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Defining and acting on water poverty in England and Wales

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ABSTRACT

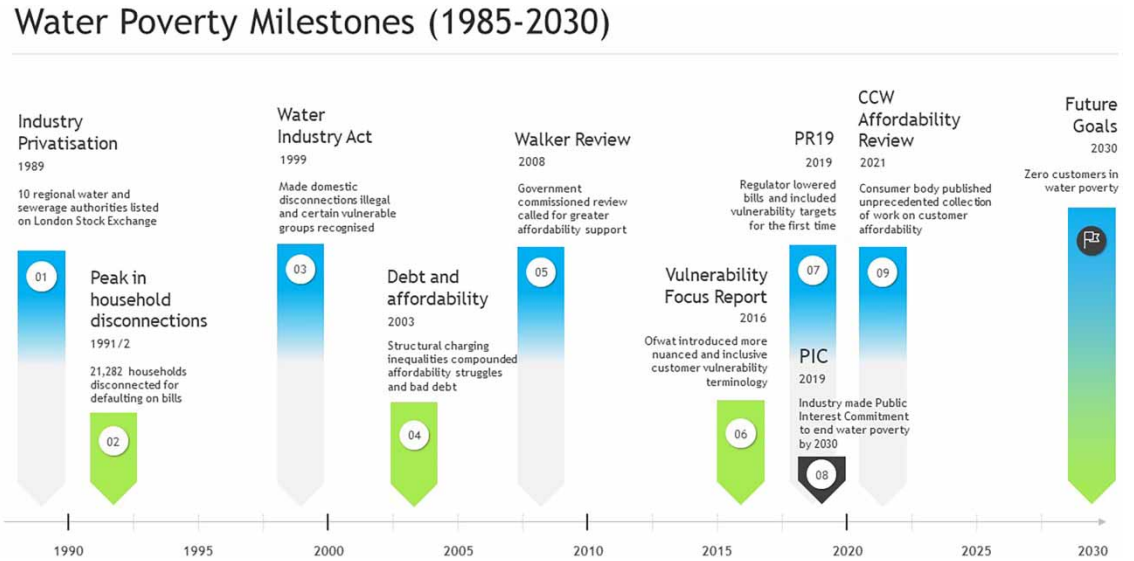
Water poverty is the lived condition households experience when they are struggling, or unable, to afford their water bills. Despite a relatively low public profile, it affected approximately 20% of households in England and Wales in 2020. Currently, as many as 34% of bill payers report struggling to pay fairly frequently. This comprehensive review examines definitions, prevalence and manifestations of water poverty through an analysis of 354 grey and academic documents, dating between 1985 and 2022. Synthesising the literature revealed how water poverty is a structurally-produced problem, reflecting trends in sector governance and wider societal processes. In the 1980s and 1990s, water poverty was characterised by household disconnections, as defaulting customers were considered a drain on the financial health of newly privatised utilities. Owing to civil society opposition, by 2000 water poverty became a technocratic problem of affordability and debt. Despite certain legal protections for vulnerable households, structural drivers of water poverty were unresolved and rates continued to rise, peaking in 2013/2014. Contemporary discourse emphasises extending availability, accessibility and flexibility of support, but structural inequalities remain hidden. It is, therefore, highly questionable whether the water sector in England and Wales can fulfil its commitment to ending water poverty by 2030.

Key words: Affordability, Customer vulnerability, United Kingdom, Governance, Water poverty

HIGHLIGHTS

- Civil society opposition precipitated legal protections for domestic water customers.
- Bad debt has spiralled in the water industry reaching an estimated £3.5 billion in 2020.
- Customer affordability is intrinsically linked to structural inequalities in sectoral financial mechanisms.
- Regulation has tentatively protected customers in recent years, although securing business interests continues to take priority.

GRAPHICAL ABSTRACT



INTRODUCTION

The UN General Assembly Resolution 62/292 recognises the human right to water and sanitation, holding states and other rights-bearers responsible for ensuring 'safe, clean, accessible and affordable drinking water and sanitation for all' (UN General Assembly, 2010 p. 3). It is widely believed that this right has been fulfilled in high-income country (HIC) contexts (Meehan *et al.*, 2020). However, recent research on Household Water Insecurity (HWI) disproves this assumption, finding limitations and inequalities in service provision stemming from a lack of funding and local capacity, discrimination issues and technical challenges (Mattos *et al.*, 2021).

Research in this emerging field is concentrated in the United States. In Europe, water access has been studied largely from an affordability perspective, examining notions of equity within the wider context of population trends and water scarcity (García-Valiñas *et al.*, 2010). Alternative tariff structures, affordability indicators and more targeted support have been proposed to allow vulnerable households to meet their basic water needs (Martins *et al.*, 2016; Vanhille *et al.*, 2018). Yoon & Saurí (2019) present an ethnographic study centring the experiences of those living with water and energy poverty, asking the question 'who decides the criteria for vulnerability?'.

There are a few studies on the affordability of water in the UK, although most were conducted over 10 years ago (Middleton & Saunders, 1997; Sawkins & Dickie, 2005; Chappells & Medd, 2008; Bradshaw & Huby, 2013). No recent academic work has investigated complex affordability issues or, more broadly, perceptions of universal access. Although households in England and Wales (E&W) are protected in legislation from being disconnected from services (Water Industry Act 1999), assuming that this equates to universal access across the entire population is simplistic. The premise for this review is that water poverty is the most visible case of the infringement upon the right to water and sanitation in E&W, although less visible cases likely exist among transient populations (Anthonj *et al.*, 2020; Maroko *et al.*, 2021).

Water poverty is considered as a 'multidimensional concept open to a variety of definitions' in the European literature (Yoon *et al.*, 2021 p. 1330). In E&W, a household 'lives with' water poverty if their water and sewerage bill exceeds 3 or 5% of their disposable income (CCW, 2021). These affordability thresholds have developed in

the literature since the 1990s, deriving from international standards for water affordability (UNICEF & WHO, 2021). The water industry has yet to agree a sector-wide definition, the closest was set out in legislation in 2017:

> *'for the purposes of this chapter a person lives in water poverty if the person is a member of a household living on a lower income in a home which*:
>
> – *Cannot be supplied with water at a reasonable cost, or;*
> – *Cannot be supplied with sewerage at a reasonable cost*' (Digital Economy Act, 2017)

The terminology in the Digital Economy Act is insufficient for enabling substantive action to be taken. The Northumbrian Water Group and National Energy Action's joint programme on ending water poverty by 2030 is currently working on the vital step of establishing a comprehensive definition (NEA, 2019).

Depending on calculation methodology, between 18–20% and 5–10% of households were affected by water poverty at the 3 and 5% levels, respectively, in the year 2019/2020 (Water UK, 2020; CEPA, 2021). In 2022, research found that over a third of customers struggle to afford their bills fairly frequently (Forbes & Kiel, 2022). This article focuses on the 3 and 5% measures as the standards used in E&W, however studies in other HICs have explored alternative, micro-level indicators for improving the identification of vulnerable households (Vanhille *et al*., 2018). Martins *et al*. (2016, p. 117) show that average measures alone are insufficient because they can 'mask affordability issues for substantial proportions of the low income groups'.

Statistics reveal the scale of the problem but fail to represent the lived reality. Research has shown the gap between economic indicators and lived experiences of energy poverty, an analogous field with a greater number of studies and progressed theories (Longhurst & Hargreaves, 2019). Focusing on an income percentage frames the problem of energy poverty as a strictly technical one, which can only be addressed through technical solutions. Not only does this 'technicalisation' obscure lived experience, it also hides the political processes that work to create the problem (Middlemiss *et al*., 2019). Therefore, bringing in social and political perspectives to studying water poverty is necessary to reveal its embodied nature. This is crucial for re-politicising it as a structural problem of inequity and injustice. The last time these perspectives were central to the field of water poverty was during the period of widespread opposition to water company disconnection practices in the 1990s (Huby, 1995; Marvin & Guy, 1997; Middleton & Saunders, 1997).

Most water poverty literature does not interrogate structural drivers, instead focusing on economic analyses (Bradshaw & Huby, 2013; NEA, 2019; CEPA, 2020, 2021). Investigating the origins of present-day water poverty can reveal its roots, by asking why it exists and how it is produced. It is also necessary to re-attribute responsibility to institutions rather than to households, which is often done through assigning blame and through the practice of cross-subsidies. Adding an average of £30 onto customer bills to fund affordability tariffs during a national 'cost of living crisis', while shareholder profits remain in the billions, demonstrates the immense inequity that is built into the water sector (Ambrose *et al*., 2016; Hall, 2022).

Six drivers of water poverty were recently identified by the water industry research body: 'absolute income, unit cost of water, bill and income volatility, living costs, volume of water required, and customer control and understanding' (UKWIR, 2020, p28). These factors influence the severity of water poverty but do not reveal the structures that produce it. For example, the unit cost of water is set by water companies, varying between regions, as well as between metered and non-metered households (Bakker, 2001). Water billing is not only calculated based on unit cost but also on infrastructural investment, cross-subsidies and the cost of company and customer debt. The role of the customer in paying for these additional costs is not inevitable, rather it is the product of ideologically designed governance processes, which are contested in the academic literature (Bayliss *et al*., 2021; Hall,

2022). Similarly, the unit cost of water is set within the framework of 'financial engineering' where it is commodified, along with household units, to secure company borrowing and shareholder profit (Loftus *et al.*, 2016). Therefore, politically engaged drivers of water poverty exist, and are hidden, within water sector governance processes.

In this rigorous review, a systematic-style methodology was used to examine the state of scholarly and grey literature on water poverty in E&W. It was synthesised into a chronological narrative, structured around key policy milestones including: the 1999 Water Industry Act; the 2008 Walker Review; the 2021 CCW Affordability Review. The first narrative section details the characteristics of water poverty between 1985 and 2000. The influence of privatisation is discussed, particularly changing industry priorities and the new principles behind water charging. The second section presents developments between 2000 and 2022. Marked by the ban on household water and sewerage disconnections in 1999, water poverty in the 21st century is characterised by affordability struggles, social impacts and spiralling levels of bad debt. Section three discusses future trends and goals, highlighting areas that require further research and policy emphasis. Overall, an extensive synthesis of knowledge on water poverty is presented, contributing to theorising its systemic nature and providing insights to support long-term solutions.

METHODS

This study was designed to compile the breadth of published literature on water poverty in E&W between 1985 and 2022. A systematic-style approach was taken to the process of gathering relevant literature, based on the established SPIDER framework (Cooke *et al.*, 2012). Table 1 details the search strategy taken.

Literature compilation

Databases were selected based on their relevance to the topic of water poverty. Four academic databases were selected because they contain peer-reviewed research from social science, political and economics disciplines. Thirty-five grey databases were selected, comprising water company websites, regulator websites, water sector research bodies, consumer representative bodies, cross-sectoral public support organisations and non-government organisations. The full list of databases searched is included in the supplementary information.

Search terms were developed based on the search strategy outlined in Table 1. These terms are detailed in Table 2. Search strings were formulated by combining terms into strings in sets of three (1 AND 2 AND 3), for example, 'water consumer' AND 'affordabl*' AND 'United Kingdom'. In grey database searches, the strings were tailored to the specific database depending on the type of organisation and the effectiveness of the search function. For example, on a water utility website, multiple single-word searches were conducted using

Table 1 | Literature review search strategy.

SPIDER category	Review strategy
Sample	Population of England and Wales
Phenomenon of interest	Water poverty
Design	Qualitative, quantitative, mixed methods and policy (non-novel research or based on secondary research). Any study design was included if it contained data on water poverty
Evaluation	Data on water poverty or the associated concepts: affordability, vulnerability, bad debt
Research type	Academic and non-academic research of any design and nature

Table 2 | Literature review search terms.

Key criteria		Search terms
1	Water consumers	'water user*' OR 'water customer*' OR 'household water'
2	Affected by water poverty	'affordabl*' OR 'water poverty' OR 'vulnerab*' OR 'water debt' OR 'low income household' OR 'in arrear*'
3	Relevant to England & Wales	'United Kingdom' OR 'England' OR 'England and Wales'

terms from key concept 2, because key criteria 1 and 3 were filled by the fact that the website was that of an English or Welsh water utility.

Search results were screened to eliminate irrelevant literature by applying inclusion and exclusion criteria to the abstracts and titles. For grey literature without abstracts or executive summaries, the entire text was assessed against the criteria. Figure 1 sets out the process of literature compilation using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) approach.

Quality appraisal

Most of the included literature was non-academic and varied in format and purpose. Therefore, the quality appraisal could not be conducted by ranking literature via a standard quality assessment designed for academic research. A more relevant and impactful indicator in this review was influence, rather than quality. The

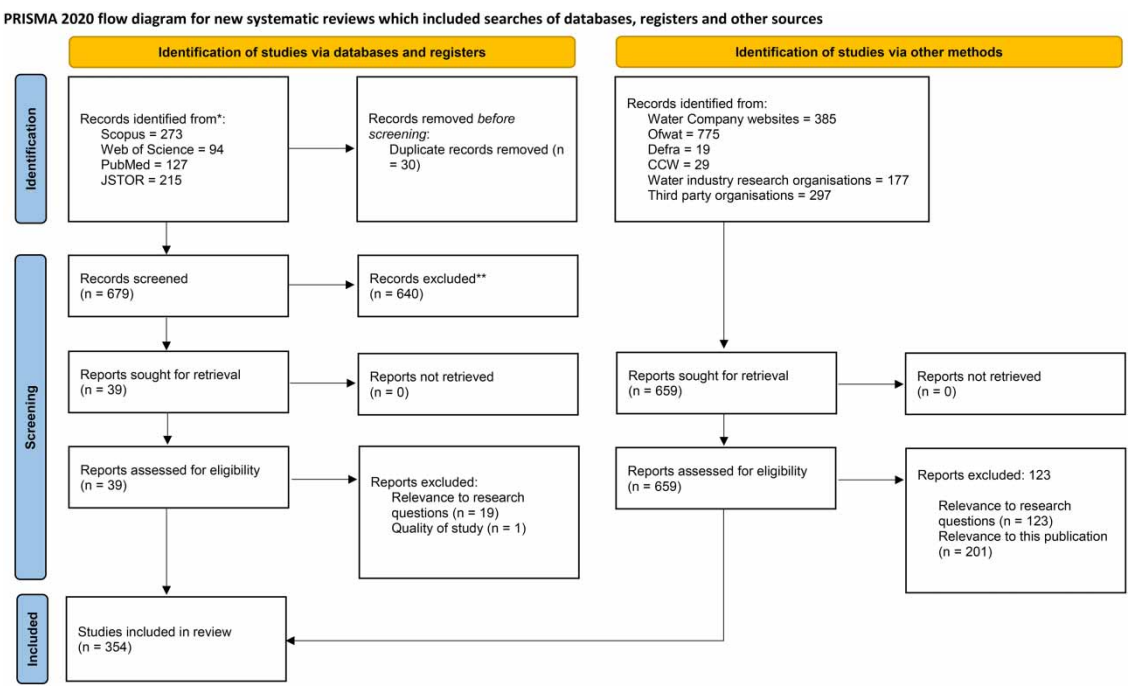


Fig. 1 | PRISMA flow diagram detailing the literature compilation process.

influence of certain documents or ideas was determined by how often they appeared in the compiled body of literature.

Data extraction and synthesis

The included pieces of literature were downloaded and stored in NVivo software, and subsequently grouped into sets based on the databases they were retrieved from. All documents were read individually, which was done methodically by set. Relevant data were extracted from the document by coding sections of text. Codes were developed based on the search strategy, detailed in Table 1, and some additional sub-codes were generated during reading in an iterative manner. The full list of codes is included in the supplementary information. General notes were also taken to extract additional relevant data.

After data were extracted into codes and notes, they were synthesised through summarising the key points or figures from each section within a code or sub-code. Similar points were grouped together and via an iterative process, a picture emerged of the issue at hand, enabling theory development based on trends and patterns in the data. This process was repeated for the codes based on the key terms water poverty, affordability, vulnerability and bad debt. A historical narrative was built up around chronological policy milestones that emerged out of the data from multiple codes.

Limitations

This main limitation of this method was the number of included documents. Although noticing the repetitive nature of certain information was useful for assessing influence, a similar understanding could have been gained with fewer included documents. The benefits of the systematic-style method, however, included limiting the influence of researcher bias in the inclusion or exclusion of certain literature. A reason for using a systematic-style method was to ensure as much available data on water poverty was compiled. However, this could not be fully achieved due to the number and format of databases. Grey databases could not always be searched using search strings, and so there may have been documents missed. Additionally, some website search functions did not operate effectively, and at points manual searching through webpages was necessary to locate documents.

The researchers' positionality to the subject matter must also be noted. In terms of replicability, different researchers carrying out the method as described would likely not produce exactly the same results, due to the subjective nature of the data synthesis procedure. However, it is anticipated that the broad themes and conclusions drawn would be very similar, as the influential data and concepts in the literature are undeniable.

RESULTS

1985–2000: restructured water charging

The term water poverty first became widely used in literature and public discourse following privatisation of the water industry. The Conservative government of the 1980s championed neoliberal values and drove the marketisation of many areas of the economy, including essential service sectors. In 1989, the 10 major regional water and sewerage companies in E&W were listed on the London Stock Exchange, and multiple independent and government bodies were subsequently mandated to regulate them. Ofwat, the economic regulator, was tasked with three potentially conflicting responsibilities: protecting the interests of customers, promoting competition, and ensuring the proper financing of company functions (Bayliss *et al*., 2021).

In the years leading up to privatisation, water companies undertook efforts to get their business assets in order. This led to a new level of scrutiny on domestic customers, in an attempt to recover outstanding debts. Subsequently, the number of household water disconnections rose 40-fold between 1985 and 1989, continuing to increase into the 1990s (Marvin & Guy, 1997). Water poverty at this time was, therefore, characterised by the state that arose from physical disconnection from water and sewerage services.

Water prices increased at a faster rate than any other privatised household utility in the 1990s, with bills rising by approximately 40% after inflation by the end of the decade, hitting low-income households the hardest (Lister, 1995; Bayliss *et al*., 2021). The gap between the lowest and highest charging areas widened, as the newly private companies set their charging rates based on regional resources and population characteristics, rather than on nationally agreed pricing (Bakker, 2001). Chappells & Medd (2008) argues that this situation was underpinned by the move to economic efficiency principles behind water charging upon privatisation, resulting in households no longer paying an equal rate for the cost of water but instead paying for the cost they imposed on the system.

The term 'bad debt' denotes debts incurred by domestic customers defaulting on bills. Between 1989 and 1994, the percentage of households in arrears rose from less than 1 to 9% (Marvin & Guy, 1997). Low household income was found to be a strong indicator of predicting water debt (Huby, 1995; Huby & Anthony, 1997; Bakker, 2001). Another cause of increasing bad debt was changes to the billing system. Upon privatisation, water companies terminated agreements with local councils, through which many households paid their water bills on a weekly basis along with other outgoings such as council tax (Marvin & Guy, 1997; Bakker, 2001). Replacing this system with larger half-yearly bills was, in 1990, predicted by the Department of Social Security to 'bring about particular problems to income support claimants', including increasing bad debt and related budgeting problems (Huby, 1995, p. 220). Regional disparities were compounded by the fact that means-tested income benefits were set nationally, resulting in some households facing water bills that were twice the price of others as a percentage of income (Huby & Anthony, 1997; Marvin & Guy, 1997; Middleton & Saunders, 1997).

The rising price of water, widening regional inequalities, and changes to the billing system were key factors behind rapidly increasing bad debt in the 1990s. By 1994, two million households were in debt to their water provider, with unpublished figures suggesting this may be a conservative estimate (Marvin & Guy, 1997). This is a notable reference point for narratives around present-day water poverty, as it demonstrates how debt and inequity during this period were strongly related to aspects of water sector governance. Revealing some of the systemic roots of water poverty provides an argument to refute the notion that individual households themselves are to blame. This notion is discussed further in subsequent sections.

Public health concerns

In the early 1990s, rates of diseases including dysentery, hepatitis and shigella reportedly increased, raising national concern about the consequences of water poverty (Marvin & Guy, 1997). Major studies at the time did not find a causal relationship between increased incidents of diseases and household disconnections, with the exception of a small study that discovered unreported health problems in disconnected households, and concluded that such groups were unlikely to be identified by systems due to wider societal inequalities (Middleton & Saunders, 1997). In 1994, the head of the British Medical Association called out water utilities, stating 'the policy of disconnection [is] inhumane and medically dangerous not just to the individuals but to the wider community' (Lister, 1995, p. 83). Campaigns to end disconnections on public health grounds grew throughout the 1990s. Key campaigners included 'The Campaign for Water Justice' lead by working-class women in Bradford and Merseyside, and the Child Poverty Action Group (Lister, 1995).

Increasing civil objection pressured Ofwat to modify their guidance on the practice in 1992, and rates began to fall gradually after peaking at 21,282 that year (Marvin & Guy, 1997; Middleton & Saunders, 1997). The decision to modify the guidance was taken after 7 years of high disconnection rates, between 1985 and 1992. In this situation, Ofwat's responsibilities to customers and companies conflicted, and ultimately business interests were prioritised until it became publically unacceptable.

In 1999, after 2 years in government, the New Labour Party implemented the Water Industry Act which made domestic water and sewerage disconnections illegal. This fundamentally changed the defining characteristic of water poverty in E&W. The reform was timely and necessary, ensuring social protection and a higher standard of living for households vulnerable to water poverty. The following year the concept of vulnerability was officially recognised in legislation under the Water Industry (Charges) (Vulnerable Groups) Regulations, which made provisions for certain groups. To have qualified for support, a household must have been in receipt of an income-related benefit and be either a large family (three or more children under 16) or have special water needs due to a specific medical condition (The Water Industry (Charges) (Vulnerable Groups) Regulations, 1999; Bakker, 2001; Sawkins & Dickie, 2005).

An influential voice on poverty during this decade was Ruth Lister. Applying her knowledge on social inequity to the issue of water, she elicited the complex needs of vulnerable groups, particularly women and ethnic minorities. Lister (1995) discusses the relative size of ethnic minority households compared to white households, in general, making them more vulnerable to high bills under metering. Women tend to absorb the consequences of poverty, for example, they often do the majority of the housework and so become the managers of household water saving when there is scarcity (Lister, 1995). Despite the limitations of the Water Industry (Charges) (Vulnerable Groups) Regulations, they mark the first step towards officially recognising the complexity of water poverty. However, integrating non-financial considerations in an industry now operating in the language of economics was to prove challenging.

2000–2020: Extrinsic reforms

Entering the 21st century, domestic customers were protected from disconnection, enabling them to continue to use running water and functioning sewerage even if they did not pay their bills. Beyond this, no structural reforms were brought in to address the inequalities within the charging system, and consequently, the affordability of bills continued to be a problem for many households (Fitch & Price, 2002; Sawkins & Dickie, 2005). A 2003 report by the Department for Food and Rural Affairs (Defra) showed concern that, in the highest charging region, the South West; 'affordability has become a threat to public health… [and] a poor diet and social isolation were inevitable if debt is to be avoided and excessive charge absorbed out of a standard pension income' (Sawkins & Dickie, 2005, p. 226). The turn of the century marked a new manifestation of water poverty, as an issue of affordability and bad debt rather than physical disconnection. The implementation of the Water Industry Act satisfied opposition sparked by public health concerns, causing political pressure to dissipate.

Regional inequalities in household billing led the UK and Welsh governments to commission an independent investigation in 2008. Known as 'The Walker review', the results from this investigation called for the sector to ensure the affordability of water for those on the lowest incomes, with the final report stating that 'affordability issues must be resolved' (Defra, 2011a, p. 4). The Walker review coined the phrase 'affordable for all', now regularly used by Ofwat and other water sector actors (Walker, 2009). In response, the UK government pledged to 'reform the water industry to ensure more efficient use of water and the protection of poorer households', a commitment later reiterated in 2011 regarding: reforms to the WaterSure tariff; the approach to company social tariffs; and options for government spending to provide further support (Defra, 2011a, p. 4).

A key government action precipitated by Walker's investigation was the move to cut South West Water bills by £50 for every household. Although this was not targeted at households in water poverty, it demonstrated that state intervention in the privatised water industry was possible on issues of affordability. However, the wider impact of the review was limited, as recommendations focused on improving the uptake of social tariffs (Defra, 2011b), rather than tackling systemic inequalities within the charging system. In a similar way to the ban on disconnections in 1999, the state forced the industry to adjust but failed to ensure complimentary systemic changes. Structural reform in the water industry is not a simple task, as governance processes exist due to the private

nature of water companies and bind around funding investments and cross-subsidies through customer billing. Therefore, water poverty and customer affordability are inextricably tied to wider financial engineering mechanisms in the sector (Loftus *et al.*, 2016; Bayliss *et al.*, 2021).

Statistics suggest that the direct impact of the Walker review on customers experiencing water poverty was minimal, as prevalence increased following its publication, peaking in the year 2013/2014. This can be attributed to both the increasing price of water and wider national economic crisis. The price of water rose more than fourfold between 1987 and 2011, a rate faster than inflation and 1.5% faster than earnings (Bradshaw & Huby 2013). Patterson (2013) notes how this crisis led to lower financing costs in the water sector, resulting in companies and their investors making record profits in fallout years while more households struggled to afford their bills. In 2013, a survey by the statutory consumer body for the water industry, the Consumer Council for Water (CCW), found record lows of customer affordability and satisfaction with value for money. Twenty-one percent of customers reported finding their bills unaffordable and 31% were unsatisfied (Ofwat, 2015).

At PR14, decisions were influenced by the national economic situation, as it would have been unacceptable to continue the trend of increasing prices. Ofwat (2015, p. 21) states that 'Overall, our final determinations for PR14 resulted in water and wastewater bills 5% lower on average in real terms in 2019–20'. As well as setting more consistent prices, greater affordability support was encouraged by the regulator, giving companies the goal of assisting an additional 1 million customers over the 2015–2020 period. In 2015, the number of customers receiving support from their water company stood at 760,000. Therefore, the aim was a total of 1,760,000 by 2020 (Ofwat, 2015).

During this price review period, the number of customers reporting that their bills were unaffordable remained at around 3 million, the equivalent of 12% of all households (Defra 2017). In 2021, the CCW reported that 1 in 10 and 1 in 8 customers in England and Wales, respectively, found their bills unaffordable. This equates to approximately 2.5 million households. The reduction of 0.5 million households from the start to end of the 2015–2020 period can largely be attributed to an increase in water company support schemes. In 2019/20, 900,000 households received support (CCW, 2020) which, although an improvement, falls well short of Ofwat's 1,760,000 target (Ofwat, 2015). Water UK (2020) highlights the 'significant progress' made in the 2010s in the breadth, volume and range of affordability support. However, there remained 2.5 million households finding their bills unaffordable. Additionally, the strategy of funding support schemes through cross-subsidies was not challenged, either on ethical grounds or on the capacity to cover substantial funding gaps. This is further evidence of sectoral resistance to consider much-needed structural reform to governance processes.

Bad debt and funding gaps

Although affordability support and prices have been more favourable for customers since PR14, bad debt in the industry has continued to rise substantially. Table 3 sets out the water industry's cumulative levels of bad debt between 2004 and 2020, along with the impact this has had on average customer bills.

The increasing costs associated with bad debt in turn raise the cost of service provision. Stipulations in the privatised governance model require this cost to be absorbed by customers, an arrangement that becomes increasingly socially unacceptable as debt levels increase. As Walker (2009, p. 17) explains, 'Both the unrecoverable bad debt and the costs incurred in trying to recover bad debts are added to the bills of those that do pay.' This statement plays into a sector-wide narrative that seeks to emphasise the impact bad debt has on paying customers. Although this is the case, it stems from financial structures that separate company profits from revenue streams that can be used to fund affordability support and recover costs incurred from bad debt.

The calculations performed by water companies to determine the amount added to customer bills are; '(a summation of) revenue written off, debt operating expenditure and an assumed 5% cost of capital… (divided by) the number of households billed' (Ofwat, 2015). This can be viewed as a 'vicious cycle', where managing and writing-

Table 3 | Bad debt levels in E&W between 2004 and 2020.

Year	Amount added to average customer bill	Total	References
2004	Data not available	£785	UKWIR (2009)
2008	£11–12	£930 million	Walker (2009)
2009	£12	£1.4 billion	UKWIR (2010)
2010	£15	£1.9 billion	Defra (2017)
2013/14	£15 (England) £20 (Wales)	£2.2 billion	Ofwat (2013a, 2013b)
2016/17	£21 (England) £32 (Wales)	£2.2 billion	Ambrose *et al.* (2016)
2020	£21	[a]£3.5 billion	NEA (2020c)

[a]Estimate based on official figures (Ofwat, 2015).

off bad debt leads to hidden cross-subsidies and rising prices, which heightens problems of affordability. The overall picture revealed by Table 3 is one of rapidly increasing debt. There appears to be no sustainable strategy in the sector for tackling bad debt, other than increasing the amount added to bills. Meanwhile, company shareholders have received a total of £18.9 billion in dividends since 2010 (Hall, 2022).

In 2019, the English water industry made a Public Interest Commitment (PIC), pledging to: 'Make bills affordable as a minimum for all households with water and sewerage bills more than 5% of their disposable income by 2030 and develop a strategy to end water poverty' (Water UK, 2019, p. 2). Until 2019, water poverty figures were calculated from the Department for Work and Pension's Family Resources Survey data, and were broadly consistent year on year as shown in Table 4. This methodology is attributed to Bradshaw & Huby (2013). Meeting the recent PIC target requires close monitoring, a consideration that led to the revisiting of this established methodology. In 2020 Water UK, the representative body of the water industry as a whole, commissioned an in-depth analysis of water poverty in E&W. The purpose was to establish baseline water poverty levels and explore 'detailed methodological choices', for example, the decision whether or not to include housing costs in disposable income figures (CEPA, 2021; Water UK, 2020). This study used income data from the ONS and billing data supplied by water companies. Self-reporting is also used to verify statistical measurements of affordability, particularly from CCW's 'Water Matters' survey.

Table 4 | Water poverty prevalence in E&W between 2007 and 2020.

Year	Households at 3% level (%)	Households at 5% level (%)	Source
2001/2	17	N/A	Fitch & Price (2002)
2007/08	22	10	Defra (2013)
2009/10	23.6	11.5	Bradshaw & Huby (2013) and NEA (2020a)
2011/12	23	11	Defra (2013)
2013/14	24	11	NEA (2019)
2017/18	21.9	10	NEA (2020b)
2019/20	17.9	6.5	CEPA (2021)
2019/20	>20	5–10	Water UK (2020)

The 'water poverty gap' reflects the theoretical minimum cost of eradicating water poverty, if interventions could be perfectly targeted (CEPA, 2020). The gap was first calculated for the year 2009/2010, showing that households at the 3 and 5% levels required their bills to fall by a mean average of £3.46 and £3.62, respectively (Bradshaw & Huby, 2013). Re-calculation for 2017/2018 found these figures had increased to £4.75 and £6.48 (NEA, 2019), despite a reduction in the prevalence of water poverty, as shown in Table 4. This increase in depth signifies that more financial support was required to lift households out of water poverty, although there were fewer of them overall (NEA, 2019). These results correlate with the total number of households in water debt: 5.5 million in 2013, falling to 3 million in 2020 (CAB, 2020). In 2019/2020, the total water poverty gap was found to be £236 million at the 5% level and £720 million at 3% (CEPA, 2020). These figures support a concern shared by many essential service sectors; that support is effective in reaching 'easy win' cases but not those of entrenched poverty. Households with complex cross-sector affordability and debt issues are harder to reach, and numbers of such households are likely to increase along with recent rises in inflation and energy prices.

Customer perspectives and experiences

Ofwat defines affordability as 'the ability of a customer to pay their water bill' (Ofwat, 2017, p. 2). Two qualitative studies commissioned by the CCW investigated what customers consider affordability to mean. Study participants found it difficult to define the concept, seeing it as relative to necessity, cost and time (CR, 2009, 2014). Whether a bill was thought to be affordable depended on its priority against other outgoings and whether a person struggled as a result of paying it (CR, 2009, 2014). Bills that could be paid often and in smaller amounts were considered more affordable (CR, 2014). Therefore, the ability to budget well in the context of all household outgoings had the greatest impact on perceived affordability. This is distinct from income level, although the two are connected.

Water affordability is strongly related to other outgoings, in particular energy and housing, which often cost much more than water and are generally a higher priority for customers. In their small qualitative study, Rosenblatt *et al*. (2021) used customer research to rank priority outgoings, putting food, housing costs, electricity and gas before water, in agreement with other studies (CR, 2009, 2014). Although the cost of water bills is lower, if customers give priority to larger energy and housing costs then the perceived affordability of water may be reduced. Often low-income customers are on pre-payment meters for gas and electricity, which adds to the pressing need to pay these outgoings first (CR, 2009). Customer affordability is therefore shown to be subjective and circumstantial, demonstrating the limitations of 'top-down' statistics based on water bill to household income ratios.

For customers living with water poverty, common coping behaviours were found to include: cutting back on leisure and social activities, buying only the essentials, and dipping into savings (CR, 2009). Those with the greatest affordability issues would continually trade off essential outgoings and juggle multiple debts. The emotional responses to living in water poverty varied. Those with children, disabilities or health conditions found it particularly hard to make cutbacks, both emotionally and for health purposes. Overall, 'people disliked being in a situation where they could not pay their bills, often it had come about through a change in circumstances' (CR, 2009, p. 66). CR (2014) found that among participants' fears were 'universally expressed' over consequences of non-payment, such as bailiffs and County Court Judgements. Many respondents expressed dissatisfaction with water bills being addressed to a single named person in the household, because it implied that one person had the power to control all household finances (CR, 2014).

Research has shown that water customer experiences of bad debt are similar to other forms of debt (NEA, 2020a). Customers in arrears reported finding themselves in spirals of debt, with the toll this took on their mental health restricting their ability to get back on track (CR, 2009, 2014). Some used problematic strategies, such as delaying payments and taking out credit cards. Those who did begin to pay back their arrears could

not understand why their debt might continue to rise despite regular payments. Many shared a fear that by contacting their water utility regarding arrears they may be penalised in some way, such as through forced meter installation (CR, 2009, 2014). Emotionally, those who were in debt expressed anxiety, fear, helplessness, anger and a sense of isolation (CR, 2014). Overall, the literature shows that water customers in debt 'gained little if any benefit from not paying a bill but rather, this added to the stress they were already under in coping with day to day life' (CR, 2009, p. 66).

2020–2030: Pressing challenges, ambitious targets

By 2020, the literature reveals an improved understanding in the sector of water poverty and affordability issues faced by customers. However, the roots and drivers are contested, and structural solutions are overlooked by most actors. The current decade is one of high pressure for the water industry, with many simultaneous challenges needing to be addressed. The 2019 PIC summarises five priorities to be resolved by 2030; leakage, affordability, net zero, plastic waste and social mobility (Water UK, 2019). The requirements to fund interventions through customer billing is a cross-cutting theme that has been identified as problematic for customer affordability, especially when the cost of living remains at unprecedented levels.

In 2021, the CCW commissioned a review of water affordability, comprising calls for evidence; research into social tariffs; cross-sector best practice; and customer views on affordability support (CCW, 2020, 2021; Cook, 2021). Key developments in the water poverty landscape since the Walker review were summarised in this review, including regional variations in billing and support; institutional funding constraints; overlap between water poverty and other forms of poverty; debt management strategies; and the need for improved relationships between water companies and the customers and communities they serve. Recommendations to address these issues were made, including a single social tariff across E&W, a sector-wide adoption of the 5% definition of water poverty and proactive engagement with customers utilising new technologies such as data sharing (UKWIR, 2020; CCW, 2021).

If these recommendations are to be actioned, institutional arrangements and funding structures in the water industry are in need of upheaval. Although it falls short of stating this explicitly, this review presents the greatest opportunity for the water sector to enact reform on the problem of water poverty, since the Walker review.

DISCUSSION

Vulnerability

The introduction of vulnerability terminology in the 1990s enabled policy approaches to begin targeting customer groups which were in greater need of support. Early definitions of vulnerable customers were narrow, and described in Fitch & Price (2002) as 'completely ineffective' as uptake stood at less than 1% of those eligible in 2001/2002. In 2014, UKWIR published a list of vulnerability factors , extending those of the 1999 Regulations. These were as follows: living alone; long-term disability or illness; not owning a car; living in social or council housing; single parent; head of household is unemployed or in receipt of benefits; claiming pension tax; and three children under 18 living in the house (UKWIR, 2014).

In the first Vulnerability Focus Report, now a yearly publication, Ofwat (2016, p. 20) defined the concept of vulnerability as:

> '*A customer who due to personal characteristics, their overall life situation or due to broader market and economic factors, is not having reasonable opportunity to access and receive an inclusive service which may have a detrimental impact on their health, wellbeing or finances*.'

This report marked a shift in the use of vulnerability terminology: away from the restrictive approach of focusing on particular demographic groups, to recognising it as a state or set of circumstances. Ofwat (2017) claims that half the population will at one time or another find themselves in a situation that could make them temporarily vulnerable. Practice has changed substantially, with the regulator and water companies employing the new concept of vulnerability to tailor support. However, the statutory definition of vulnerability remains outdated, as the Citizens Advice Bureau (CAB) highlights, calling for the need to 'remove that mismatch between rules and reality' (CAB, 2019, p. 10). Only 4% of customers reported receiving financial support in 2021/2022 (Worsfold & Saif, 2022), implying that progress has been slow since the 1% figure reported in Fitch & Price (2002).

Mental health and future population trends are two other aspects of vulnerability emerging in current sector discourse. Research has shown that engagement in essential service markets can be difficult for customers experiencing mental health issues, as it requires proactive communication and dealing with potential 'crises' such as a missed bill or service outage (Kilshaw *et al*., 2021; Holkar, 2022). In 2017, Ofwat and Ofgem produced a combined report detailing population trends that are important for the sectors to consider when planning customer support. It detailed physical and mental health, disability, age, and caring trends in the UK, and commented that companies looking to 'build customer confidence' must engage with such trends (Ofgem & Ofwat, 2017).

'Won't Pay' customers

Since the 1999 Water Industry Act banned household disconnections, there has been a widespread belief in the water industry that customers in arrears fall into two categories: 'won't pay' and 'can't pay'. It is considered that 'won't pay' customers intentionally do not pay their bills because they know they cannot be cut off from services. The evidence suggests that this narrative is a prejudiced version of reality. In 2009, UKWIR, the research platform for UK Water Companies, found household affordability issues to have a strong influence on both debt penetration and intensity, suggesting that the proportion of 'won't pay' customers was lower than assumed (UKWIR, 2009). In their research with 42 customers experiencing water poverty, CR (2009, p. 69) concluded that 'The assumption that water debt is caused by customers knowing they cannot be disconnected is not supported by this research'.

In a non-water-specific study on debt in low-income households, the Joseph Rowntree Foundation (JRF) found that participants felt they could 'more safely ignore' water bills if money was not available because they wouldn't be disconnected (Dearden *et al*., 2010). NEA (2020a) comments that water bills are one of the first that customers default on, evidencing the levels of bad debt in the water sector as more than double that in energy. Additionally, a 2018 JRF report found that arrears on water bills were the most common type of debt for low-income households (Bayliss *et al*., 2021).

Although inconclusive, the literature on this issue presents a more rounded picture than the narrative of deliberate or malicious defaulting on bills. Instead, the most common situation appears to be that when customers cannot afford all essential outgoings they often default first on the one with less immediate consequences (NEA, 2020a). However, many central water actors maintain that certain customers choose not to pay their water bills despite being able to do so. Recent stakeholder research found that respondents from water companies were more likely to hold this view compared with those from other stakeholder groups (Cook, 2021). This implies a disconnect between outward facing language, such as vulnerability terminology, and pervasive internal attitudes.

Collective and non-customer relationships

Recent public discourse has shown that the water sector's relationships with consumers and the environment are under increased scrutiny. Until the 2020s the industry operated discretely, with limited transparency, enabling

issues such as spiralling debt being kept low-profile. Many organisations call for water companies to improve communication and relationships with their customers (CCW, 2021). SF (2020) recognises that outcomes in the water sector do not only occur in the individual customer sphere, but also occur for citizens, communities and the wider public. Public acceptance and community value placed on water resources comprise integral parts of social-water relationships.

There is also a hidden tension between customer and non-customer access, Citizens or residents of E&W who do not reside in standard households do not enjoy protection from service disconnection, for example, those experiencing homelessness, canal boaters, van dwellers, and Gypsy Roma and Traveller communities. The access levels received by such groups are widely unknown in the UK, although some data have been collected in other contexts (Anthonj *et al*., 2020; Maroko *et al*., 2021). These studies point to a situation of unstable and unreliable access, as well as uncertainty around which institutional actors are responsible for ensuring all people have basic access to this human right.

CONCLUSIONS

Water poverty as it exists in the present day is the condition in which households struggle to afford their water bill and suffer economically or socially because of it. Emerging as a pressing problem in the 1990s, water poverty worsened substantially during the years of early privatisation as the water industry sought to establish business interests, often at the expense of customers. The 1999 Water Industry Act removed companies' powers to disconnect households from services. However, this did not solve the problem of water poverty, as the root causes of unequal charging structures and affordability issues for vulnerable households were not addressed. Therefore, in the 21st century, water poverty has been expressed as an affordability indicator and is characterised by the debt and wellbeing consequences that arise from falling below this threshold.

Bad debt accumulated to an estimated industry total of £3.5 billion in 2020. This figure continues to spiral as financial mechanisms in the privatised industry require debt costs to be covered through customer billing. Narratives in sector discourse have blamed vulnerable customers for putting pressure on paying customers' bills, and sometimes for deliberate non-payment. This argument has been disputed by research in the 2010s, which has brought to light the more complex reality of holistic household affordability and prioritisation of essential outgoings. Levels and diversity of affordability support have improved during the 21st century. Despite this, evidence suggests that at least 1 million customers in need of support are not receiving it. This figure is based on industry targets rather than actual levels of water poverty, which is still measured by affordability indicators. Support offered varies substantially between companies, often compounding nuanced inequalities related to high charging regions, metering penetration and nationally set income-related benefits.

The majority of water poverty research between 1985 and 2022 has concentrated on high-level economic analyses, water company responses and the situations of vulnerable customers. There is scant investigation into the structural roots of the problem. This review has revealed the complex drivers of water poverty, in both water sector governance processes and wider societal circumstances. While providing immediate support through social tariffs is necessary, reforming sector governance is required if the problem of water poverty is to be solved in the long term. Overall, it is clear that structural issues including unequal charging systems across regions and between households, bad debt recovery mechanisms, funding gaps in affordability support, and the requirement to finance infrastructural investment through customer billing, are incompatible with the target of ending water poverty by 2030.

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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.

REFERENCES

Ambrose, A., Damm, C., Foden, M., Gilbertson, J. & Pinder, J. (2016). *Delivering Affordability Assistance to Water Customers: Cross Sector Lessons.* Report Centre for Regional Economic and Social Research, Sheffield Hallam University, Sheffield, UK.

Anthonj, C., Setty, K. E., Ezbakhe, F., Manga, M. & Hoeser, C. (2020). A systematic review of water, sanitation and hygiene among Roma communities in Europe: situation analysis, cultural context, and obstacles to improvement. *International Journal of Hygiene and Environmental Health 226*, 113506.

Bakker, K. (2001). Paying for water: water pricing and equity in England and Wales. *Transactions of the Institute of British Geographers 26*(2), 143–164.

Bayliss, K., Mattioli, G. & Steinberger, J. (2021). Inequality, poverty and the privatization of essential services: a 'systems of provision' study of water, energy and local buses in the UK. *Competition & Change. 25*(3–4), 478–500.

Bradshaw, J. & Huby, M. (2013). Water poverty in England and Wales. *Journal of Poverty and Social Justice 21*(2), 137–148.

Cambridge Economic Policy Associates (2020). *Measuring Water Poverty Using a Bills to Income Metric.* Report Cambridge Economic Policy Associates, London, UK.

Cambridge Economic Policy Associates (2021). *Quantitative Analysis of Water Poverty in England and Wales.* Report Cambridge Economic Policy Associates, London, UK.

Chappells, H. & Medd, W. (2008). What is fair? tensions between sustainable and equitable domestic water consumption in England and Wales. *Local Environment 13*(8), 725–741.

Citizens Advice Bureau (2019). *The Future of Regulation: A Response to the National Infrastructure Commission Call for Evidence.* Report Citizens Advice Bureau, London, UK.

Citizens Advice Bureau (2020). *Excess Debts – Who Has Fallen Behind on Their Household Bills Due to Coronavirus?* Report Citizens Advice Bureau, London, UK.

Consumer Council for Water (2020). *Water for All: Water Affordability and Vulnerability Report 2019–20.* Report Consumer Council for Water, Birmingham, UK.

Consumer Council for Water (2021). *Independent Review of Water Affordability*. Report Consumer Council for Water, Birmingham, UK.

Cook, J. (2021). *CCW Water Affordability Review: Thematic Analysis of Call for Evidence Responses January 2021.* Report Consumer Council for Water, Birmingham, UK.

Cooke, A., Smith, D. & Booth, A. (2012). Beyond PICO: the SPIDER tool for qualitative evidence synthesis. *Qualitative Health Research 22*(10), 1435–1443.

Creative Research (2009). *Living with Water Poverty: Report of Research Findings*. Report Creative Research, London, UK.

Creative Research (2014). *Living with Water Poverty 2014: Keeping Your Head Above Water.* Report Creative Research, London, UK.

Dearden, C., Goode, J., Whitfield, G. & Cox, L. (2010). *Credit and Debt in Low-Income Families*. Report Joseph Roundtree Foundation, York, UK.

Department for Environment, Food and Rural Affairs (2011a). *Affordable Water: A Consultation on the Government's Proposals Following the Walker Review of Charging.* Report Department for Environment, Food and Rural Affairs, London, UK.

Department for Environment, Food and Rural Affairs (2011b). *Water Affordability in Response to the Walker Review of Charging for Household Water and Sewerage Services*. Report Department for Environment, Food and Rural Affairs, London, UK.

Department for Environment, Food and Rural Affairs (2013). *Freedom of Information Request RFI 5561*. London, UK.

Digital Economy Act (2017) c. 38.

Department for Environment, Food and Rural Affairs (2017). *he government's strategic priorities and objectives for Ofwat*. Report Department for Environment, Food and Rural Affairs, London, UK.
Fitch, M. & Price, H. (2002). *Water Poverty in England and Wales*. Report Public Utilities Action Forum, Newcastle, UK.
Forbes, C. & Keil, M. (2022). *Customer Spotlight: People's Views and Experiences of Water*. Report Consumer Council for Water and Ofwat, Birmingham, UK.
García-Valiñas, M. D. L. Á., Martínez-Espiñeira, R. & González-Gómez, F. (2010). Measuring water affordability: a proposal for urban centres in developed countries. *International Journal of Water Resources Development 26*(3), 441–458.
Hall, D. (2022). *Water and Sewerage Company Finances 2021: Dividends and Investment – and Company Attempts to Hide Dividends*. Working Paper PSIRU, London, UK.
Holkar, M. (2022). *Time to Act: The Equality Act, Essential Services and People with Mental Health Problems*. Report Money and Mental Health Policy Institute, London, UK.
Huby, M. (1995). Water poverty and social policy: a review of issues for research. *Journal of Social Policy 24*(2), 219–236.
Huby, M. & Anthony, K. (1997). Regional inequalities in paying for water. *Policy Studies 18*(3–4), 207–217.
Kilshaw, H., Pike, B. & Baichoo, J. (2021). *Qualitative Research to Explore What Support Customers Need: Focusing on Customers Struggling to Pay and Those Dealing with Mental Health Challenges*. Report ICM Unlimited, London, UK.
Lister, R. (1995). Water poverty. *Journal of the Royal Society of Health 115*(2), 80–83.
Loftus, A., March, H. & Nash, F. (2016). Water infrastructure and the making of financial subjects in the South East of England. *Water Alternatives 9*(2), 319–335.
Longhurst, N. & Hargreaves, T. (2019). Emotions and fuel poverty: the lived experience of social housing tenants in the United Kingdom. *Energy Research & Social Science 56*, 101207.
Maroko, A. R., Hopper, K., Gruer, C., Jaffe, M., Zhen, E. & Sommer, M. (2021). Public restrooms, periods, and people experiencing homelessness: an assessment of public toilets in high needs areas of Manhattan, New York. *PLoS One 16*(6), e0252946.
Martins, R., Quintal, C., Cruz, L. & Barata, E. (2016). Water affordability issues in developed countries – the relevance of micro approaches. *Utilities Policy 43*, 117–123.
Marvin, S. & Guy, S. (1997). Consuming water: evolving strategies of water management in Britain. *Journal of Urban Technology 4*(3), 21–45.
Mattos, K. J., Mulhern, R., Naughton, C. C., Anthonj, C., Brown, J., Brocklehurst, C., Brooks, C., Desclos, A., Escobedo Garcia, N. E., Gibson, J. M. & Linden, K. G. (2021). Reaching those left behind: knowledge gaps, challenges, and approaches to achieving SDG 6 in high-income countries. *Journal of Water, Sanitation and Hygiene for Development 11*(5), 849–858.
Meehan, K., Jepso, W., Harris, L. M., Wutich, A., Beresford, M., Fencl, A., London, J., Pierce, G., Radonic, L., Wells, C. & Wilson, N. J. (2020). Exposing the myths of household water insecurity in the global north: a critical review. *Wiley Interdisciplinary Reviews: Water 7*(6), e1486.
Middleton, J. & Saunders, P. (1997). Paying for water. *Journal of Public Health Medicine 19*(1), 106–115.
Middlemiss, L., Ambrosio-Albalá, P., Emmel, N., Gillard, R., Gilbertson, J., Hargreaves, T., Mullen, C., Ryan, T., Snell, C. & Tod, A. (2019). Energy poverty and social relations: a capabilities approach. *Energy research & social science. 55*, 227–235.
National Energy Action (2019). *NEA Discussion Paper Water Poverty: A Common Measurement*. Report NEA, Newcastle, UK.
National Energy Action (2020a). *National Energy Action (NEA) Response to CCW's Water Affordability Review Call for Evidence*. Report NEA, Newcastle, UK.
National Energy Action (2020b). *Water Poverty: The Consistency of Social Tariffs*. Report NEA, Newcastle, UK.
National Energy Action (2020c). *Social Tariffs in Water: The Impact of Covid-19*. Report NEA, Newcastle, UK.
Ofgem and Ofwat (2017). *Making Better Use of Data: Identifying Customers in Vulnerable Situations. UKRN*. Report The UK Regulators Network, London, UK.
Ofwat (2013a). *Setting Price Controls in 2014: A Briefing Note for Investors*. Report Ofwat, Birmingham, UK.
Ofwat (2013b). *Setting Price Controls in 2014: A Briefing Note for Welsh Government Stakeholders*. Report Ofwat, Birmingham, UK.
Ofwat (2015). *Towards Water 2020 – Meeting the Challenges for Water and Wastewater Services in England and Wales*. Report Ofwat, Birmingham, UK.
Ofwat (2016). *Vulnerability Focus Report*. Report Ofwat, Birmingham, UK.
Ofwat (2017). *Delivering Water 2020: Our Final Methodology for the 2019 Price Review Appendix 1: Addressing Affordability and Vulnerability*. Report Ofwat, Birmingham, UK.
Patterson, O. (2013). *To All Water Company CEOs*. Report Defra, London, UK.

Rosenblatt, G., Kilshaw, H., Pike, B. & Baichoo, J. (2021). *Qualitative Research to Explore What Support Customers Need: Focusing on Customers Struggling to Pay and Those Dealing with Mental Health Challenges*. Report ICM Unlimited, London, UK.

Sawkins, J. W. & Dickie, V. A. (2005). Affordability of household water and sewerage services in Great Britain. *Fiscal Studies 26*(2), 225–244.

Sustainability First (2020). *Fair for the Future Project: Sustainability Metrics in Public Utilities*. Report Sustainability First, London, UK.

The Water Industry (Charges) (Vulnerable Groups) Regulations (1999). c.2.

United Kingdom Water Industry Research (2009). *Debt Collection Performance and Income Deprivation*. Report UKWIR, London, UK.

United Kingdom Water Industry Research (2010). *Reduced Flow Devices – Impact and Use in the Household Sector*. Report UKWIR, London, UK.

United Kingdom Water Industry Research (2014). *Understanding Customer Behaviour for Water Demand Forecasting*. Report UKWIR, London, UK.

United Kingdom Water Industry Research (2020). *Defining Water Poverty and Evaluating Existing Information and Approaches to Reduce Water Poverty*. Report UKWIR, London, UK.

United Nations General Assembly (2010). *Resolution 64/292: The Human Right to Water and Sanitation*. 3 August UN General Assembly, New York, US.

United Nations International Children's Emergency Fund & World Health Organization (2021). *The Measurement and Monitoring of Water Supply, Sanitation and Hygiene (WASH) Affordability*. Report UNICEF and WHO, New York, USA.

Vanhille, J., Goedemé, T., Penne, T., Van Thielen, L. & Storms, B. (2018). Measuring water affordability in developed economies. The added value of a needs-based approach. *Journal of Environmental Management 217*, 611–620.

Walker, A. (2009). *The Independent Review of Charging for Household Water and Sewerage Services: Final Report*. Report Defra, London, UK.

Water Industry Act (1999). c.9. https://www.legislation.gov.uk/ukpga/1999/9/contents.

Water UK (2019). *Public Interest Commitment*. Report Water UK, London, UK.

Water UK (2020). *Water UK Response to Call for Evidence for the Independent Review of Affordability Support for Financially Vulnerable Water Customers in England and Wales*. Report Water UK, London, UK.

Worsfold, O. & Saif, N. (2022). *Customer Spotlight: People's Views and Experiences of Water*. Report Consumer Council for Water and Ofwat, Birmingham, UK.

Yoon, H. & Saurí, D. (2019). 'No more thirst, cold, or darkness!' – social movements, households, and the coproduction of knowledge on water and energy vulnerability in Barcelona, Spain. *Energy Research & Social Science 58*, 101276.

Yoon, H., Domene, E. & Sauri, D. (2021). Assessing affordability as water poverty in Metropolitan Barcelona. *Local Environment 26*(11), 1330–1345.

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