

Synthesis Paper

Gender dimensions of water vending in LMICs: A scoping review

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ARTICLE INFO

Keywords:

Water vending
Gender dimensions
Equity
Scoping review

ABSTRACT

This scoping review draws together the existing literature on the gender dimensions of water vending. Although research on this topic remains limited, available studies indicate that gender significantly influences the dynamics of water vending and its implications for gender equality. The expression of gender through water vending is context-specific, shaped by cultural, social, economic, and environmental factors, and it evolves over time. The findings show that gender norms, roles, and relations play a crucial role in shaping local water vending systems. Key factors that affect the relationship between water vending and gender include different types of labor—particularly the intersection of productive and reproductive work—and the broader economic, social, and environmental conditions in which water vending occurs. These findings highlight the need to recognize the gendered nature of water supply systems in order to ensure equitable water access and promote gender equality. This review emphasizes that, despite the heterogeneity of local water vending practices, the gendered nature of these activities remains a critical factor influencing broader issues of inequality.

1. Introduction

1.1. Gender and water

Access to safe water, sanitation, and hygiene (WASH) is quintessentially gendered [44]. In many parts of the world women and girls are primarily responsible for collecting water [32,58], impacting their health, education and economic situation. Because of their caring and domestic tasks, girls drop out of school, strongly impacting their schooling and educational opportunities [37,43]. Water fetching puts women and girls at risk of physical, mental, and sexual violence [50]. Inadequate sanitation further exacerbates these vulnerabilities [6,46] and has also severe health impacts on women [19,24,48].

In 2010 the right to safe drinking water was recognized as a Human Right by the United Nations (UN) [65]. The Dublin Conference on Water and Environment in 1992 explicitly recognized the gender and water nexus. Principle 3 of the Dublin-Rio Principles states that “women play a central part in the provision, management and safeguarding of water” [34]. With the Sustainable Development Goal (SDG) 5 on gender equality and SDG 6 on sustainable water management and sanitation, the UN also pays “special attention to the needs of women and girls and those in vulnerable situations” (United Nations, 2015, Goal 6. Ensure availability and sustainable management of water and sanitation for all). In 2020, 2 billion people lacked access to safe drinking water, 3.6 billion

people lacked safe sanitation services and 2.3 billion people lacked a basic handwashing facility [66]. In many low- and middle-income countries (LMICs), a piped water supply is not the norm. Instead, people resort to various alternative water sources, which are predominantly categorized under the concept of informal water markets [71]. This review focuses on the gender dimensions of an increasingly important aspect of water supply – water vending.

1.2. Water vending

Water vending is described as “the sale of water on the doorstep or at the street corner” [18] or “res[elling] water” [35] in areas where population growth and urbanization complicate access to piped water. As Kjellén and McGranahan (2006) explain, there are many different forms of water vending that develop in varied settings and “fill specific niches” [36]. Water vendors operate water kiosks, selling water from shallow wells and boreholes. They drive water tanker trucks or pushcarts or sell bottled or sachet water on the street. This privatization of the water supply was often taken “as a symptom of a failure in [...] piped systems” [36] and in many cities is actively discouraged.

Over the past decade, there has been a shift in the perception towards water vending, now recognized as an important supplement to existing water provision gaps [68]. Without including water vending where appropriate, improvements in currently inadequate water supplies are

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hard to accomplish [36]. According to Dardenne (2006), small-scale water providers play a fundamental role “as the only available water suppliers for close to half the human beings on earth” [25], particularly for urban populations in Latin America, East Asia and Africa [71]. Despite this important role it is important to note that “water vending has both advantages and disadvantages to poor communities” [25]. The two major problems associated with water vending are pricing [36,54,56] and water quality [68].

Water vending is part of an increasing informal economy. In most regions in Africa, informal employment accounts for more than half of total non-agricultural employment, and 80 % in sub-Saharan African (SSA) countries [8]. Just like water, informal employment plays a significant role for gender equality. In general, it is a larger source of women’s than men’s employment in the Global South [12]. It has the potential for women to challenge workplace gender hierarchy and generate income that in some cases, can be the only source of family income [47].

Water vending is both an economic activity tied to gender equality and a significant contributor to water security, which is also linked to gender. Because water vending is gaining more attention as an important feature of water supply, it is important to examine water vending as a gendered activity that can contribute to water security and gender equality.

In the following we explain in more detail the concepts of water vending and gender dimensions, followed by the methodology, results, discussion and conclusions as well as future research directions.

2. Theoretical framework

2.1. Conceptualization of water vending

As Kjellen and McGranahan (2006) state, “there are many forms of water vending [...] [and] several ways of labeling and categorizing the different practices” [36]. Our aim is to conceptualize water vending as broadly as possible to encompass all types of vending, defining it simply as “the reselling or onward distribution of utility water or water from other sources” [36].

Whittington et al. (1989) explain that every vending system involves one or more of three types of vendors. (1) Wholesale vendors, “mainly tanker truck delivery, tractor services and cart-operated” [45], who obtain water from a source and sell it to distributing vendors. (2) Direct vendors, who obtain water from wholesale vendors, store it in large containers and sell it to distributors. (3) Distributing vendors, who sell water door-to-door or in public spaces [69]. We are not only interested in the gender dimensions of water vending as an activity but also in its impacts, such as dependency on water vendors. With our broad conceptualization, we aim to show how water vending both shapes and is shaped by the societal and gender context in which it is embedded.

2.2. Conceptualization of gender dimensions

On a global scale water (as well as sanitation and hygiene – or WASH) is quintessentially a gendered issue. Taking *gender dimension* into account means integrating sex and gender analysis into research [28,29]. Research that focuses on gender/sex as a variable to count the number or emphasize the differences between men and women is partial at best. We aim to explore how “ideas about gender and gender relations in society and culture are constructed [around water vending], maintained and changed, and how such processes are related to power relations” [38]. Drawing from Hensing and Greaves (2020), we divide gender dimensions into gender norms, gender roles, and gender relation, to examine water vending as a gendered activity [33].

Gender norms are social norms, that “refer to societal rules and expectations that dictate the behaviors considered appropriate or desirable for people based on their gender” [33]. They reflect what it means to be a woman or man in a specific social setting; a failure to conform to these

norms can lead to social sanctions. They also determine women’s and men’s agency and capacity to act [14].

Gender roles “include the expected roles and behaviors attached to the genders. Expectations about gender roles often affect and determine the opportunities available to different genders, based on culture, place and time” [33]. They differentiate genders by certain attributes, which can be “trait descriptors (e.g., self-assertion, concern for others), physical characteristics (e.g., body height, hair length), role behaviors (e.g., taking care of children, being a leader), or occupational status (e.g., truck driver, homemaker)” [27].

Gender relations “refer to the relationships between women and men, and how these relationships are influenced by, and in turn influence, the social expectations of women and men in society” [39]. They reflect gendered norms and “affect health, behaviors and roles” [33]. Gender relations are an indicator of power relations and shape the individual abilities to act freely [14].

To contribute to the long-term objectives of water security and gender equity, we conducted a scoping review of existing peer reviewed literature to explore how gender dimensions shape and are shaped by water vending. Gender dimensions are “embedded in all societal institutions, from formal legal frameworks (such as family law or labor regulations) to religions and traditional culture” [14]. We also identify the factors intertwined with gender dimensions, because “women’s and men’s opportunities and actions are determined as much by [...] [gender dimensions] [...] as by the conditions of the communities and countries they live in” [14].

3. Method

This scoping review follows the stages of a scoping review provided by Arksey & O’Malley (2005): (1) identify the research question; (2) identify relevant studies; (3) study selection; (4) charting the data; and (5) collating, summarizing, and reporting the results [9].

3.1. Search strategy

A literature search in May 2022 was conducted using four electronic databases: SCOPUS, Web of Science, Pubmed and Google Scholar.

3.2. Inclusion criteria

Studies were eligible for inclusion if they satisfied the following criteria:

- Articles published after 2000 (the date the Millennium Development Goals were established);
- Peer-reviewed articles published in English;
- Articles that address and align with our conceptualization of water vending;
- Articles that have gender as a category of analysis, not just as a variable;
- Articles that analyze the gender dimension (norms, roles, and relations) of water vending.

3.3. Data extraction and data analysis

We identified 1107 articles from Web of Science, Scopus and Pubmed (Fig. 1), all of which were saved in ZOTERO and uploaded to Rayyan (<https://www.rayyan.ai/>). An additional 25 articles were included following title screening in Google Scholar. Duplicates (419) were automatically removed then titles and abstracts were screened; 661 articles were removed at this step for not meeting inclusion criteria. Full-text screening of the remaining 52 articles was undertaken by the first author and 8 additional articles were included for full-text screening through references to the included articles. 55 additional articles were excluded after reading the full text for not meeting the inclusion criteria.

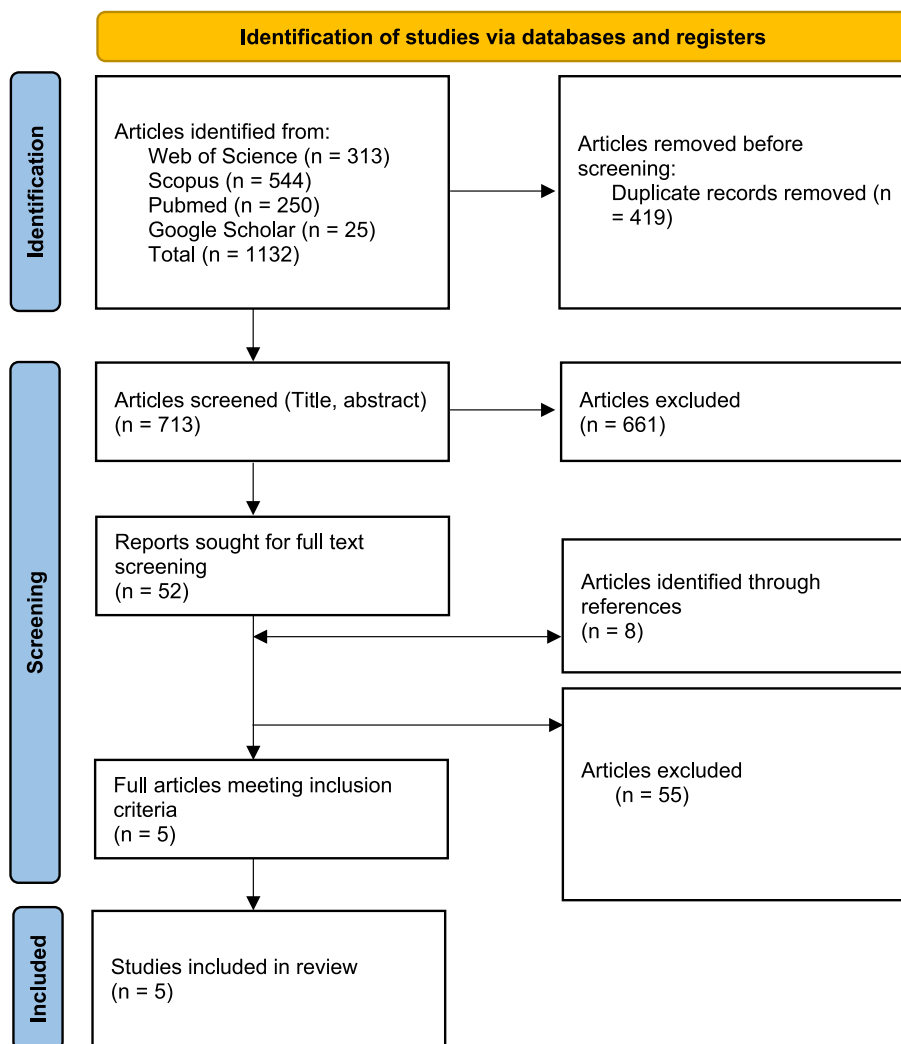


Fig. 1. PRISMA 2020 flow diagram of the scoping review output [49].

Ultimately, 5 articles were included in this scoping review. This small number points to the gaps in the literature around the gendered dimensions of water vending.

4. Results

All studies took place in an urban or *peri*-urban setting in the Global South; two in Ghana [5,45] one in Mozambique [4], and two in India [13,63]. Qualitative data collection strategies were used in all studies, with a combination of interviews, focus groups and participant as well as non-participant observation. Two studies only gathered data from women [13,63].

Various types of water vending are presented in the studies. Alda-Vidal and colleagues interviewed women and men “involved in the small-scale water provision sector in different roles (owners, workers, and family members)” [4] in Maputo, Mozambique to explore the role masculinities and femininities play in informal water supply practices. These small-scale water providers function like small water companies, using electric pumps to extract groundwater, storing it in tanks, and delivering it via a network of pipes to in-house or yard connections. The study focuses on established businesses with a profit vision [4].

Amankwaa (2017) interviewed sachet water vendors (n = 230) at thirteen major traffic light intersections in Accra to explore their daily experiences. Sachet water vending is a form of distributing vending, where drinking water is packaged in small, sealed plastic bags. These

sachets usually contain 500 ml of water and are commonly sold in markets and streets [60]. More than half of them (90 females and 30 males) were randomly interviewed. The majority of the interviewees were under 25 years old, had a low level of education, and had children.

Nyamekye and colleagues (2016) undertook one-to-one-in-depth interviews within 16 selected water vending households in Tamale, northern Ghana, to evidence the importance of women’s work for the water supply. Most of the interviewees were distributing vendors, who carry containers on their heads and “walk to where their water is needed” [45]. Depending on seasonality and availability, vendors get their water from different sources. These include tankers, boreholes, wells, and dams.

For her study about water access in Coimbatore, India, Biswas (2021) interviewed 49 women across 13 slum locations to examine “the everyday negotiations that urban women from slums undertake at different water sources” [13]. In the studied slums, women are primarily responsible for collecting water and are affected by an inadequate and infrequent water supply. Women depend on multiple sources for water supply. Street taps, vendors, and tankers are the most used water sources.

Truelove (2011) interviewed 40 women who live in slums in Delhi, India, “whose socio-economic class gave them little financial recourse to invest in purchasing water or water-related technologies” [63]. She uses a feminist political ecology framework to highlight how water compensation practices are embodied in women.

Each water-vending study occurred in a unique geographical context, but all were underscored by the gender dimensions of water provision.

4.1. Gender dimensions

4.1.1. Gender norms

The results show how gender norms shape and are shaped by water vending, with different types of labor playing a key role. Local norms dictate access to labor and define the tasks for women and men, as seen in water practices. Alda-Vidal et al. (2017) explain that in Maputo, water provisioning through small household businesses is viewed as physical and technical work, traits linked to masculine identity, making water vending primarily a male job. In Accra, sachet water vending is typically a women's job, and expectations of womanhood and manhood shape both genders' access to this business [5]. Nyamekye and colleagues (2016) conclude that women and girls are restricted in areas of technical knowledge. Because of the traditional belief that men are not supposed to carry water, distributing vending is an activity for women and girls.

Other key factors linked to gender norms include water infrastructure and socioeconomic status. Truelove (2011) shows how gender norms become "mapped onto the body through the physicality of accessing water and sanitation" [63]. In South Delhi, irregular water tanker supply forces many women to engage in illegal methods to obtain water, putting them in physical danger and excluding them from legal citizenship rights. These actions illustrate the intersection of gender and class, as women in extreme poverty resort to illegal activities to meet household and cultural expectations.

4.1.2. Gender roles

The selected studies highlight the close connection between gender roles and various types of labor. In Maputo water provisioning is a man's job, because of "associations between masculinities, technology and entrepreneurship" [4]. Despite this, women's involvement in the business includes entrepreneurial tasks like negotiating and financial decision-making. However, these activities are often labeled as household-related and disconnected from the business. Alda-Vidal et al. (2017) argue that this dynamic obscures women's true engagement through public-private boundaries. Because there is a belief that women are more patient and accessible, they are often employed in customer service. Nyamekye and colleagues (2016) suggest that there is a division of gender roles in the water vending sector in Ghana. Distributing vendors, who sell water door to door or sell bagged ice water, are mainly women because carrying water has been socially constructed to be a female activity. Wholesale vendors (mainly tanker truck delivery) are male vendors because operating trucks is constructed as a male activity. Direct vendors, who obtain their water from wholesale vendors and sell it to distributing vendors, are mainly female vendors in Ghana. Amankwaa (2017) also concludes that in Accra, sachet water vending is dominated by women. However, the notion of water vending as a feminine activity is changing; with more unemployed men joining the ranks due to scarce employment opportunities [5].

Two studies also highlight the significance of reproductive roles on water vending. In Accra, female (sachet) vendors state that vending offers great flexibility and allows them to "juggle family and work responsibilities" [5]. Nyamekye and colleagues (2016) indicate that women dominate the water vending sector in Ghana because it allows them to "combine their productive activity with their reproductive roles" [45].

One study highlights the impact of seasonality on women's water vending roles in Ghana. Distributing vendors earn most of their income during the dry season, while earnings drop in the wet season. However, women must manage reproductive and care work year-round, with their workload increasing significantly in the dry season as they juggle multiple roles [45].

Truelove (2011) and Biswas (2021) explore how gendered roles and

behaviors both shape and are shaped by water practices and the existing water infrastructure. Truelove (2011) highlights how poor water access in Delhi limits the life opportunities and mobility of girls and young women. Due to infrequent water deliveries, girls are often kept out of school to wait for water tankers or assist with household chores. Women frequently bend or break laws to access water, such as bribing tanker drivers or illegally tapping into pipes. Poor women, in particular, face abuse, violence, and reinforced spatial exclusion, ultimately diminishing their citizenship rights [63]. In her study Durba Biswas (2021) argues that there are "complex dynamics of how women navigate their gendered roles while maintaining social relations and simultaneously procuring water on an everyday basis" [13]. When public tap water supply is poor, the burden on women increases, with household storage capacity playing a key role. Households with more storage face less pressure during no-supply days. Biswas shows how women cooperate by sharing supply timing information and filling water buckets for each other. She emphasizes that focusing solely on the technological aspects of water access overlooks the everyday struggles of women. Water vendors help alleviate this burden by reducing the labor needed to procure water and providing smaller quantities for purchase.

4.1.3. Gender relations

The selected studies suggest two distinct ways in which water vending both shapes and is shaped by the relationships between women and men: cooperation and (unequal) power dynamics.

Amankwaa (2017) suggests that water vending can lead to cooperation between genders, despite the assumption that "competition may arise as men cross over into non-traditional job[s], and women themselves continue to have few opportunities in male domains" [5]. In Accra male and female vendors see one another "as part of the same social and occupational group" [5]. Sharing the same workspace increases the likelihood of cooperation, as vendors help one another and form solidarity against business threats. This cooperation is further enabled by the less privatized nature of vending spaces like traffic lights [5]. Alda-Vidal et al. (2017) also highlight gender cooperation in household water vending businesses, noting that water provisioning does not adhere to strict gender roles or professional distinctions. It requires various types of work and skills, with male and female household members collaborating and sharing responsibilities [4].

How water vending can affect and is affected by power dynamics is described by Nyamekye et al. (2016) and Truelove (2011). Nyamekye et al. (2016) examine how water vending affects women's bargaining power in households, which is closely tied to their income and reproductive roles. If women fail to meet their husbands' expectations regarding domestic responsibilities, their relationships may become strained. This creates a dilemma: while water vending is a crucial income source, women must also manage household chores. Without social support, informal economic activities can enhance women's bargaining power but may also disrupt household dynamics [45]. Truelove (2011) examines power dynamics in water access, stating that access to water is inherently shaped by social and economic power relations, with men largely controlling the water infrastructure.

5. Discussion

This scoping review synthesizes the peer-reviewed literature on the gender dimensions of water vending. Despite growing awareness of water-gender inequalities and the global significance of water vending, evidence on its gender dimensions remains scarce. Existing studies, however, highlight the strong connections between gender and water vending.

All studies were conducted in LMICs, supporting the assumption that informal water supply is particularly significant where official services are lacking. However, the results highlight that these countries are not homogeneous; local context is crucial. Gender norms, roles, and relations are shaped by the unique histories of specific places, making

generalizations difficult. Despite this, a key message emerged: water vending is consistently a highly gendered activity.

Various factors influence gender relations and how water vending contributes to gender equity. The selected studies examine factors such as different forms of vending and labor, economic and social conditions, the buying and selling sides, household dynamics, reproductive tasks, and environmental conditions. These factors are interconnected and mutually influence one another. Interventions aiming to enhance the impact of water vending on gender equity must account for the range of influencing factors that vary by location.

The studies show that gender dimensions significantly shape women's and men's access to water vending. This access is strongly influenced by the type of water vending and the activities involved. Other studies, not included in this review, also examine differences in access to the various types of labor involved in water vending [31,51,56,76]. For example, Geere et al. (2010) observed that the practice of carrying heavy water loads on the head is widely accepted among women in South Africa [31]. In contrast, Sarkar (2020) identified that men in Kenya tend to favor mechanically assisted tools for such tasks [56]. Further studies discuss the impact of the combined reproductive and productive workload on women [10,23], the impact of seasonal variation on water security [3,16,17] and power relations between different actors [2,21,40]. As shown Truelove (2011) uses a feminist political ecology framework to show how water compensation practices are embodied in women. In recent years, new research has developed embodied perspectives on urban water insecurity, inequality, and infrastructure. Influenced by political ecology, this literature critiques depoliticized views of water scarcity and insecurity, emphasizing the socially unequal experiences within urban water systems [1,7,26,41,64].

Due to the narrow scope of this review (focusing only on studies that examined water vending and gender with gender as a category of analysis), only five studies were reviewed. However, a larger body of existing literature can be considered to contextualize the work despite the fact it does not meet our strict inclusion criteria.

Research on the gender dimensions of water vending must be placed within the broader tradition of studies on water and inequality [20,22,53,75], as well as the growing body of literature addressing water justice [11,61,72,77]. An important aspect for the examination of the intersection of gender and water vending is health. Various studies examine the health implications of water vending activities and the associated labor conditions [30,31,51,52,56,67,76], as well as the connection between water (in)security and mental health [42,55,59,70,73,74]. Another important topic for the research on the water-gender nexus is violence, experienced by women and girls when attempting to meet their water needs [57,62].

This scoping review has some limitations. As the aim was to be as broad as possible, the articles reviewed are highly heterogeneous and comparisons are complicated. Due to the level of priority attached to water security issues by many international organizations (e.g., UN Water, UNICEF, WaterAid) as well as the competence of international organizations to undertake research, the addition of gray literature would likely yield more results. This was not possible in the current work but is the subject of future research.

The reviewed studies all build on the binary of genders and examine the role of women or/and men in water vending, reflecting and empirical reality based on a binary gender system. It is important to understand how women and men are affected by water issues. However, to get a more complete picture, future studies must also address identities that do not fit into this system [15].

6. Conclusion

Conducting this scoping review allowed us to synthesize the peer-reviewed literature on the gendered dynamics of water vending. Despite increasing awareness of the link between water and gender

inequalities, as well as the global significance of water vending, the evidence on the gender dimensions of water vending remains scarce, underscoring the need for further investigation.

Future research should broaden this understanding by exploring the experiences of non-binary and gender-diverse individuals, thus moving beyond binary gender frameworks. Additionally, examining power dynamics among vendors, consumers, and stakeholders could reveal how these relationships influence gendered access, equity, and experiences within water vending. The intersection of reproductive and productive roles in the context of water vending and their implications for gender equity and labor distribution require further in-depth investigation. Comparative studies on different water vending contexts will shed light on how varying infrastructures and environmental conditions shape gender norms, roles and relations.

As gender dynamics are continually evolving, ongoing research situated within specific social, cultural, political, and environmental contexts is essential to deepen our understanding of gender in water vending practices.

Declaration of generative AI and AI-assisted technologies in the writing process

During the preparation of this work the author(s) used Chat GPT during the revision process in order to improve language and readability. After using this tool, the authors reviewed and edited the content as needed and take full responsibility for the content of the publication.

Disclosure statement

Given their role as Section Editor, Susan Elliott had no involvement in the peer-review of this article and has no access to information regarding its peer-review.

CRedit authorship contribution statement

Lukas Weissenberger: Writing – review & editing, Writing – original draft, Visualization, Validation, Methodology, Investigation, Data curation, Conceptualization. **Susan J. Elliott:** Writing – review & editing, Supervision, Conceptualization.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgements

The first author received financial support from the German Academic Exchange Service (DAAD) and Mitacs Canada as part of a Globalink Research Internship at the Department of Geography and Environmental Management at the University of Waterloo.

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