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Research Paper

Experiences of water poverty in the metropolitan area of Barcelona: implications for the Global North

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ABSTRACT

Water poverty, primarily understood as a problem of affordability, is increasingly important in developed countries. It burdens vulnerable households with mounting debts or deprives them of this fundamental resource. Faced with this threat, households may modify their habits to reduce consumption and seek also assistance to reduce the amount of the water bill. Both strategies imply stressful efforts, often exacerbated by unexpected events like the COVID-19 pandemic. Using semi-structured interviews with 35 vulnerable households in a working-class town near Barcelona, in this paper we blend a quantitative assessment of home water habits with a qualitative analysis of strategies to reduce water bill costs. Results reveal a strong commitment to water savings but clashes with essential household needs, particularly for children. Respondents lament that despite intense water saving, bills remain high, given water's perceived expense and limited subsidy access. In sum, addressing the issue of water poverty from the subjective experience of those struggling against it in their daily lives allows to identify situations where basic physical and mental comfort of the more vulnerable is under severe stress. These experiences and perceptions are linked to sociopolitical and economic processes such as accumulation by dispossession or ecological modernization, contributing to water poverty.

Key words: accumulation by dispossession, Barcelona area, consumption habits, ecological modernization, water poverty

HIGHLIGHTS

- It is necessary to conceive water poverty beyond efficiency.
- Low-income households are double vulnerable due to a lack of knowledge and effective advice.
- There is water insecurity and a lack of water comfort in many low-income households.
- The impacts of water poverty often escape detection by social services and water supply companies.
- Water poverty may attain a magnitude and severity that remains socially unnoticed.

INTRODUCTION

The concept of water poverty gained international recognition when the United Nations declared universal access to water and sanitation a human right (UN 2010). However, and contrary to the Global South, water poverty has received comparatively little attention in the Global North at least in what concerns the much more developed research field of energy poverty (Bouzarovski & Petrova 2015; Yoon & Saurí 2019; Middlemiss 2022). Especially, and unlike research on energy poverty, water poverty, with some exceptions (Anderson *et al.* 2023), lacks studies on household and personal experiences of the problem from more qualitative perspectives (Longhurst & Hargreaves 2019; Sylvester *et al.* 2023). Moreover, studies on water poverty in the Global North have been primarily interested in quantifying the extent of water poverty by discussing affordability thresholds; that is, households would be defined as water poor if their water bill exceeds a certain percentage of the budget, usually set at 3%. It is assumed that, beyond this percentage, households would need to reduce other expenses, perhaps not as critical as water but equally important for household reproduction (Martins *et al.* 2016; Smets 2017; Goddard *et al.* 2021). This line of research has shown how water has become unaffordable for 2 out of 20 low-income households in

countries such as the United States, putting people at risk of having their water shut down (Teodoro 2018). In England and Wales, up to 20% of households may be affected by water poverty (Sylvester *et al.* 2023).

In the Metropolitan Area of Barcelona (AMB), it has been calculated that water poverty could affect 10% of households (Domene & Satorras 2022). Moreover, successive economic, health, and geopolitical crises in the second and third decades of the 21st century have undermined water security in many households of the Global North, in which, despite having extensive network coverage and advanced technological capabilities, access to basic services is not guaranteed (Huerta-Saenz *et al.* 2011; Mack & Wrase 2017; March & Saurí 2017; Tirado-Herrero 2018). These crises have made even more evident the vital importance of continuous and affordable access to basic water services for human comfort and well-being (Domene & Satorras 2022).

In this article, the term 'water poverty' will be used to refer to the difficulties experienced by households in achieving socially and materially sufficient water (Bouzarovski & Petrova 2015; Meehan *et al.* 2020). In the context of the Global North, some authors have made estimations amount of water needed to satisfy minimum requirements of drinking, cooking, sanitation, and hygiene in general, and have established figures such as 100 liters/person/day (lpd), which, according to the OECD, is considered the minimum (Bartram & Howard 2003). Some of the most remarkable results in this area refer to the situation suffered by disadvantaged households, which allocate approximately three times more of their income to energy and twice more to water than middle- or high-income households (Bednar & Reames 2020; Domene & Satorras 2022; Romero-Gomez *et al.* 2024).

The objective of this article is to explore the material conditions of households that suffer from water poverty, as well as to understand the characteristics of water metabolism in these households and the coping strategies they pursue to ease the burden of the water bills. To do this, we have developed and used semi-structured interviews with a quantitative part to gain knowledge of habits of water use in households and a qualitative part addressed at unravelling the strategies of water management within the households and the myriad of problems these households face when attempting to reduce consumption. Interviews with households have been complemented with interviews with social agents (municipal social services, water company managers, and NGOS working in poverty alleviation) to grasp better the social and institutional contours within which household decision-making must operate.

Water poverty: from quantitative thresholds to lived experiences

Problems related to water and energy poverty are often analysed in terms of efficient use and solutions to these problems are typically proposed through infrastructural and technological improvements (Medrano-Gómez & Izquierdo 2017; Filippín *et al.* 2018). However, vulnerable households often have difficulties to apply improvements that require relatively high initial investments or depend on landlords to do so (Yoon & Saurí 2019). This 'positivist perspective', to use the expression by Ambrose & Marchand (2017), considers the scope and depth of energy and water poverty as a purely technical and economic question and therefore it may be criticized for adopting a narrative exclusively expressed in terms of technical efficiency for what is a multidimensional problem. This 'technification' of poverty not only hides the diversity of experiences lived by households but also the broader socio-political processes that lie at the heart of the issue (Middlemiss *et al.* 2018). One particularly important factor that cannot be measured statistically is the emotional impacts, especially distress and anxiety caused by the variability and unpredictability of energy and water bill prices and the permanent fear of not being able to pay the bills (Middlemiss & Gillard 2015; Longhurst & Hargreaves 2019).

Several studies have begun to study energy poverty with qualitative, ethnographic approaches in order to understand better the daily struggles of the population affected (Ambrose & Marchand 2017; Longhurst & Hargreaves 2019; Anderson *et al.* 2023). It should be noted also that some recent studies are developing the concept of 'energy vulnerability' with the aim of incorporating all the conditions and factors that escape the conventional concept of energy poverty based only on economic metrics (Longhurst & Hargreaves 2019; Recalde *et al.* 2019; Yoon *et al.* 2019). These new approaches make it possible to recognize and deepen understanding of the nature of the experiences lived by the affected households. At the same time, these methodologies attempt to make visible the worries, anxieties, frustrations, stigmas, personal perceptions, and shame generated by resource poverty and forgotten in positivist perspectives (Butler & Sherriff 2017). This paper wants to contribute to the debate by adding water to the matrix of resource poverty in households.

Bases for critical analysis: The determinants of water poverty

Just as water poverty and energy poverty are beginning to be investigated using qualitative approaches, many authors are turning their attention to the structural, social, political, and economic causes that generate this form of poverty. These new

approaches range from macroeconomic factors – measurable quantitatively – to socio-political processes. Although structural socio-economic conditions are the direct cause of energy and water poverty in vulnerable households in the Global North (Recalde *et al.* 2019; Bednar & Reames 2020), it is necessary to understand that these structural conditions derive from political-economic processes that are more common in countries under neoliberal economic regimes. Some of the influential processes amplifying water and energy poverty are for instance, the feminization of poverty (Sultana 2011), the process of accumulation by dispossession (Hodkinson & Essen 2015), ecological modernization (March 2013; Middlemiss 2022), or water insecurity (Meehan *et al.* 2020).

Structural conditions of households

Much of the current research on the conditions that generate water poverty, and on the policies that seek to alleviate them, continue to conceptualize, define, and act on the basis of the factors that Boardman described in her groundbreaking work three decades ago as the main causes for energy poverty: low incomes, energy inefficient households, and high energy costs (Boardman 1991). In this way, during the last decades, energy poverty and later water poverty have been discussed solely in terms of efficiency and affordability. This approach justifies that actions to pursue limit themselves to assistance policies in the form of discounts on water bills or the encouragement of households to use technological improvements to reduce costs. However, this approach has not proven to be very efficient in eradicating this problem in most countries (Longhurst & Hargreaves 2019).

To understand and assess which variables have been used to define the 'structural conditions of households' beyond just income, water and energy prices, and efficiency of use, we provide a list of such variables in Table 1. These variables, used in various studies, allow for a more precise determination of the scope, causes, and impacts of water and energy poverty.

Although the social and economic determinants listed in Table 1 affect resource poverty directly, it is necessary to consider the incidence of many other factors including precarious labour markets, inflation, or the worsening conditions of the welfare state (Recalde *et al.* 2019). All these play an important role in the ability or inability to assume the economic effort of purchasing water and energy, especially for low-income households. Moreover, households under energy and water poverty are not only defined by social class but also by gender. Several authors speak of the feminization of poverty as a structuring factor in energy and water poverty in the Global North, since poor households are often associated with women (Middlemiss *et al.* 2018; Robinson *et al.* 2019; Sánchez-Guevara Sánchez *et al.* 2020; Petrova & Simcock 2021).

The process of accumulation by dispossession

Energy and water poverty may also be part of the process known as accumulation by dispossession (Harvey 2008; March 2013; Hodkinson & Essen 2015; Yoon & Saurí 2019). This phenomenon, originally classified by Marx as primitive accumulation, is defined as a particular way of capturing wealth and power at the expense of common or public resources (Harvey 2008; Hodkinson & Essen 2015). Accumulation by dispossession unfolds through practices, policies, and mechanisms allowing to turn common, collective, or state resources (water, energy, housing, transportation, etc.) into private commodities (Harvey 2008; Bayliss *et al.* 2021).

Table 1 | Variables affecting resource poverty

General category	Specific variable	References
Economic	GDP/capita	Recalde *et al.* (2019) and Boardman (1991)
	Unemployed adults	Bienvenido-Huertas (2021);
	Gini coefficient	Galvin (2019)
	Population at risk of poverty	Middlemiss (2022)
	Rent	Recalde *et al.* (2019)
	Price of water and of other items included in the water bill	Marí-Dell'Olmo *et al.* (2022)
Social, demographic, ethnographic	Immigrants	Oliveras *et al.* (2020)
	Women (gender)	Petrova & Simcock (2021)
	Sick or disable occupants	Ivanova & Middlemiss (2021)
	Single families	Eisfeld & Seebauer (2022)
	Household size	Robinson *et al.* (2019)

Source: authors.

Some studies relate accumulation by dispossession to energy and water poverty by especially highlighting the often-sharp increases in the price of water that occur after privatization and deregulation processes (Yoon & Saurí 2019). In England, the privatization of water produced important economic benefits for companies and their investors, while the poorest households underwent increasing hardship to pay the water bills (Bayliss *et al.* 2021). Moreover, market ethics imposes specific behaviours on users of energy and water services, now marketable goods, requiring them to act as fully informed rational buyers with the ability to maximize the utility of their consumption (Lennon *et al.* 2020; Bayliss *et al.* 2021). This vision of the behaviour that society should pursue regarding the use of basic services is criticized as harmful to low-income households (Middlemiss & Gillard 2015; Williams *et al.* 2017; Ross 2020).

Some authors claim that when neoliberal economic policies are applied, economic and social inequality grows (March 2013; Galvin 2019). According to Galvin (2019), when poverty measured in terms of economic inequality (through for example the Gini index) is high, its influence in the generation of energy poverty is also high. In the same vein, other studies use the commodification of water to explain how the processes of accumulation by dispossession have been put into practice by depriving poor households of the universal right to these services (March & Saurí 2017; Yoon & Saurí 2019). This situation of vulnerability has often been compensated for through solidarity funds and discounts. However, in practice, these mechanisms based solely on a proof of a specific financial status by families, do not solve other problems arising from the commercialization of water services, such as the difficulties in saving water, the presence of other taxes and fixed charges, and the often-poor state of household water fixtures (Yoon & Saurí 2019). Some authors have initiated the debate on the effectiveness of affordability assistance without a deep reform of the financial structures in the water sector (Sylvester *et al.* 2023).

Ecological modernization

Environmental policies addressed to mitigate and adapt to climate change and other environmental problems may be connected to the deprivation of rights to basic resources such as energy and water for the most disadvantaged strata of society (Bakker 2005; March & Saurí 2017). Ecological discourses have been mobilized to highlight environmental limits and question the hegemonic economic model, but on the other hand, neoliberal orthodoxy has been able to circulate and hybridize with environmental ideas with relative ease (March 2013). The reduction in domestic water consumption in some countries of the Global North in the last decades responds to several reasons (Sauri Pujol *et al.* 2015; March & Saurí 2017), among which awareness campaigns and technological improvements. However, as Karen Bakker points out, neoliberalization processes involve the re-regulation of socio-environmental resources and geometries of power, which reconfigure (and in some cases, limit) the rights of both humans and the environment (Bakker 2005). Free market environmentalism and ecological modernization continuously assume economic growth as the basis for sustainability (Asara *et al.* 2015). For example, raising the price of water can mean a decrease in consumption, which is positive in environmental terms but also produces a burden for families increasingly unable to meet the water bills, which is negative in social terms (March & Saurí 2017).

Despite the reduction of water consumption in many European and North American cities (Barraqué *et al.* 2011; Kristina& Heather 2015) attributable to ecological modernization and market environmentalism, criticisms of these approaches are widespread. On the one hand, the perception that in these processes with which neoliberalism promotes sustainability efficiency is prioritized over equity should be noted (March & Saurí 2017). On the other hand, free market environmentalism has been criticized for conveying the idea that the environmental crisis is global, generated by everyone and affecting everyone. However, ecological modernization intensifies the risk of poverty for vulnerable households as they enter this process at a disadvantage, in economic terms, with respect to average households (Middlemiss 2022).

Water security

The concept of water security is gaining relevance in recent studies on water poverty in the Global North. Although it is not considered as a structural socio-economic condition or a driving factor of water poverty, water security is used to support some discourses on the processes of the commodification of water. Especially since the 1990s and during the re-regulation processes of the energy and water markets, the debate on what was the best governance system for water management, introduced a series of criteria into the public sphere such as accessibility, quality, affordability, universality, or uniformity (Bakker 2005). These criteria, however, have become unfulfilled myths in many countries of the Global North (Meehan *et al.* 2020).

Regarding the universality of water, some authors point out that in certain states of the USA, as well as in Canada, France, or some Northern and Eastern European countries, patterns of inaccessibility repeatedly appear in rural areas or urban districts coinciding with processes of racial segregation (Gunnarsdottir *et al.* 2017; Leker & Gibson 2018). The idea that water should be provided at affordable prices is also under discussion (Meehan *et al.* 2020) while some authors criticize that water and sewerage services are not affordable for many households with low incomes in countries of the Global North (Mack & Wrase 2017; Teodoro 2018). Another factor that perpetrates inequality and water insecurity is the fragmentation of the water management sector (Meehan *et al.* 2020). This fact has created 'gaps' in regulatory coverage, failures of some providers, and lack of coordination in governance in some countries of the Global North (Bakker & Cook 2011). For these reasons, it has been considered that the right to water in the Global North is not guaranteed for all.

METHODS

In this paper, we use qualitative methodologies to investigate the impacts of water poverty on vulnerable households. The research includes 35 semi-structured interviews with households at risk of poverty in a working-class town of the Barcelona area as well as two interviews with local government agencies. Interviews with households have a categorical and quantifiable part to assess the attempts to address the daily experience with water use and their material and emotional implications. Interviews with social agents were conducted both with local social services and the municipal entity specializing in water and energy poverty, 'Rubí Brilla.' These two entities are responsible for detecting and alleviating cases of water and energy poverty in the municipality and have therefore very valuable experiences on the topic.

With the aim of characterizing and understanding the socio-economic profile of households, the questions asked were divided into blocks: Sociodemographic profile of households; Economic saving strategies and habits, water consumption and impact of Covid-19, and personal perceptions regarding water quality, prices, and subsidies. Additionally, the section 'the view from social local agents' has been added regarding the responses from the interviewed municipal social agents.

The 35 semi-structured interviews, as well as the interviews with municipal agencies, were conducted between February and July 2022 by personnel of the Department of Geography of the *Universitat Autònoma de Barcelona*. This work was part of the AQUA-POB project, which replicates the same type of study in other areas of the Spanish Mediterranean such as Alicante and Murcia.

The semi-structured interviews had a duration of approximately 30 min each, were conducted by telephone, and were transcribed using the Sonix software. The locality where the interviews were conducted is Rubí, a municipality chosen for its representative socio-economic profile within the metropolitan area of Barcelona and for the close relationship between the research group and the municipal administration staff dealing with water and energy issues. This facilitated contacts with local NGOs and, through these, with the vulnerable households interviewed. Response results were extracted separately according to whether they were open-ended or coded responses. Ethical procedures of the entire process were agreed upon by the municipal administrations, the collaborating entities, and the University following the guidelines of a 'Confidentiality Commitment'. This document, signed by the director of the research team, stated that the use and analysis of the data and information extracted from the interviews would ensure anonymity and confidentiality and would serve academic purposes only.

Socioeconomical and geographical context

In 2020, the average income of households in the metropolitan area of Barcelona (AMB) fell between 7 and 8% compared to 2018 and the population at risk of poverty increased by 20% (Navarro-Varas *et al.* 2020). At the same time, about 10% of Metropolitan households were considered as water poor since they spent more than 3% of the household income on water (Domene & Satorras 2022). Regarding water supply, most municipalities of the AMB are served by a mixed capital company (85% of the shares belong to the private partner) while in the town of study water supply is entirely private (Yoon & Saurí 2019). After the devastating effects of the financial crisis of 2008 in Spain and in this region in particular, with water shutoffs and evictions occurring daily, citizen action managed to protect the rights of vulnerable households through legislation introduced in the Regional Parliament of Catalonia so that since 2015 water shutoffs are prohibited for vulnerable households. Water-related debt, however, mounted to reach over 30 million euros in 2018 (March 2014; Yoon & Saurí 2019).

RESULTS

Sociodemographic profile of households

Households interviewed were mostly formed by couples with children, although there were also single-parent households with children or people living alone. The majority of these households have a high number of members living together,

even higher than the average of the metropolitan municipalities. Regarding the economic conditions of the households, most indicated a total income of less than EUR 1,200/month, including some 20% of households who did not exceed EUR 600/month. It is also relevant to mention that approximately 40% of households interviewed affirmed having a member with a disability or chronic illness. More than 80% of respondents were women, indicating that women carry the responsibility of household management, including the management of water and energy flows.

In many households, technologies and devices to improve the efficiency of domestic water consumption were largely absent. For example, dishwashers were present in only one out of four homes while flow reducers in taps or dual flushing toilets were absent in approximately half of the homes interviewed.

In the open question section, we asked about their views on strategies to pay the water bills. Answers ranged from general observations to the lack of balance between salaries and prices to specific actions taken to curb consumption:

'I wish salaries were higher, more balanced, and that the prices [of water bills] were lower.'
[Male, 45 years old. February 26, 2022]

Many of the comments point out not only the high cost of energy resources relative to salaries but also the economic difficulties they face due to employment issues such as unemployment.

'Everything is very expensive, the water, the electricity…, and if you add the apartment, it's a shame that they're helping me because I don't work, and government help it doesn't give much. I am having many money problems now; it is very difficult to be able to pay everything.' [Female, 41 years old. March 5, 2022]

'Everything has gone up in price, and we are both only receiving unemployment benefits. Well, my benefits have already ended, so now only my husband receives unemployment. It's very difficult to save.' [Female, 62 years old. March 5, 2022]

Water saving strategies and the impact of COVID-19

A very high awareness of water-saving habits was common in most households with many different strategies to reduce water consumption. These measures range from collecting cold water in the shower before it turns hot to reducing the frequency of use of cleaning appliances or using short programmes to save electricity and water. Next, we include a few comments given by respondents regarding saving actions:

'[…] the hot water comes very quickly to the bathtub, but I collect the cold water with a bucket and use it to scrub later and things like that.' [Female. March 12, 2022]

'You can reduce the time for the washing machine, 15 minutes at most…' [Male, 45 years old. February 26, 2022]

'I have rules set at home and they have to be followed. Washing machines work every 3 days, we turn off the tap for everything, in the shower we don't wait for the water to come out hot, we can't allow it, you have to be strong and willing to shower with cold water until it's hot but no more than 5 minutes.' [Male, 50 years old. February 27, 2022]

'Washing less often is the only measure to take in my case.' [Female, 70 years old. February 26, 2022]

However, many answers exposed the difficulties in further reducing consumption beyond what they have already managed, for example:

'I haven't reduced it because it can't be reduced any more either, it's not like we're wasting a lot of water.' [Female, 31 years old. March 12, 2022]

'I haven't been able to reduce consumption because it's what we use every day, I could do fewer dishwashers … but since they get full loads every day it's more economical than washing them by hand, and I also put a lot of washing machines, but because they're full every day.' [Female, 47 years old. March 3, 2022]

'[…] it is impossible to reduce and in addition the prices are very high.' [Male, 45 years old. February 26, 2022]

Regarding households with children and teenagers, respondents were concerned about the habits of children, who, according to them, are generally less aware of the need to save water.

'[…] we have to go after the children because when they brush their teeth, sometimes they leave the tap open and those things.' [Female, 34 years old. March 19, 2022]

The comments highlight that the adults in these households are not only strict about saving water in daily actions like brushing their teeth but also do not allow differentiated water use for children in the shower. Here is a sample of comments on these actions:

'We are one of those people that for us it is a sin to leave the tap running while you are doing things, it is something that is not allowed, even when the children are in the shower, we tell them to turn off the water all the time, they are not allowed to spend like that.' [Female, 48 years old. March 19, 2022]

'[…] previously my son was taking a shower, and it took half an hour to rush him out, now we can't afford it, sometimes it happens, but we have to let him know.' [Female, 56 years old. March 26, 2022]

'Well, that's about short showers, my son likes to stay in the water and relax, but we have to say that he can't always do it.' [Female, 36 years old. March 5, 2022]

Regarding the impact of the COVID 19 pandemic on water consumption, most of the people interviewed affirmed that especially during the confinement period, their water consumption increased.

'It changed everyone's life… because of the work I do, I always wash my hands a lot. In the more intense moments of COVID we started to wash everything as if we had fleas in the house. I haven't done it again, but I wanted to keep everything clean. Because of confinement, my son showered a lot, every time he came back from outside he showered, maybe 4 times a day.' [Female, 67 years old. March 6, 2022]

'[…] we have noticed it because water is used for everything. Before we cleaned the apartment only once a week and now, we clean it 2 or 3 times. Cleaning clothes is also an expense that has increased.' [Female, 62 years old. March 5, 2022]

Some comments also mention the increase in electricity expenditure due to changes in habits during the pandemic months. This water-energy nexus is very present in these households when asked about the increase in consumption and energy costs during this period.

'A lot. Washing clothes, cleaning everything, making sure the towels are always disinfected, using the washing machine once a week for a while, the high temperatures… all that is a high cost of water and electricity.' [Female, 47 years old. March 12, 2022]

Personal perceptions regarding water quality, prices, and subsidies

Regarding the characteristics of water for drinking, three out of four people interviewed said that they consume bottled water. Most pointed at the quality of the tap water as being bad or very bad to justify the choice of bottled water.

'Yes, we drink bottled water, but they told us that tap water has a lot of lime and is not good for drinking.'
[Male, 56 years old. March 30, 2022]

However, some answers even mentioned that by purchasing bottled water they saved in the water bill.

'[…] we drink water from the bottle, so we don't spend from the tap.' [Female, 41 years old. March 12, 2022]

Some were aware of the high cost of bottled water:

'[…] then I buy bottled water to drink and it costs 1 euro each […]' [Male, 50 years old. February 27, 2022]

As regards the difficulties in paying water bills, more than half of the people interviewed admitted that they had difficulties in paying the water bills, some of them also claimed that bills made them to reduce consumption, but most indicate that one of the reasons of their difficulties in paying the bills was the impossibility of reducing water consumption beyond some essential needs.

'I always pay more or less the same, all my life, I don't spend more than what I use. So I can't reduce, I prefer to call the company and pay them in two instalments.' [Female, 80 years old. April 6, 2022]

'I have to clean the kitchen, children have to shower, clothes have to be cleaned. We have not reduced because it cannot be reduced, we have to keep doing things.' [Female, 27 years old. March 28, 2022]

Regarding the perception of the water price, the general answer was that water was expensive although not as expensive as electricity:

'Both of them [water and electricity] are very expensive and difficult to save.' [Female, 41 years old. March 5, 2022]

'Of course, electricity is the thing I have to pay the most, it's the thing that's used the most, although it's as basic and necessary as water, but it's much more expensive.' [Female, 47 years old. March 12, 2022]

Despite these difficulties in dealing with the payment of receipts, three out of four persons interviewed admitted to never having contacted any association to receive advice on the issue of the water bill, nor requested any kind of official financial help. In contrast, regarding family or friend support, almost a third of the interviewed households acknowledge having asked for financial assistance from a relative at some point. For this reason, it was interesting to analyse the perspective of the local social services regarding this issue.

The view from local social agents

From the interview carried out with local social services, the first thing revealed was a history of years of working together with the companies in cases of energy and water poverty unheard of in many other municipalities. Social services act quickly in cases where the water company notifies them about households with water bills pending payment. The ensuing procedure is carried out within the framework of the Collaboration Agreement between the city council and the water company to combat energy poverty (including water) and economic vulnerability. This agreement has allowed to assist families with debts and to prevent their supply from being cut off, to clear debts and to receive advice and mediation between the household and the water company. In short and through this agreement, they have developed a way of coping with water poverty in the city.

'The fact of having a fund (provided by the water company) available that can cover both discharges and debts and that does not have a budget limit makes us very happy, since it wipes out debt situations that liberate families from the stress of being in debt that could limit their access to housing.' [Social Services. July, 2022]

However, a shortcoming recognized by social services, concerned the access to families in debt that have never applied for financial help:

'Those people we don't know, we are not calling them. It had been done back in the day, but it was an absurd investment. In other words, a lot of effort was made in contacting and notifying all these unknown people and in the end only about 10% or less came to us. Hence, ninety percent of the list of debtors are not known by social services. Imagine the volume of affected people who do not go through us.'

Regarding the profile of the homes receiving assistance by Social Services:

'The majority of people who come to us in a situation of energy poverty (and the lists of debtors) are nuclear family units and this worries us. In other words, many people are affected, both adults and minors. I insist a lot on poor [in the stages of] children and teenagers under 18.'

However, another municipal entity in charge of data and studies on water and energy poverty has developed software that cross-checks the debtor's data provided by the company with the municipal census to quantify how many of the debtors are women and how many are men.

'What we have seen is that while we detect that most of the water invoice holders are men, when we do counselling sessions, women are the ones who come.'

Thanks also to this system of cross-referencing data, it was possible to approximate the georeferencing of the neighbourhoods of the city with the most homes affected by water poverty:

'Right now, I think that [water poverty] is common in all neighborhoods, but as always and as in all problems, the neighborhoods that have the lowest income and a greater presence of older and degraded buildings suffer more problems.'

Data provided in these interviews on the impact of the pandemic on the municipality show an increase of almost 30% in people who requested to be assisted by the Solidarity Fund (a subsidy provided by the water company to households in a situation of vulnerability) between the years 2020 and 2021. However, this substantial growth due to the pandemic is preceded by a moderate but constant growth of households since 2016 requesting access to this fund due to the impossibility of paying their bills.

DISCUSSION

Results are discussed through two deeply interwoven levels of analysis. The first includes the everyday reality of vulnerable households vis a vis water poverty while the second responds to more general economic and socio-political processes relevant for water poverty alleviation. The experiences of vulnerable households are analysed in relation to their habits of using, saving, and paying for water, as well as the strategies they follow to ease as much as possible the burden of the water bills. In turn, these experiences and strategies are related to more structural, social, and economic causes of water poverty as described in the theory section.

Regarding the characteristics and structural conditions of households and as described in the theoretical framework, defining the role of variables that characterize structural conditions is essential for understanding energy and water poverty. As shown by the results, most persons interviewed lived under conditions that made them prone to suffer from water poverty, especially low incomes (Boardman 1991), and demographic profiles that include the elderly, single parents with children or adults living alone as well as a relatively high percentage (Eisfeld & Seebauer 2022) of chronically ill or disabled people (Ivanova & Middlemiss 2021). As indicated by other studies, other variables that can indicate water or energy poverty are present in the sample, such as unemployment (Bienvenido-Huertas 2021), high utility prices (Marí-Dell'Olmo *et al.* 2022), rent costs (Recalde *et al.* 2019), and household size (Robinson *et al.* 2019).

Another result that exemplifies how these households start at a systemic disadvantage is their inability to enter the process of ecological modernization (Asara *et al.* 2015; March & Saurí 2017). Most of the households interviewed did not have water-saving devices in taps or toilets and their appliances (for example, washing machines) tended to be old and wasteful. Resources required to purchase efficient fixtures or appliances were not within the reach of these families, who remained behind, in economic terms, compared to households in general (Middlemiss 2022). Although, given the vulnerability profile of these households, a lower presence of modern appliances compared to the general population was expected, the proportion of water-saving mechanisms in this sample is very low, particularly dual-flush toilet systems and faucet flow restrictors, which have a relatively low cost. This situation may explain the difficulties in further reducing water consumption and the anxieties it generates in many households, as reflected in many of the statements presented in the results.

Regarding gender, which is often portrayed in a close relationship with poverty (Sánchez-Guevara Sánchez *et al.* 2020; Petrova & Simcock 2021), interviews with social agents showed the deep implication of women in seeking assistance or in applying for subsidies, although bills were generally under the men's name. Also noteworthy is the fact that, as mentioned in the results, 80% of the interview participants are women. This very active presence corroborates not only the well-known, dominant role of women in the reproduction of households but also their higher exposure to the stress and anxiety associated with keeping water consumption in the household as low as possible in order to reduce the amount of water bills. In this

sense, water poverty becomes another component of the more general feminization of poverty (Sultana 2011) producing physical and emotional impacts on women in charge of the daily management of households.

Households were highly aware of habits and strategies for saving water. One interesting exception to this could be the habit of drinking bottled water instead of tap water, which involves an extra economic cost even though some interviewed are convinced otherwise. Some households justified this habit in terms of the quality of the tap water, which was generally perceived as bad or very bad. This result is consistent with literature describing countries such as the USA relatively higher consumption of bottled water among minorities and the poor (Huerta-Saenz *et al.* 2011; Graydon *et al.* 2019), especially in households with children (Blocker & Eckberg 1989). In the case of immigrants, the lack of trust in tap water may be related to previous experiences of poor quality (March *et al.* 2020). This situation exacerbates – probably unconsciously – the vulnerable situation of these families even more since the price of bottled water may increase water expenditure significantly. In addition, the price of bottled water is ignored when calculating the affordability of water in households.

Households with children and teenagers experience additional difficulties in reducing water consumption. This suggests that large families who are also low-income struggle to support the needs of children but may be forced to impose children and teenagers using less water and perhaps affecting the metabolic needs of this demographic group. Likewise, and for hygienic reasons, water needs by women tend to be higher than those of men (Kayser *et al.* 2019). This situation reflects an issue related to the justice of recognition (Anderson *et al.* 2023).

The Covid-19 pandemic hit many poor households hard. Most of the households state that they had to make higher financial efforts to cope with the added costs of cleaning and hygiene during the months of confinement. Moreover, many of these households bore the added vulnerability of precarious labour markets and diminishing resources of the welfare state (Mayer & Ryder 2022; Champlin *et al.* 2023).

The results obtained from the analysis of the experiences of vulnerable households in relation to their living conditions, consumption habits, and water-saving strategies, as well as the difficulties they face in reducing the amount of bills and their experiences during the pandemic, revealed emotional issues related to stress and anxiety, particularly in households with dependent children. The daily coping with these vulnerabilities threatens both mental and physical comfort (Middlemiss & Gillard 2015).

Finally, many respondents stressed how the difficulties in paying the bills, despite efforts to reduce consumption, altered their daily life. This situation especially happened when, regardless of the situation of economic precariousness and the high degree of water-saving awareness, they were not prepared to give up basic hygienic needs both personal and of the household. Some interviewees acknowledge that if it weren't for the aid they received (both from family and public), these difficulties would be unsurmountable. Proportionally, there are many more households that seek help from family members rather than from administrations or utility companies. This may be due to the stigma associated with asking for official assistance, although some families might also be unaware of the available aid or how to apply for it. For this reason, it is likely that only one in 10 debtor households was advised and assisted financially according to social services. This situation of chronic precariousness becomes especially critical during episodes of crisis and exemplifies how the commodification of basic services without effective protection for the most vulnerable strata of society is an essential part of the process that leads to accumulation by dispossession. In our case, this was mostly reflected by the association of high-water prices with the concession to a private company of the city's water supply.

CONCLUSIONS

The article has begun addressing one major gap in the research on water poverty in the Global North, namely the insufficient consideration of the multidimensionality of the problem. For this reason, we have focused it on two main topics. On the one hand, we have analysed the strategies, habits, and perceptions of vulnerable households regarding water supply and consumption. In this case, we contribute with a case study that shows the nuanced living experiences of water poverty. On the other hand, we have attempted to shed light on the daily struggles of households that face water poverty, highlighting structural processes of dispossession and unequal access, such as access to water-saving technologies.

One of the main problems we have detected is the lack of previous research on water poverty beyond efficiency or affordability issues, and especially related to the material conditions of households, both measurable and experienced. The results of this study show that water poverty is not only a problem influenced by the prices of water, wages, or subsidies, but that it may be the direct expression of several systemic processes that are rooted in the inherent inequalities of the dominant economic

system. In our case, the socio-economic profile of many households makes them double vulnerable due to a lack of knowledge and effective advice. Many of the affected families did not know how to ask for help, and many had false perceptions about the quality of tap water for drinking, often leading them to consume bottled water and paying much more for this basic resource, further aggravating their precarious situation.

One condition often invisible to many quantitative studies as well as in the entities in charge of reducing water and energy poverty that has been detected in the present study is the lack of water comfort and the water insecurity of many households. Despite having detected a high degree of awareness about consumption, the widespread difficulties in dealing with payments raise anxiety, lack of mental and physical comfort and may force unsatisfactory consumption habits unable to ensure comfort for additional water needs groups within the households such as children and women.

In our research, most households did not have efficient appliances that could reduce water consumption. This circumstance is a derivative of unjust ecological modernization processes resulting from free market environmentalism policies that put vulnerable populations at systemic disadvantages. Finally, the structural socio-economic factors that define the profile of families suffering from water poverty make them particularly exposed to economic crises. This fact has been evidenced by the experiences described during the crisis period at the root of the Covid-19 pandemic as the product of the combination of higher water consumptions and mounting unemployment.

Regarding the price of water, beyond considerations of whether they perceive the price as high or low, based on the other structural conditions and inequity processes, it does not mean that it is affordable. With regard to subsidies and other forms of assistance, most persons interviewed claimed to have never requested help for paying the bills. The situations experienced by the families described in this case study are widely reproduced throughout the metropolitan area, especially where the water supply service is under private management. Hence it could be argued that one of the origins of water insecurity in these households may be related to processes of accumulation by dispossession taking the form of the privatization of water described in the introduction.

Eventually, it is important to highlight that the data provided by the municipal entities show serious deficiencies in terms of the scope of the welfare actions undertaken, since these only reach a small percentage of households in debt of the municipality. Hence, water poverty may attain a magnitude and severity that remains socially unnoticed. The processes of accumulation by dispossession also operate in our area of study, where basic resources have become commodities in the hands of private companies and the problem of water poverty in vulnerable households has become more acute in recent decades.

Finally, the results of this article point to several research, practice, and policy implications. It highlights the need to conceive water poverty beyond efficiency. It is necessary to understand the real scope of this problem and to do so, it is essential to change the political approach of how it is addressed since the model of current intervention based on subsidies, alone, cannot solve the problem. Understanding both household impacts and the socio-political processes and trends that create water poverty is essential to addressing both causes and the symptoms. In this sense, our research could be complemented with more detailed assessments of domestic water metabolism. This additional research should also recognize the role of women, particularly how the feminization of poverty impacts daily water habits and practices. The understanding of lived experiences should in the future be an essential complement to the more quantitative approaches.

The impacts of water poverty often escape detection by social services and water supply companies. However, it is evident that there are structural socio-economic conditions and water use habits and strategies in these households that make it difficult for families to overcome water poverty. At the same time, the importance of the conditions that favour water poverty as the direct expression of socio-political processes that create or perpetuate it has been made evident through the experiences of people who are struggling to pay their water bills. These families are fully aware of what their situation means to them in attempting to achieve a comfortable and fair domestic water metabolism.

DATA AVAILABILITY STATEMENT

Data cannot be made publicly available; readers should contact the corresponding author for details.

CONFLICT OF INTEREST

The authors declare there is no conflict.

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