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REVIEW ARTICLE

Understanding energy hardship and health among vulnerable populations: a secondary analysis of a scoping review

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ABSTRACT

Energy hardship, also known as energy or fuel poverty, is a growing global concern that affects the ability of individuals and households to access or afford sufficient energy for essential daily needs. The health implications of energy hardship are profound, ranging from increased physical illness and mortality to adverse mental health outcomes, particularly among vulnerable populations. This paper presents a secondary, targeted analysis of an existing scoping review on energy hardship and health, conducted using Arksey and O'Malley's framework. The original review identified 90 relevant publications from a search of 12 databases. For the secondary analysis, we examined the subset of 23 studies that addressed vulnerable groups, including women, older adults, people with disabilities, children, and migrants, in order to identify what is known and where research gaps remain. While the main focus is this subset, key findings from the full dataset ($n = 90$), such as Eurocentric bias in the literature, are also discussed, as they bear directly on the representation of vulnerability. The analysis revealed an Eurocentric focus in current research and a predominance of quantitative, secondary data analyses. Vulnerable groups, such as women, people with disabilities, children, older adults, and migrants, face disproportionate health risks due to energy hardship. However, these populations remain underrepresented in the literature. There is a need for a more inclusive, intersectional, and geographically diverse research agenda to fully understand the health impacts of energy hardship. Greater focus on underrepresented populations and qualitative insights is essential for informing equitable policy and health interventions.

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Introduction

Energy hardship, often referred to as energy poverty or fuel poverty, occurs when individuals or households are unable to afford or access sufficient energy to meet basic needs, such as maintaining a safe indoor temperature or operating essential household appliances (Che et al., 2021; European Anti-Poverty Network, 2010; Jones, 2016; Lawlor & Visser, 2022). More than a question of affordability, energy hardship also includes challenges around the availability of reliable energy sources (Fairburn, 2019). This situation may prevent households not only from adequately heating their homes, but also from cooking warm meals or maintaining hygienic living standards due to a lack of hot water or functioning appliances (Jones, 2016).

The World Health Organization (WHO) recommends an indoor temperature of at least 18°C as a minimum for health protection in colder climates (WHO, 2018). Conversely, insufficient cooling during periods of extreme heat also constitutes a form of energy hardship (Jones, 2016). According to Thomson

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et al. (2019), energy hardship can be understood as the inability of households to secure adequate energy for participation in the normal activities of daily life, such as heating, cooling, and food preparation. Additionally, energy hardship may also manifest in high energy-related expenses relative to household income (Cong et al., 2022) due to volatile energy prices, low income, and poor housing conditions or outdated appliances (de Vries & Blane, 2013; Halkos & Gkampoura, 2021; Kyprianou et al., 2019).

The wide-ranging impacts of energy hardship on health and wellbeing have been well documented in the literature (Brown & Vera-Toscano, 2021; Katoch et al., 2024; A. Lee et al., 2022; Llorca et al., 2020; Oliveras et al., 2020; Riva et al., 2023; Xu et al., 2022). Exposure to cold or poorly heated environments is associated with respiratory conditions such as asthma, cardiovascular issues, and heightened mortality risk (O'Meara, 2016; Recalde et al., 2019; WHO, 2018). Mental health is also negatively affected, with increased rates of depression, anxiety, and emotional distress linked to living in energy-deprived conditions (Bentley et al., 2023; Brown & Vera-Toscano, 2021; Xu et al., 2022). Such studies illustrate that energy hardship is not merely an economic challenge but a public health concern with both acute and long-term consequences, reinforcing the importance of understanding its social determinants.

In addition to its direct health impacts, energy hardship may place an economic strain on households through increased healthcare costs, also contributing to broader public health challenges (Bukari et al., 2021; Fan et al., 2024; C.-C. Lee & Yuan, 2024). Energy hardship has emerged as a growing concern, particularly following the 2008 economic crisis. More recently, sharp increases in energy prices have further intensified the problem (Menyhért, 2022), disproportionately impacting vulnerable populations and potentially worsening their health conditions. Beyond financial strain, climate change poses an added threat to those living in energy hardship. Rising temperatures and extreme weather conditions may exacerbate health risks and further compound these issues by increasing the demand for both heating and cooling, especially during extreme weather events (Jessel et al., 2019; Nawaz, 2021).

Certain groups may be particularly vulnerable to the impacts of energy hardship on health. Vulnerable populations are individuals at higher risk of poor physical and social health (Rukmana, 2014). Such groups 'are considered vulnerable because of disparities in physical, economic, and social health status when compared with the dominant population' (Rukmana, 2014, p. 6989). While some vulnerabilities in relation to energy hardship and health stem from socioeconomic conditions such as poverty or unemployment (Polimeni et al., 2022), others relate more directly to marginalised social identities including older adults, individuals with disabilities, children, women, and migrants (Jones, 2016; Karmaker et al., 2022; Oliveras et al., 2021; Sen, Karmaker, et al., 2023; Sen, Singha, et al., 2023; Sen et al., 2024; Shupler et al., 2022). Reaños and Lynch (2022), for instance, observed that fuel poverty extends beyond households classified as income poor, arguing that vulnerability assessments should adopt broader criteria and tailor interventions to the specific forms of fuel poverty experienced by different groups. This suggests an interplay between social identity and material conditions in shaping vulnerability.

Existing scoping reviews have examined energy hardship and health from different perspectives, including region-specific syntheses, such as Europe (Champagne et al., 2023), equity-focused assessments of health effects and interventions (Ballesteros-Arjona et al., 2022), and thematic explorations of the housing–energy–health nexus (Mei & Seo, 2024). While these reviews have generated important insights, they have not explored how socially defined vulnerable groups such as women, older adults, migrants, children, and people with disabilities are impacted across the literature.

The aim, therefore, of this paper is to identify what is known about these vulnerable groups in relation to energy hardship and health, as well as to highlight gaps in the literature, both in terms of population coverage and geographic scope. The paper discusses findings from a secondary targeted analysis of a broader scoping review conducted on the intersection of energy hardship and health (Denieffe et al., 2024). This secondary analysis examined all publications from an original scoping review that addressed women, people with disabilities, children, older adults, and migrants.

Methodology

The original scoping review followed the methodological framework proposed by Arksey and O'Malley (2005) and included 90 publications. While this paper focuses primarily on a subset of 23 studies concerning vulnerable groups, it also draws on relevant findings from the full dataset where they provide

essential context, such as geographic bias or methodological trends, which may affect representation.

A scoping review methodology is especially valuable when a research area is still emerging or has not yet been extensively reviewed (Grant & Booth, 2009). It enables researchers to explore the breadth and depth of existing literature within a given field, to assess the scope and diversity of research, and to highlight gaps in current knowledge (Pham et al., 2014; Pollock et al., 2021). It may also offer valuable insights into health equity by identifying gaps in research related to social determinants of health and underrepresented populations (Khalil et al., 2025).

Scoping review search strategy and selection process

The original scoping review was carried out between March and April 2023, following the methodological framework developed by Arksey and O'Malley (2005). The review was conducted in line with the PRISMA-ScR checklist (Tricco et al., 2018). It was initially guided by the research question: what is known about energy hardship and palliative care in the existing literature? This question was developed as part of a larger research project examining energy hardship among cancer patients receiving palliative care (Denieffe et al., 2024, 2025). To support this inquiry, a tailored review protocol was created to direct the search process.

Twelve electronic databases were searched: CINAHL, the Cochrane Library, OVID SP, JSTOR, PsycArticles, ScienceDirect, Web of Science, Academic Search Complete, BASE Digital Collections, DOAJ (Directory of Open Access Journals), PubMed, and Wiley Online. Supplementary searches were also conducted via Google and Google Scholar to capture relevant grey literature. Keyword combinations were designed to reflect the original research focus and included: 'energy poverty and palliative care', 'energy poverty and health', 'energy poverty and cancer', 'energy poverty and end of life', and 'energy poverty and nursing'. The search strategy also accounted for alternative terms, including 'fuel poverty', 'energy hardship', 'household material hardship', and 'energy affordability'. Only English-language sources published between 2013 and 2023 were considered.

A 10-year timeframe (2013–2023) was applied to ensure that the review captured recent literature reflecting contemporary developments in energy hardship and health-related research. The review was also limited to English-language publications due to time, funding, and translation capacity constraints, a common practice in evidence syntheses (Nussbaumer-Streit et al., 2020). While this may have contributed to the Eurocentric pattern observed in this paper (further discussed in the results section), it also reflects structural features of global knowledge production, particularly the dominance of English in academic publishing (Hyland, 2016). Reliance on published literature means that publication bias may also have influenced the findings; for example, the indexing practices of major databases often privilege research from the Global North and reduce the visibility of studies from the Global South (Bol et al., 2023). These systemic factors likely shaped the range of publications available for inclusion in the scoping review, but they also reinforce our argument about inequities in existing knowledge on energy hardship and health among vulnerable groups.

However, the original scoping review search yielded scarce literature directly on the research question of energy hardship and palliative care. Given these results, and consistent with the iterative and flexible nature of the scoping review methodology (Gottlieb et al., 2021), the research question was then refined to: what is known about energy hardship and health in the existing literature? This adaptation allowed for the identification of broader, health related evidence while maintaining relevance to the original population of interest. According to Peters et al. (2021) 'scoping reviews may be iterative and flexible and whilst any deviations from the protocol should be transparently reported, adjustments to the questions, inclusion/exclusion criteria and search may be made during the conduct of the review' (p. 3). A broad lens in the original scoping review enabled the exploration of relevant health related themes such as increased vulnerability, financial strain, and compromised wellbeing that may have implications for individuals receiving palliative care.

In total, 5386 publications were identified – 5366 from databases and 20 from additional sources. Publications were eligible for inclusion if they addressed energy hardship, included a health-related outcome, and were published between 2013 and 2023 in the English language. After an initial screening, 359 records were deemed potentially relevant. Of these, 182 duplicates were removed, leaving 177

publications for further review. Titles and abstracts of these documents were screened based on two exclusion criteria: (a) the literature was not accessible, and (b) the content was not relevant to the research question based on title and abstract. Initial screening was conducted by a single reviewer, which was then independently reviewed by two other authors, to enhance reliability and minimise selection bias. This approach, while more commonly used in rapid reviews, is recognised in methodological guidance as an acceptable adaptation in scoping reviews when resources are limited, provided verification steps are taken to ensure reliability (Mak & Thomas, 2022; Nussbaumer-Streit et al., 2023). Given the varying definitions of 'wellbeing' encountered during the literature selection process, a decision was made to include only those sources that explicitly considered health as a component of wellbeing. Studies that defined wellbeing solely in terms of life satisfaction, happiness, or general welfare, without reference to health-related dimensions, were excluded from the review. Any uncertainties about inclusion were discussed with the broader research team until consensus was reached on the papers included.

Following this screening process, 90 documents, comprising both peer-reviewed publications and grey literature, were included in the final scoping review. The study selection process is summarised in the flow diagram in Figure 1, following PRISMA-ScR guidance for scoping reviews (Tricco et al., 2018). The full dataset served as the foundation for the secondary analysis presented in this paper.

Analysis of scoping review

During the data extraction process, the studies were categorised and summarised in a Microsoft Excel spreadsheet. This included organisation of the publications by article type, year of publication, country or region of focus of the study, and research methodology. Following data extraction, a thematic analysis was conducted to identify patterns across the publications. Each study was reviewed to identify the health themes it addressed, the study population, and other relevant topics of focus.

Secondary analysis: focus on vulnerable groups

During the charting process of the original review, the research team observed a concentration of studies on particular vulnerable groups and a geographic skew towards Europe. These patterns informed the decision to conduct a targeted secondary analysis to better understand the scope and limitations of the existing evidence on vulnerability to energy hardship and its health impacts. Of the 90 included studies, a subset of 23 publications specifically addressed vulnerable populations, including women, older adults, people with disabilities, children, and migrants. The aim of this secondary analysis was to explore how energy hardship affects the health of these groups, and to identify key gaps in the existing literature. See Appendix 1 for a summary of the included studies.

Similar secondary analysis approaches have been used to generate focused insights from broader scoping reviews across health fields (Bharmal et al., 2025; Johnson et al., 2023). For this analysis, we re-examined a subset of publications to extract information on health impacts of energy hardship among vulnerable populations and to identify key trends and gaps in the literature. In this context, we apply a working definition of vulnerable populations as those who experience heightened health risks in relation to energy hardship (Rukmana, 2014). While some vulnerabilities stem from socioeconomic disadvantage, others relate to marginalised social identities. In this paper, we focus on vulnerability as it relates to social identity.

Results from the scoping review

The results generated from the secondary analysis included two themes: Existing literature on energy hardship and health – evidences of Eurocentrism; and Heightened vulnerability to energy hardship and its impact on health among certain groups.

Existing literature on energy hardship and health – evidences of Eurocentrism

Our scoping review identified a total of 90 publications on energy hardship and health published between 2013 and 2023. As shown in Figure 2, there seems to have been a steady increase in

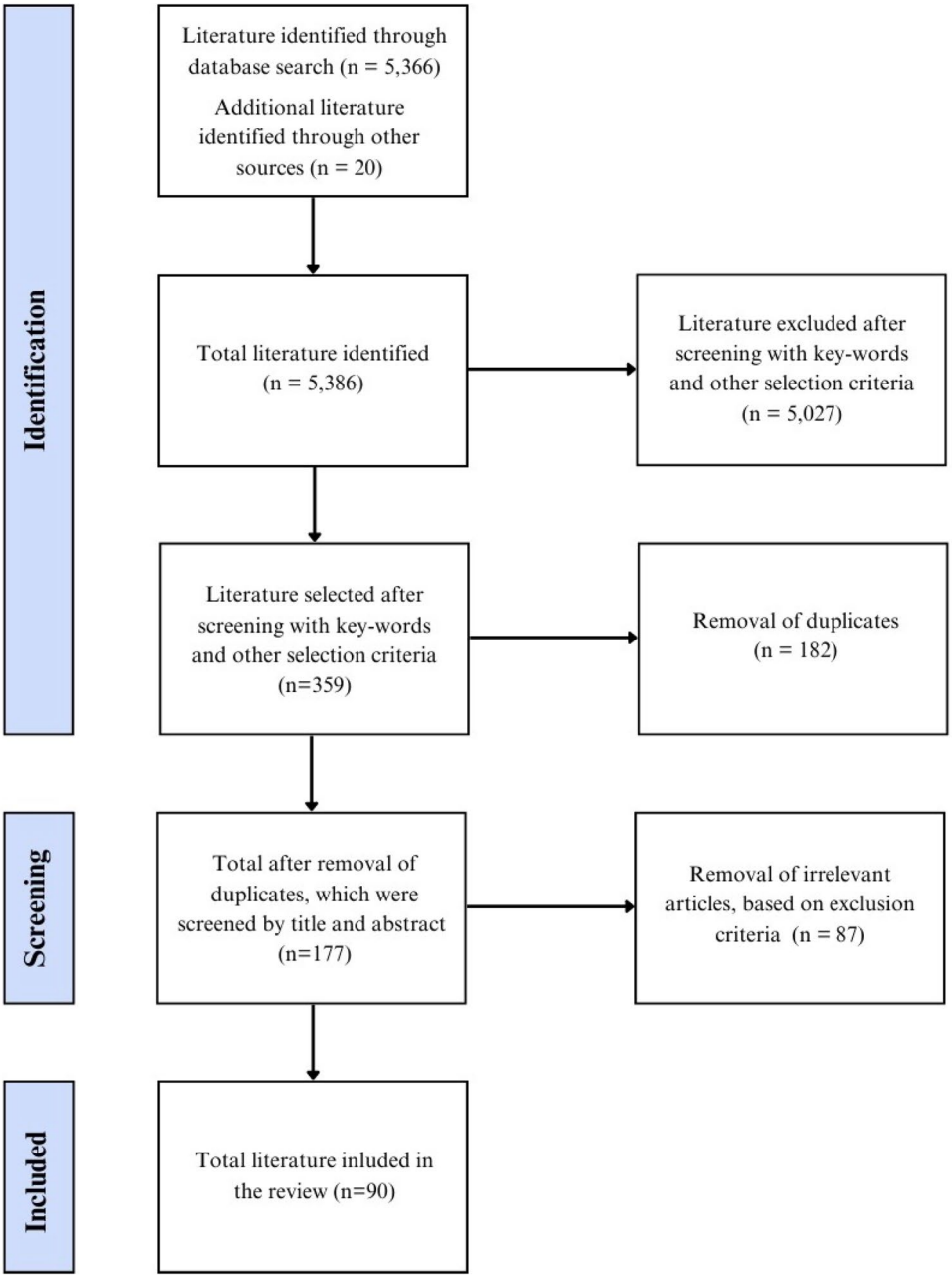

Figure 1. Flowchart of the scoping review selection process.

publications over the past decade (2013–2023). The overwhelming majority of studies found in the scoping review were academic papers ($n=74$).

Our findings indicate that most of the studies on energy hardship and health have been secondary ($n=65$), quantitative research ($n=66$), mostly survey analysis ($n=51$) of official government or international organisation statistics. Very few studies relied on qualitative methods ($n=16$), such as interviews, and a very low number of studies employed mixed methods ($n=8$). The absence of qualitative methods may be a reflection of the sensitive nature of the topic, and the challenges surrounding the engagement of research participants on the theme. However, this means that there remains a significant gap in the literature in relation to people's perceptions, perspectives, and lived experiences.

Our review showed that the vast majority of publications featured in the literature have focused on general health ($n=58$), followed by mental health ($n=14$), and wellbeing ($n=13$) (See Table 1). Note that topics are not mutually exclusive, as we identified more than one theme in several of the publications.

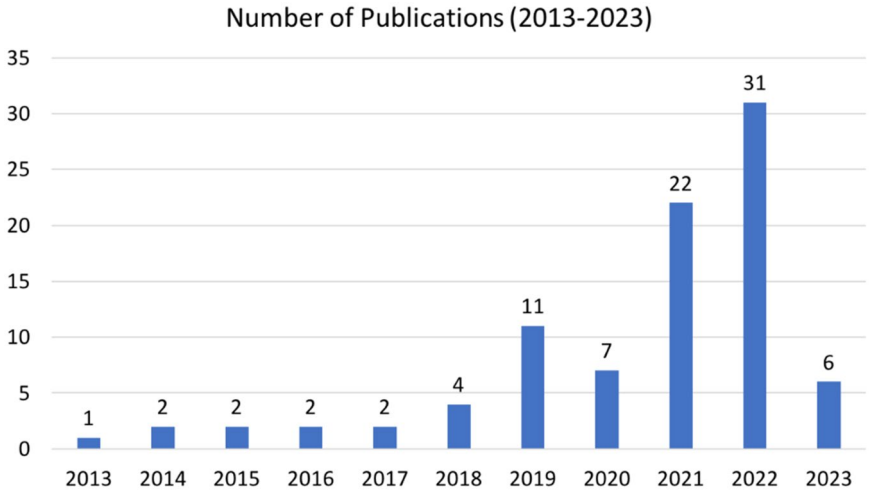

Figure 2. Number of works published per year between 2013 and 2023 focusing on energy poverty and health.

Table 1. Topics of focus of the literature in relation to health.

Topics of focus of the literature in relation to health	*n*
General health	58
Mental health/depression/anxiety	14
Wellbeing	13
Disability/long-term illness	5
Public health	4
Health service/healthcare facilities	4
Respiratory health/condition/infection	4
Health expenditure	3
Mortality	2
Comfort/quality of life	2
Injuries/accidents/poisoning	2
Obesity	1
Cancer	1
Terminal illness	1
At home care	1
Lung function	1
Stunting	1
Diarrhoea	1
COVID-19	1
Cardiovascular disease	1

However, a key finding of the scoping review had to do with the geographical focus of the publications, which revealed a tendency towards Eurocentrismpredominant in the literature on energy hardship and health (see Figure 3). Eurocentricity 'is an ideological attitude that takes Europe as the norm to assess or compare societies, cultures, and histories' (Pelizzon & Somel, 2021). Most studies identified specifically focused on Europe ($n = 37$), followed by Asia ($n = 20$). Of the European countries featured in the literature, the United Kingdom (UK) was the most studied, followed by Spain and Ireland. In Asia, the majority of the works in the literature focused specifically on China. The literature on Oceania focused exclusively on Australia, and the literature on North America included mostly studies on the United States. The literature on the African region focused on different countries, including Ghana, Kenya, Uganda, Cameroon, Nigeria, South Africa, and Senegal. Literature focusing on Latin America and the Caribbean was not found.

This geographic concentration suggests that much of the existing evidence base reflects the contexts of high-income countries. As a result, the literature may overlook region-specific drivers of energy hardship and health impacts present in the Global South. Scholars of both health (Aubel & Chibanda, 2022) and energy hardship (Walker, 2022) research recognise the problem of Eurocentricity and Western-centrism in the literature, and call for a decolonisation agenda (Walker, 2022). Walker (2022) argues that it is important to recognise from the outset that people's vulnerabilities and needs are diverse, and that research, design, and decision-making processes must include a wide range of voices and critically

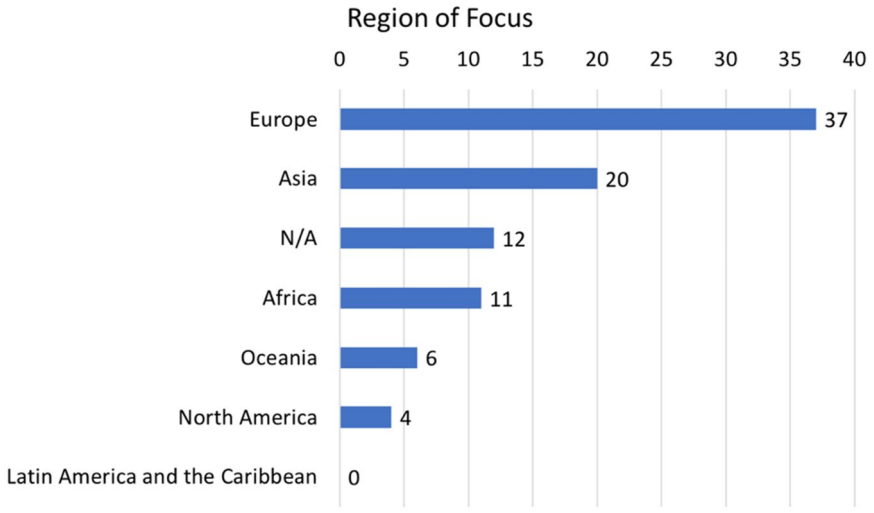

Figure 3. Region of focus of publications (N/A* – this includes the literature which either had a global focus, a focus on developed or developing countries, or that did not focus on any specific region).

examine whether assumptions reflect real lived experiences. Expanding the geographic scope of the literature would allow for a better understanding of diverse lived experiences relative to energy hardship. This is particularly salient as climate change disproportionately impacts developing countries (Jafino et al., 2020), exacerbating existing energy poverty and increasing health risks (Jessel et al., 2019; Nawaz, 2021). Pan et al. (2021), for example, point out that the link between energy hardship and health outcomes is influenced by a country's standard of living. According to their findings, nations with higher living standards tend to face less severe public health consequences resulting from energy hardship (Pan et al., 2021).

The literature reviewed, therefore, show a geographic tendency towards a focus on the Global North, and Europe in particular. They also predominantly rely on quantitative secondary analyses, with limited qualitative exploration of lived experiences. These patterns highlight the uneven coverage and research gaps in the energy hardship–health literature.

Heightened vulnerability to energy hardship and its impact on health among certain groups

Several of the studies reviewed showed that certain population groups are more susceptible to the health impacts of energy hardship, often experiencing its effects more severely. These vulnerable groups include the unemployed, individuals living in poverty (Polimeni et al., 2022), and marginalised social groups such as those from disadvantaged backgrounds, immigrants from low- and middle-income countries (Oliveras et al., 2020), low-income individuals (Simcock et al., 2021), women (Oliveras et al., 2020), racial and ethnic minorities, families with children (Hernández & Siegel, 2019; Simcock et al., 2021), and people with disabilities (Simcock et al., 2021).

Simcock et al. (2021) highlighted significant overlap among socio-demographic groups most affected by both energy and transport poverty, with the greatest vulnerability occurring in households experiencing multiple forms of disadvantage. For example, a study conducted in a New York City community (Hernández & Siegel, 2019) found that energy insecurity was more common among racial and ethnic minorities, families with children, and those living in substandard housing. Hernández and Siegel (2019) suggest that energy hardship could be a contributing factor to the respiratory and mental health disparities observed among vulnerable populations. Similarly, Zhang, He et al. (2022) found that in China, factors such as age, gender, household size, religion, education, marital status, and employment status all influenced the likelihood of depression among individuals experiencing energy hardship. Across these studies, vulnerability is shaped not only by income or housing conditions but also by social identity factors. Where these factors intersect, the impacts of energy hardship may also be compounded.

Five particularly vulnerable groups include: women, older adults, people with disabilities, children, and migrants. For each group, we summarise the focus and scope of existing studies (what is known) and identify key gaps in the literature (what is missing) relevant to the research objectives.

Women

The majority of studies reviewed that addressed gender focused specifically on women. Notably, none of the studies examined the experiences of LGBTQI+ individuals, indicating a clear gap in the literature. This limits our understanding of how energy hardship and health intersect for this population, potentially obscuring unique forms of vulnerability linked to discrimination, housing insecurity, and access to health services among sexual and gender minorities. However, in relation to women, the publications reviewed showed that this group is especially susceptible to the adverse effects of energy hardship on both their physical and mental health (Oliveras et al., 2021; Shupler et al., 2022). Evidence also points to a strong link between multidimensional energy poverty (MEP) and negative health outcomes among women (Abbas et al., 2021). Additionally, Bakehe (2022) found that energy hardship elevated the risk of respiratory diseases, which in turn negatively affected labour force participation, particularly among women. Research conducted by Zhang, Linghu et al. (2022) also highlighted the role of housework in the causality between energy hardship and health, noting that individuals in energy poverty who spent more time on domestic tasks tended to report poorer health, a burden that may disproportionately fall on women due to traditional gender roles. Similarly, research in China by Nie and Li (2022) indicated that energy hardship could lead to increased out-of-pocket expenses for inpatient and general health care, with these financial impacts being especially significant for women and residents of urban areas. Across these studies, women's experiences of energy hardship appear to be impacted by gendered divisions of labour, differential exposure to health risks, and unequal access to healthcare resources. Therefore, structural vulnerability and traditional gender roles may amplify health impacts.

People with disabilities

All of the studies examined relating to people with disabilities were focused on the context of the UK. This concentration of evidence within a single national context limits our understanding of how disability and energy hardship intersect under different policy regimes, cultural settings, and environmental conditions, and risks producing an evidence base that is not fully representative of global experiences. Of the studies that we reviewed, a research report revealed that disabled individuals and families with disabled children often face a combination of challenges, including poverty or low income, substandard housing, and additional essential living expenses, such as energy costs, which collectively increase their risk of experiencing fuel poverty (George et al., 2013). Studies have underscored the heightened vulnerability of people with disabilities to energy hardship. For example, households with disabled members are more likely to experience fuel poverty than those without (Snell et al., 2014). Further research in the UK found that fuel poverty was more prevalent among households with disabled individuals, particularly among single, working-age disabled adults (Snell et al., 2015). The same study also reported a higher reliance on prepayment metres among disabled households. Additionally, a separate UK study focusing on individuals with Sickle Cell Disease (SCD) found that energy hardship significantly impacted both children and adults with the condition, contributing to a cycle of poor health and increasing disability (Chavez, 2017). Taken together, these studies suggest that people with disabilities face heightened and compounding risks from energy hardship, yet the concentration of evidence focusing on the UK limits our understanding of how these challenges manifest in other national and regional contexts.

Children

Some of the studies reviewed highlighted the specific health impacts of energy hardship on children and families with children. For example, Oliveras et al. (2021) reported a high incidence of energy hardship among households with children, along with a strong correlation between energy insecurity and negative child health outcomes. These included increased cases of asthma, overweight children, lower health-related quality of life, and poorer mental health. Similarly, Terfa et al. (2022) found a clear link between energy hardship and child health, identifying MEP as a key predictor of acute respiratory infections (ARI) among young children. Additional research showed that energy hardship is connected to under-five mortality and disparities in education access (Sule et al., 2022). Qurat-Ul-Ann and Mahfooz

(2022) further demonstrated that rising household cooking energy poverty could directly contribute to a higher incidence of respiratory illness in children, suggesting that, as cooking energy deprivation increases, so too does the number of children affected by such health issues. These findings suggest that childhood exposure to energy hardship may contribute to long-term health disparities and educational disadvantage, perpetuating cycles of vulnerability into adulthood.

The older population

Studies reviewed also examined the effects of energy hardship on older adults. One such study found that while energy hardship can negatively affect both cognitive and mental health in middle-aged and older individuals, the impact is more pronounced among the elderly (Li et al., 2022). Another study highlighted that MEP may worsen symptoms of depression in older adults, especially in those already experiencing high levels of depressive symptoms (Hou et al., 2022). The same research indicated that the effect was stronger for older individuals living in urban areas and those who lived alone. In a separate study focusing on low-income seniors, Valente et al. (2022) identified a range of consequences linked to energy hardship, including food insecurity, inability to afford essential items and medical treatments, thermal discomfort, and social isolation. More importantly, the study also revealed that many participants were either unaware of their situation or reluctant to seek help due to stigma, suggesting that the extent of energy hardship among older populations may be significantly underreported (Valente et al., 2022). Across these studies, findings suggest that older adults are a group particularly susceptible to both the physical and mental health impacts of energy hardship, with factors such as living alone, low income, and social isolation further amplifying vulnerability.

Migrants

The only study reviewed that focused on migrants revealed significant impacts of energy hardship on their health. Looking specifically at internally displaced people in rehabilitated residences in Sri Lanka, Kumareswaran et al. (2021) found that many of these individuals experienced hidden energy hardship, often residing in overheated environments. The study also reported that 62% of participants exposed to fuel poverty, inadequate thermal comfort, and poor indoor air quality experienced at least one illness, with 37% being particularly vulnerable to cardiovascular and respiratory conditions (Kumareswaran et al., 2021). The limited evidence suggests that migrants, particularly displaced populations, face health burdens linked to hidden or unmet energy needs. However, the scarcity of studies makes it challenging to establish patterns or conclusions, and highlights the need for further research.

This secondary analysis indicates that while certain groups have been more frequently studied, others are significantly underrepresented. Of the 90 publications reviewed, 11 focused on children, five on women, five on people with disabilities, four on older adults, and just one on migrants. Six publications also focused on vulnerable populations more generally. These categories are not mutually exclusive, as some publications addressed more than one group. Within these groups, migrants, in particular, are critically underrepresented, despite facing disproportionate risks, especially those who are forcibly displaced (Haselip, 2025; United Nations High Commissioner for Refugees, 2025). The United Nations notes that displaced families often experience energy hardship, contributing to instability, poor health, and limited life opportunities, with migrant women and children bearing the greatest burden.

Discussion

This paper set out to explore what is currently known about the health impacts of energy hardship on vulnerable populations and to identify gaps in the literature, through a targeted secondary analysis of a broader scoping review. Specifically, it aimed to synthesise findings related to five groups, namely women, older adults, people with disabilities, children, and migrants. In addition to the focused secondary analysis, the paper also draws on selected findings from the full scoping review where they provided relevant contextual insight, particularly in relation to geographic scope and methodology.

Taken together, our findings indicate that research on energy hardship and health is unevenly distributed across both populations and geographies, with certain vulnerable groups and regions underrepresented. The field is also predominantly characterised by secondary, quantitative studies, which limits insights into lived experiences and context-specific drivers of vulnerability. These patterns suggest that current knowledge may reflect imbalances in research focus.

This paper identifies three critical research gaps in the current evidence base:

- **Population underrepresentation** – Some vulnerable groups, such as migrants and people with disabilities, are particularly under-studied.
- **Geographic bias** – Evidence is weighted towards high-income countries, particularly Europe, with no studies found focusing on Latin America and limited coverage in relation to African countries.
- **Methodological imbalance** – The literature is largely composed of secondary quantitative analyses, with very few qualitative or mixed-methods research capturing lived experiences.

While this review does not specifically investigate intersectionality, the findings reinforce the importance of considering it as a guiding framework for future research. Energy hardship is shaped by the interplay of social identity, economic position, and environmental context. Studies that overlook this complexity may produce interventions that fail to meet the needs of those facing multiple, overlapping forms of disadvantage.

Although previous scoping reviews on energy hardship and health were not specifically focused on vulnerable groups, their findings are broadly consistent with ours. Ballesteros-Arjona et al. (2022) reported that energy hardship was linked to poorer health, particularly among women, older adults, children, and low-income households, and noted that interventions to address energy hardship are typically linked to better health outcomes or reduced risk factors, although some measures may inadvertently worsen indoor air quality by reducing ventilation. Champagne et al. (2023) likewise identified women, children, and older adults as being at heightened risk in the European context. Mei and Seo (2024) further showed that low-income households, renters, individuals with pre-existing health conditions, older adults, children, and women are especially vulnerable to the impacts of household energy hardship and inadequate housing conditions, and highlighted that evidence from developing countries remains limited. They also identified a range of interventions, including housing retrofits, energy subsidies, and awareness programmes, many of which improved thermal comfort and health among households experiencing energy hardship.

Our review adds to this literature by focusing specifically on vulnerable groups such as migrants, people with disabilities, women, children, and older adults. While the health impacts of energy hardship may be known, more evidence is needed on how they affect marginalised populations. This shortcoming of the literature represents an important gap with implications for both research and policy.

Future research should address these imbalances by expanding population coverage to include socially marginalised groups, conducting studies focusing on underrepresented regions, and integrating qualitative and mixed-methods approaches to capture lived experiences. Additionally, adopting intersectionality as a guiding framework could help ensure that interventions are supported by evidence reflecting diverse social identities and contexts, thereby avoiding the perpetuation of inequities in health outcomes.

Several limitations to our paper should be acknowledged. First, the original scoping review and the secondary analysis were restricted to English-language publications, which may have contributed to the observed Eurocentric bias. Second, due to resource constraints, screening and data extraction were initially conducted by a single reviewer, which was then independently reviewed by two other authors, to enhance reliability and minimise selection bias, and to ensure that all relevant publications were included. While every effort was made to ensure a comprehensive and consistent selection process, the possibility of minor omissions or classification differences remains, as is typical in reviews of this scale. Finally, the study is subject to publication bias, a common limitation in scoping reviews. Reliance on published, indexed literature may have excluded relevant studies from non-English-speaking regions or local knowledge sources not visible in major databases.

Conclusion

This paper presented findings from a secondary analysis of a previously conducted scoping review on energy hardship and health, with a specific focus on vulnerable groups, including women, people with disabilities, children, older adults, and migrants. The analysis examined the existing literature to understand what is currently known and to identify key research gaps affecting these populations. In addition to the targeted analysis, selected findings from the broader scoping review were also incorporated to provide contextual insight into methodological and geographic patterns across the literature.

The findings highlighted disparities in the representation of vulnerable groups, with some populations underrepresented, and a geographic skew towards studies from the Global North. While interest in the topic has increased over the past decade, the literature remains uneven. The evidence base is also dominated by secondary, quantitative research, with limited qualitative or mixed methods, constraining understanding of lived experiences and nuanced social contexts. These patterns are significant because they risk producing an evidence base that disproportionately reflects the experiences and contexts of certain populations, potentially leading to policy responses that overlook the needs of others.

These findings suggest several possible implications for policy. First, collecting data that reflects gender, disability, migration status, and other social factors may help ensure that distinct vulnerable groups are not overlooked when programmes are broadly planned and delivered. Second, measures such as subsidies, retrofits, and housing upgrades could be implemented with greater attention paid to the specific needs of marginalised groups. Third, expanding research to include regions outside the Global North would provide evidence to inform more context-appropriate interventions. Finally, considering intersectionality in energy and health policies may help to address overlapping disadvantages.

By synthesising findings across multiple vulnerable groups, this study adds to existing knowledge by showing both how research coverage varies between them and what is currently known about the health impacts of energy hardship on these populations. Future research should address these imbalances by prioritising underrepresented geographic regions, broadening population coverage, and examining how social and economic factors shape experiences of energy hardship and health. Addressing these evidence gaps will be essential for building a more inclusive and globally relevant understanding of energy hardship and health. Policy and planning efforts should be informed by evidence that reflects the diversity of affected populations, ensuring that interventions are equitable, context-specific, and responsive to the needs of those most at risk.

Author contributions

Pilar Luz Rodrigues: writing – original draft, writing – review & editing, resources, project administration, formal analysis, conceptualisation. Margaret Denny: writing – review & editing, formal analysis. Martina Gooney: writing – review & editing, funding acquisition, formal analysis, data curation. Patricia Hunt: writing – review & editing, formal analysis, data curation. Peter May: writing – review & editing, funding acquisition. Mary Nevin: writing – review & editing, funding acquisition. Muireann Prendergast: writing – review & editing, formal analysis. Mary Rabbitte: writing – review & editing, funding acquisition, formal analysis. Colin Barry: writing – review & editing. Ashna Ephraim: writing – review & editing. Suzanne Denieffe: writing – review & editing, writing – original draft, methodology, funding acquisition, conceptualisation, project administration, supervision. All authors approved the final version to be published.

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Data availability statement

The data that support the findings of this study are available from the corresponding author, upon reasonable request.

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