated with exclusive WUAs. Tantoh and McKay (2020) report that women who participated in rural water projects in northwest Cameroon were bitter about being silenced when they made presentations at water management meetings. The lack of women in decision making structures is attributed to self-doubt (interpersonal conflict), doubt of the capabilities of fellow women (intragroup conflict) leading

TABLE 6 Gendered water conflicts associated with water access and control.

Findings on types of conflicts	References
Intergroup	
Conflict over limited participation in water associations.	Tantoh and McKay, 2020
Conflicts between men and women over water priorities	Dickin et al., 2020
Conflicts with male custodians of the resources, as women violate some of the rules to access the water resources.	Kurebwa, 2017; Nkiaka et al., 2021
Conflicts with traditional authorities on the use, removal from water rich areas and violating water point access rules.	Van Koppen, 2023
Conflicts over access to a spring on female headed land or communal spring used by women	Were et al., 2008
Intragroup	
Conflicts between women themselves at water points and over their governance capabilities	Mushavi et al., 2020
Internal and intrapersonal	
Personal conflicts leading to psychological stress due to fear for assaults enroute to distant water points.	Sani and Scholz, 2022
Women regarding themselves as housewives and men as decision makers	Coulter et al., 2019
Interpersonal and conflict-related violence	
Mistrust between spouses and subsequently violence as wives took longer than expected to collect the water	Bachwenkizi et al., 2023
Conflicts leading to rape, murder, and abduction as the collect water.	Meyiwa et al., 2014; Abu et al., 2019
Human-wildlife conflict	
Clashes with wild animals on use of same water resources.	Sani and Scholz, 2022

to a lack of support when some of them are appointed to leadership positions.

5 Discussion

This systematic review sought to understand how gender politics in the water sector influence water security, rights and water-related conflicts in SSA. Network analysis of key water security parameters shows that many of the parameters are closely related. However, this does not mean that addressing one of the key parameters, such as water availability or accessibility, will guarantee the achievement of other water security parameters. Communities may have physical and economic access to drinking water sources on the lower rungs of the Joint Monitoring Program for Water Supply and Sanitation (JMP) ladder (unimproved and surface water; Ocholla et al., 2022) but this does not make them water secure, as water could be unsafe for health. To address gendered water access and conflicts, authorities should prioritize water availability, accessibility, and water governance given their strong relationship indicated by a high co-occurrence.

Many studies found that the achievement of water availability and accessibility for women remains a pipe dream in SSA due to climate change-induced water scarcity, lack of ownership, control of some water points and modern water conveyance technologies. Women walk considerable distances in the heat for many hours, and they have to balance this against their other household chores. These results are supported by research in the Singida and Dodoma regions of Central Tanzania, where women spend more than 5 h per day in search of water (Kaliba and Norman, 2004), while 91% of Muyuka women in Cameroon walk a mean distance of 2.0 km

in search of water (Fonchingong and Ngwa, 2005). Graham et al. (2016) suggest that for basic water access to water, the round-trip water collection time should not exceed 30 min for water to be considered available and accessible. This supports an observation made by United Nations Children's Fund and World Health Organisation (2023) that the poor have to "pay more" to access water resources by physically traveling long distances, manually transporting water to their homes due to the lack of modern water conveyance technologies.

This review also highlighted several factors affecting the active participation of women in WUAs established to address water availability and accessibility. These include limited access to and/or recognition of women appointed to leadership positions in WUAs and a lack of knowledge of the existence and activities of WUAs. This is an indication that water projects can address parameters such as water accessibility, availability, affordability, and quality but leave women vulnerable to exclusive and male dominated WUAs. The Water Partnership Program of the African Development Bank (2010) reports that despite women's appointment in local water and sanitation user committees in countries such as Mozambique, Malawi, and Tanzania, there are few examples in which women participate meaningfully in planning and decision-making roles in design and implementation of water services. In Ghana, the few women appointed to the WUA were just placeholders while South African men took over the duties of women and silenced women as they expressed their views during WUA meeting (Sam and Todd, 2020). Men in the Chesilot WUA and other water projects in Kenya adopt exclusionary strategies such as scheduling of meetings during evenings or days that are inconvenient for women such (Ocholla et al., 2022), use of English in management meetings or a proof financial contribution as a ticket to appointment to management positions (Kaliba and Norman, 2004). This forces some widows

to transfer their membership to male children, further promoting patriarchal hegemony.

Women seem to be more valued when providing manual labor when the water project is under construction, but once it is completed, their physical presence and ideas are no longer welcome in the decision-making process. This is against Dublin Principle 3 on integrated water resources management, which calls for the empowerment of women to participate in the decision-making of water resources structures at all levels. Under-recognition of women in WUAs hampers the achievement of SDG 6.b, which calls for promoting local communities' (including women's) participation in water and sanitation issues, as well as SDGs 5.1, 5.5, and 16.7 all calling for ensuring women's full and effective participation at all levels of decision-making and inclusive and participatory institutions. To this end, Uganda revised its strategy, which now stipulates that at least one woman should hold a key position such as chairpersons, vice chairs, secretary or treasurer and women should occupy half of the positions in the WUAs (Naiga et al., 2023). However, existing hierarchies within customary structures and uneven power relations based on gender are finding their way into the gender sensitive WUAs of Uganda. Women can be coopted into the WUAs, but cultural norms, such as those that forbid women from speaking or sitting next to older male relatives, discourage them from taking part in debates at WUA meetings (Aarnoudse et al., 2018). While many SSA countries were associated with exclusive WUAs, South Africa recorded meaningful women participation in the same sector. This can be explained by its inclusive water policies and democracy at the political level.

With regard to water quality, the study found that many women in SSA, with the exception of South Africa collected water from unsafe water sources and were prone to waterborne diseases because they were primary water users. This is confirmed by the findings in the Muyuka area of Cameroon, where communities that used unsafe water sources contracted cholera that claimed lives in 2010 (Fonjong and Zama, 2023). Households headed by illiterate and/or low-income household heads (women included) are more likely to use drinking water sources on the lower rungs of the Joint Monitoring Program for Water Supply and Sanitation (JMP) ladder (Ocholla et al., 2022) due to lack of awareness of health problems or money to invest in private water projects. As primary water handlers, women are also the first to detect changes in water quality. In support of this finding, Ocholla et al. (2022) indicate that although both sexes in Kisumu City were able to notice changes in other water security parameters, men were more sensitive to water affordability, while women were sensitive to water quality. With these findings, it was identified that water quality and affordability were understudied in the 24 articles reviewed. Figure 3 shows the two parameters having thinnest connection links (bars) and limited connection to water conflicts and uses of water. Edifying this observation, Nkiaka et al. (2021) report that there is limited research on water quality in SSA countries. Therefore, there is an urgent need to close this gap in the literature with further studies of the relationship between gender and water quality, gender, and affordability, especially in light of the impending rise in water scarcity, water vending, and private water system investment.

The review study found that women mainly handle water for domestic purposes, while access to water for commercial farming

and vending purposes is for the well-up and men. Three main factors that contribute to the limited access of women to "all waters" are limited income and lack of ownership of water conveyance technologies. Dery et al. (2024) report that of the all the informal water vendors in Kenya and Ghana, about 55% were men and made more money than women, as they owned expensive water conveyance technologies that poor women could not afford. The review further revealed that women experienced conflicts related to climate change-induced water scarcity, competition for the scare resource with wild animals, limited ownership of water points, lack of meaningful participation in WUAs, etc. These findings are consistent with a previous study in 20 countries in SSA where Barchi and Winter (2020) reported that women who collect water at public and distant water points face verbal and physical conflicts, sexual harassment, and many other forms of violence.

6 Conclusions and recommendations

Twenty-four years after the adoption of a legally enforceable human right to water, and about 6 years before the cut-off date for the 2030 Agenda for Sustainable Development, the findings of this study show that SDG 6.1 and 6.2 focusing on access to WASH services by the marginalized and women are far from being achieved. Access to "all" water by women in SSA remains a problem due to cultural factors, climate change-induced water scarcity, the use of traditional water conveyance technologies, and gender-insensitive institutional governance related to water. Studies reveal that women in SSA face multiple water related challenges such as traveling long distances to get water, the use of unsafe water where it is locally available, or lack of ownership of local water points and lack of finance that give them a voice in WUAs. In areas where community water projects are implemented, women provide manual work, while technical and managerial work is for men, thereby affecting women's participation in water governance. When women are appointed to leadership positions in WUA, men use exclusionary tactics that hinder women's full participation. The study findings also show that women in agriculture face challenges such as the dispossession of their land in water-rich areas and the unfair application of water sharing regulations by men.

Based on these findings, the work recommends that there is a need to continue reviewing water policies. Such reviews should address gender issues in specific and clear terms guided by rights and development frameworks that advocate for gender mainstreaming. State and non-state actors that implement water policies should precede the implementation of water projects by interrogating and addressing the different contextual factors that contribute to sex-based water access if the right to "all" waters, for all is to be enjoyed by women. To ensure that the most vulnerable and water-insecure (women) are not left behind, the implementation of SGD 6.1 and 6.2 should be done in the context of SDG 5.5, 5.1 and SDG 16.7, as these SDG targets are intrinsically linked. These SDG targets stress the importance of gender equality, ending all forms of poverty (including water poverty) among vulnerable members of society, and the establishment of

strong, inclusive institutions in all sectors. Women should be involved in the whole value chain of the water projects, i.e., from planning, implementation (construction), financing, maintenance, and governance of the water project. Training women in leadership and technical skills (construction, repair, and diagnosis of water facilities) is needed before the start of the project so that women know what is expected of them once the project is started. This is consistent with one of the critical success factors outlined in the African Union Agenda 2063, which emphasizes the significance of citizen participation, empowerment, and inclusion, especially of women and youth in the conception, design, implementation, monitoring, and evaluation of water projects that seek to realize the agenda's aspirations, goals, and national development objectives. Furthermore, the study found that water-related conflicts can only be addressed if attention is paid to water security parameters such as water availability, water accessibility, and water governance, as these components have a strong relationship with the former.

Data availability statement

The original contributions presented in the study are included in the article/[Supplementary material](#), further inquiries can be directed to the corresponding author.

Author contributions

GM: Conceptualization, Formal analysis, Methodology, Resources, Software, Visualization, Writing – original draft,

Writing – review & editing. GN: Data curation, Investigation, Supervision, Validation, Visualization, Writing – review & editing.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Supplementary material

The Supplementary Material for this article can be found online at: <https://www.frontiersin.org/articles/10.3389/frwa.2024.1399415/full#supplementary-material>

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