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# A scoping study on the social determinants of health and sugar consumption in the context of policy approaches for improving population health

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## Abstract

**Objectives:** To conduct a scoping review of existing research on the social determinants of health, sugar consumption and public health policy responses to address or improve health outcomes.

**Methods:** A total of 13 categories were developed to reflect the authors' interest in the overall focus on the social determinants of health, sugar as an independent risk factor, upstream policy action ('whole populations'), downstream policy action ('targeted') and two contemporary policy strategies (namely 'Vulnerable populations' and 'Proportionate Universalism'). The search strategy was then performed on MEDLINE (via Ovid) and Web of Science, and was limited to the English language. No time limits prior to when the database search was conducted in 2022 were set to explore the full extent of the literature in this field.

**Results:** Five hundred and sixty articles were retrieved, of which 181 met the criteria for review. When all categories were applied, the findings showed that 76% of papers focusing on sugar consumption as a risk factor for non-communicable diseases (NCDs) mentioned the social determinants of health. The majority of studies (60%) recommended downstream interventions, with 40% recommending 'upstream' interventions.

A limited proportion (12%) of research work was published in dental journals. Research had been done using predominantly quantitative methods (66% of articles), with 24% of studies adopting a mixed methods approach, and 8% being exclusively qualitative. Research on contemporary strategies for sugar reduction were focused on the 'Global North' and 98% of papers used individual level data focused on targeted approaches, highlighting that there is little direct evidence for contemporary strategies aimed at reducing sugar consumption.

**Conclusions:** Whilst the majority of public and dental health research argues that there is a need to address the social determinants of health, the findings from this study highlight that very few empirical studies have been designed to directly inform

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contemporary strategies for sugar reduction. More research is therefore needed that can directly assess the evidence for contemporary strategies in public health policy.

#### KEYWORDS

downstream policy interventions, health inequalities, public health, public health policy, social determinants of health, sugar consumption, upstream policy interventions

## 1 | INTRODUCTION

Added sugars are among the most hotly debated topics in oral health and nutrition research.<sup>1-5</sup> These 'free' sugars are defined as added sugars in any form, including sugars naturally present in fruit and vegetable juices, purées and pastes, and similar products in which the structure has been broken down; as well as all sugars in drinks (except for dairy-based drinks); and lactose and galactose added as ingredients.<sup>6</sup> Free sugars are also the essential dietary factor in the development of dental caries which is the most common noncommunicable disease (NCDs) worldwide.<sup>7</sup> Dental caries is an expensive disease to treat, consuming 5%–10% of healthcare budgets in industrialized countries, and is a key reason for the hospitalization of children in some countries.<sup>7</sup> Dietary sugar is also a key risk factor for other chronic NCDs, including heart disease, cancer, respiratory disease, obesity and diabetes, which are the leading causes of death worldwide.<sup>8</sup> In many countries, sugar-sweetened beverages, including fruit and milk-based sweetened drinks and 100% fruit juices, are a primary source of free sugars that contribute to people's free sugar intake. In addition, confectionery, cakes, biscuits, sweetened cereals, sweet desserts, sucrose, honey, syrups and preserves further contribute to overall consumption.<sup>7</sup> At the same time, there are considerable inequalities in related NCDs, both within and between countries,<sup>9</sup> with the social gradient in diet itself being a potential contributor to health inequality.<sup>10</sup> This social gradient shows that the more a person belongs to the most deprived classes, regardless of which indicator of deprivation is used (income, employment, social category, etc.), the worse their health or diet will be.<sup>11</sup> NCDs are therefore considered to be unfair as they are largely preventable, given the right policy approach. General public health policies are currently not capable to close this gap.<sup>12,13</sup> The impact of socioeconomic status on diet and health is clear, however, especially when considering that healthy food is estimated to cost on average three times as much as unhealthy food. Therefore, those with limited finances tend to have the least nutritious diets.<sup>14</sup> Recent figures show that the poorest 10% in UK households would need to spend 74% of their disposable income on food to meet Healthy Eating Guidelines, compared to only 6% of the richest 10%.<sup>15</sup> This problem is further compounded by the current cost of living crisis in the UK, which has been putting households under increasing pressure since 2021 due to raising food and energy bills.<sup>16</sup> The steady climb of food prices has been felt around the world, as whole food prices were on average 14.3% higher in 2022 than the previous year, impacting those on lower incomes the greatest (UK Parliament, 2023).<sup>17</sup>

To overcome the limitations of existing approaches and address the urgent issue of health inequalities, two contemporary strategies namely, Proportionate Universalism [PU] and Vulnerable Populations [VP], have been developed. The Marmot Reviews into health inequalities<sup>12,13</sup> promote PU as the best strategy for all social strata to benefit fairly from resource allocation, provided that these benefits increase with a scale and intensity that is proportional to the level of disadvantage.<sup>12</sup> The PU approach has steadily gained momentum in policymaking over the last decades.<sup>12,18</sup> An alternative is offered by Frohlich and Potvin's 'Vulnerable Populations' [VP] approach, which claims to offer a complementary strategy different to both population and high-risk approaches.<sup>19</sup> As such, a VP strategy recognizes that certain groups are, due to their position in the social strata, commonly exposed to contextual conditions that set them apart from the rest of the population. This approach is believed to better mitigate against growing social inequalities in health, which may be partly caused by the unintended consequences associated with whole population interventions.<sup>19,20</sup>

It is clear that public health policymakers have made considerable progress to refine approaches seeking to reduce inequalities in population health. What is not known, however, is the extent to which PU or VP approaches have informed empirical research on sugar consumption as a specific dietary risk factor for public health and health inequality. This is important because policies directed at moderating the effects of inequalities in population health as a result of sugar consumption will need to be supported by robust evidence if they are to gain any traction politically. The degree to which such evidence exists in relation to sugar consumption in particular remains unclear at present. The aim of this study therefore was to conduct a scoping review of existing research into the social determinants of health, sugar consumption and public health policy responses seeking to address or improve health outcomes. The two research questions that were developed to achieve this aim were:

1. What research currently exists on the social determinants of health and sugar consumption?
2. How does this research fit with current policy approaches to population health (in particular PU and VP)?

## 2 | METHODS

A scoping review methodology was chosen to account for a diversity of relevant literature and studies using different approaches, which

is not feasible in a traditional systematic review.<sup>21-23</sup> The review process followed the framework outlined by Arksey and O'Malley<sup>21</sup> on how to conduct a scoping study to enable a wide and thorough evaluation of relevant literature.<sup>21</sup> Theoretical and narrative reviews, grey literature, as well as both qualitative and quantitative research are all included within a scoping review,<sup>24</sup> making it a highly relevant method for this study.

## 2.1 | Search strategy

The search strategy was based on keywords relating to socio-economic disparity (\*social determinant\* of health or socio-economic factors or health status disparities), sugar (\*sugar consumption OR sugar intake OR sugar), public health (\*public health or \*public health policy), and keywords associated with health knowledge, dietary behaviour and associated social practices (\*health behavior\* or \*health knowledge or \*social norms or \*attitudes or \*beliefs). In April 2021, the librarian assisted the authors to add the search term *sucrose* to the key words relating to sugar (\*sugar consumption OR sugar intake OR sugar OR *sucrose*) which resulted in 50 additional papers that were added to the review.

The search strategy was performed on MEDLINE (via Ovid) and Web of Science, and limited to the English language. The resulting references were exported to Endnote where all duplicates were removed (Figure 1).

### 2.1.1 | Exclusion criteria

Papers that focused on health including oral health but excluded diet as a specific risk factor were excluded. Generic opinion pieces, reviews and summaries were also removed from the results as the study was predominantly interested in primary or secondary research conducted on the social determinants of health and sugar consumption.

#### *Developing the Categories*

The initial aim was to develop a set of categories that would adequately reflect the authors' interest in how contemporary policy approaches are reflected in research on the social determinants of health and sugar consumption. In particular, the authors were interested in how research could be classified into upstream (whole populations), downstream (targeted) and contemporary approaches (namely 'Vulnerable Populations'; and 'Proportionate Universalism' as part of whole populations strategies). This resulted in the development of 13 categories (Table 1). Further information about each of these categories is listed in Appendix S1. The study was particularly interested in finding out more about the research methods and disciplines that aim to explore the evidence for public health interventions. These could be sub-divided into the following:

- Interventions aimed at individuals (i.e. behaviour change, health education etc).
- Interventions aimed at whole populations (i.e. 'causes of incidents') and/or proportionate universalism specifically.
- Interventions aimed at vulnerable populations specifically.

The remaining categories were chosen to investigate to what extent available research specifically addressed the social determinants of health and sugar consumption. Further consideration was given to whether qualitative/quantitative data and primary/secondary data was used, the geographical location where the studies had taken place, their journal background as well as the source of funding.

The next step was to carry out a pilot study based on an initial sample of 37 papers. This was conducted to test the categories and ensure that they could adequately characterize a range of studies from different subject areas. This led to further refinement of some categories and the introduction of one additional grouping for 'journal background' after it became apparent during the pilot study that the source of funding was difficult or sometimes impossible to identify in many studies.

#### *Applying the categories*

Two reviewers from the team independently applied the exclusion criteria based on the abstracts and, where necessary, the full-length papers. Disagreements about categorization were resolved through discussion with the research team. During this process, both reviewers established that the conclusion from the full paper, and not the abstract alone, had to be read in order to wholly comprehend the recommended policy actions. Otherwise, it would have not been possible to adequately interpret the author's recommended next steps for policymakers, as the abstract and full paper's conclusions often differed in their respective follow-up recommendations.

## 3 | RESULTS

The initial search resulted in 560 publications. Once duplicates were removed, 386 individual articles remained. Application of the exclusion criteria resulted in a total of 181 papers to be categorized. After the papers had been categorized, they were grouped into 13 categories as listed in Table 1 below.

### 3.1 | Research question 1: What research currently exists on the social determinants of health and sugar consumption?

The majority of papers made the social determinants of health the overall focus of their publication. The trend in reporting was to focus on sugar as one of multiple risk factors in food, rather than focusing on sugar in isolation. Of those articles that focused on sugar as a

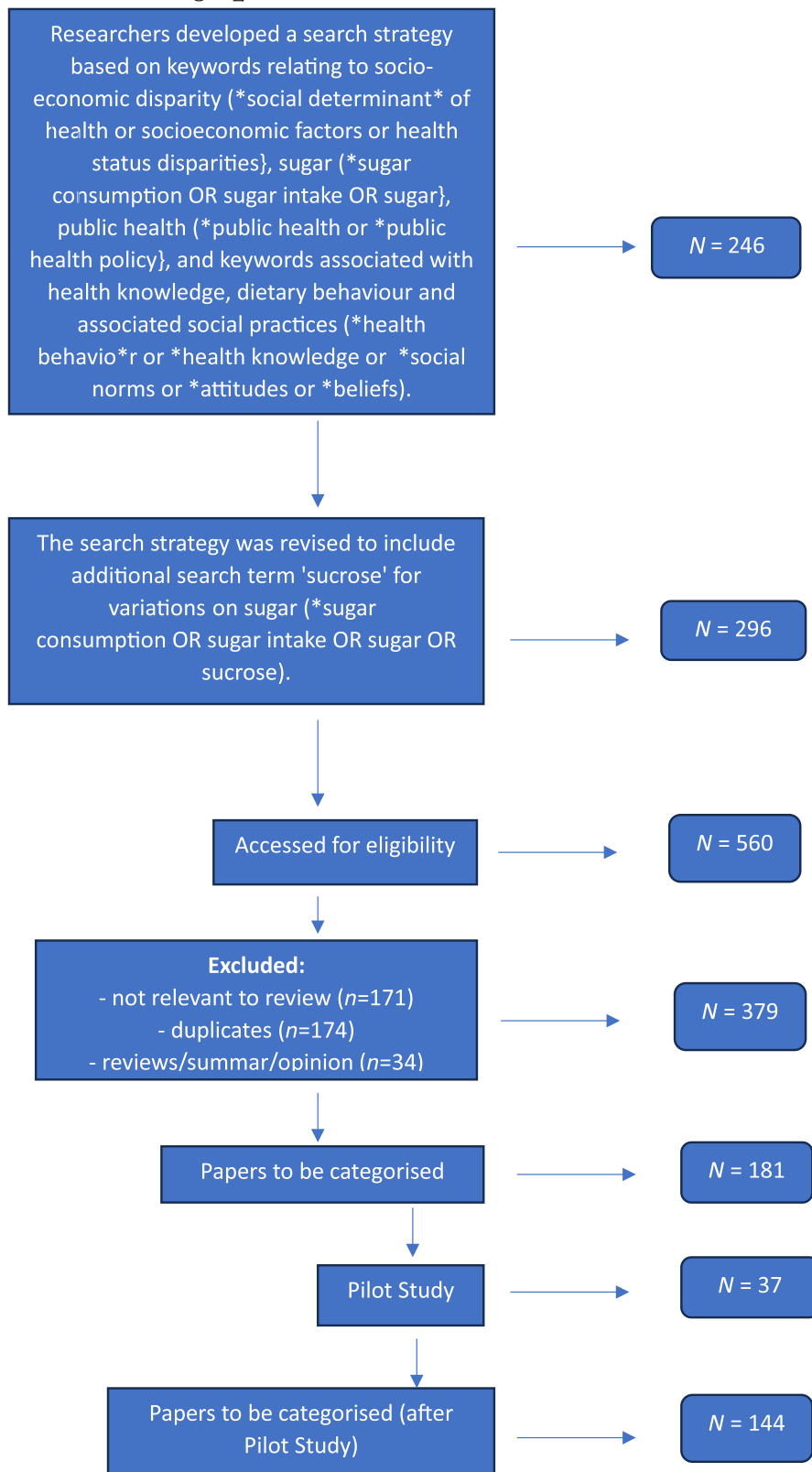


FIGURE 1 (PRISMA inspired flow chart).

primary risk factor, the tendency was to prioritize sugar sweetened beverages (76%). It also emerged that the majority of papers focused on children, young people and their carers. Four studies examined trends across multiple age groups without providing further age-specific details, which were recorded as 'mixed'. Out of 181 articles,

56 (30%) focused on the US as main country of interest. The second biggest group of countries was Australia, which consisted of 20 pieces of research work (11%), followed by 18 publications (10%) conducted in Scandinavian countries (Finland, Sweden, Norway and Denmark). This was followed by 12 papers studying trends in 'mixed'

TABLE 1 Overview of categories applied in the scoping review.

Category	Properties	Number of Papers (%)
1. Overall focus on Social determinants of health?	a. Yes	138 (76)
	b. No	36 (20)
2. Overall focus on sugar as an independent risk factor for health?	a. Sugar intake investigated as primary dietary risk factor determinant for health and socio-economic inequality	65 (35)
	b. SSB intake investigated as a dietary determinant for health and socio-economic inequality	138 (76)
3. Determinants of the disease in individuals	Papers that pursued a targeted or 'high-risk' approach aimed at behaviour change.	178 (98)
4. Determinants of the disease in populations	a. Whole Populations/Universal Approach	1 (0.5)
	b. 'Proportionate Universalism' (PU)	0
5. Vulnerable Populations	a. Vulnerable Populations	15 (8)
6. Upstream/Downstream Intervention	a. Upstream (specific)	52 (29)
	b. Upstream (non-specific)	29 (16)
	c. Downstream (specific)	71 (39)
	d. Downstream (non-specific)	52 (29)
	b. Unclear	15 (8)
7. Intervention focus	a. Children	50 (27)
	b. Adolescents	62 (34)
	c. Adults 18+	53 (29)
	d. Families/parents	29 (16)
8. Country.	a. Female caretakers	13 (7)
	a. US	56 (30)
	b. Australia	20 (11)
	c. Scandinavia	18 (10)
	d. Mixed European	12 (7)
	e. Canada	7 (4)
9. Methodology	f. UK	7 (4)
	b. Mexico	5 (3)
	a. Questionnaires	94 (51)
	b. Surveys	84 (46)
	c. Interviews	40 (22)
	d. 24 h dietary intake recalls	17 (9)
10. Qualitative/Quantitative research	e. Trials/clinical examinations	15 (8)
	f. Focus groups	8 (4)
	a. Qualitative	14 (8)
11. Primary or secondary research.	b. Quantitative/cross-sectional	119 (66)
	c. Mixed	44 (24)
12. Journal background	a. Primary	60 (33)
	d. Secondary	120 (66)
13. Funding sources/sponsors of research	a. Nutrition	78 (43)
	b. Public Health	26 (14)
	c. Dentistry	23 (12)
	d. Obesity	9 (5)
	e. Paediatrics	7 (4)
13. Funding sources/sponsors of research	a. Federal/National/Government	74 (40)
	b. Research Institute/Research Centre/Research Council	50 (28)
	c. Universities and University Hospital	28 (15)
	d. Corporate/Commercial	12 (7)
	e. EU Agencies	8 (4)
	f. Philanthropy	8 (4)
	g. Non-for-profit/charity	8 (4)
	e. No disclosure/not stated/did not receive financial support	45 (25)

European countries, usually as part of large-scale, cross-sectional analyses. Seven studies were set in Canada and the UK, and five articles explored Mexico.

The vast majority of papers used quantitative methods (66%), followed by mixed methods (24%), and a small number of exclusively qualitative research (8%). The tendency was to use secondary (66%)

instead of primary data sources (33%). The principal disciplines where the research was conducted were based in nutrition (43%), public health (14%), dentistry (12%) and paediatrics (4%). The greatest funding source came from the federal/national/government level (40%), followed by research institutes, centres and research councils (28%). Universities sponsored a small proportion of the research (15%), in addition to commercial sources (7%) and non-profit organizations funding an even smaller proportion of studies (4%). Finally, a significant minority of papers (25%) did not disclose any funding for their respective research/authorship/publication contributions.

### 3.2 | Research question 2: How does this research fit with current policy approaches to population health (in particular PU and VP)?

Of the 181 papers that met the criteria for the scoping study, 98% were categorized as 'research at an individual level', meaning that the vast majority of existing research in this area focuses on high-risk/targeted interventions. Most publications (60%) recommended downstream interventions, whereas 40% recommended upstream policy action. Each category was divided into two subgroups, Upstream/Downstream (specific), and Upstream/Downstream (non-specific), to provide an overview of the varying recommendation levels. If more than one policy action was suggested, all options were recorded. One final category titled 'unclear' was selected for papers that offered a general summary of the points raised in the study, but did not propose any further action. A total of 52 studies (29%) were categorized as 'Downstream (non-specific)', indicating a general, broad or non-conclusive policy action to guide future interventions at an individual level (i.e. education or behaviour change). Papers were classified as 'Downstream (specific)' if recommendations for individual-led intervention were more explicit. For example, this included calls for a telephone service to those 'at risk' for obesity as an efficient tool to support SSB behaviour change in rural communities. This category contained the largest proportion of research work, with a total of 71 (39%) articles promoting 'downstream (specific)' policy action.

In total, 52 papers (29%) were classified as 'Upstream (specific)', including calls for compulsory nutrition education to be taught in all schools, stricter laws on food labelling, and taxation on SSBs, among other things. Upstream (non-specific) policy action made up the smallest number of policy recommendations with 29 publications (16%) calling for more research or future interventions aiming to reduce high sugar consumption and address the **social determinants of health at a higher level, without further elaboration**. Finally, 15 studies (8%) did not fit into either upstream or downstream category and were therefore classified as 'unclear'.

#### 3.2.1 | Vulnerable populations

A total of 15 (8%) papers mentioned the term 'vulnerable populations'. Three publications used the term 'vulnerable groups'

interchangeably with meanings of being 'marginalized'<sup>25</sup> 'underserved'<sup>26</sup> or as a general reference for being exposed to broader social, economic and political determinants.<sup>27</sup> In 11 out of the 15 papers, references to 'vulnerable populations' as high risk groups were made due to numerous diverse characteristics linked to poor diets and health outcomes. These 'at risk' groups were farmworkers,<sup>28</sup> single parent households,<sup>29</sup> those who are unemployed,<sup>29,30</sup> obese and overweight,<sup>31</sup> migrants<sup>32</sup> or ethnically diverse groups,<sup>33,34</sup> frequent consumers of SSBs,<sup>26,31</sup> children or adolescents,<sup>35,36</sup> people with disabilities, older people, those living in poverty, and people affected by alcoholism and drug addiction.<sup>29,33</sup> Five studies provided vague or unclear definitions over who might be included in the term 'vulnerable populations', or the reasons why, and did not explain this concept further.

## 4 | DISCUSSION

This study examined the scope of existing research into the social determinants of health and sugar consumption. It highlighted that a relatively small proportion of papers were published in dental journals. This is surprising given that the intake of dietary sugars has been identified as perhaps the most important risk factor for dental caries (affecting  $\approx 80\%$  of the world's population).<sup>37,38</sup> Paradoxically, the paper also found that whilst the social determinants of health are widely discussed in this literature, **98% of papers use only individual-level data and recommend policy interventions targeted at individuals**. Only two publications could be categorized as not focusing on individual-level interventions, which seems surprising and out of step with the raising popularity of the social determinants of health framework. The findings also suggest that the proportion of studies focusing on sugar alone is relatively low. This perhaps underlines continued attempts to incorporate the common risk factor approach into the social determinants framework.<sup>39</sup>

The study focused on the literature related to the social determinants of health, sugar consumption and policy responses that are associated with population health. This primary focus means that the study does not provide any assessment of the strength of the relationship between sugar consumption and the social determinants of health, neither does it critically evaluate the evidence. It is therefore a preliminary study seeking to scope the literature *in the widest possible sense*, rather than providing a robust assessment of the quality of the evidence. More focused reviews are needed to examine more carefully the evidence for the link between sugar, the social determinants of health and NCDs. Given the broad approach adopted in this paper, it is nonetheless important to point out other traditions of research that may also exist in this field (the theory of fundamental causes,<sup>40</sup> or health economics<sup>41</sup>) and could be under-represented. These traditions also advocate societal-wide approaches to reduce health inequalities that are part of the overall debate on the link between inequalities in health, sugar consumption and NCDs. Moreover, the study focused on those papers published in the English language which is

an important limitation. Caution is therefore recommended in attempting to generalize these findings to the whole of research on sugar consumption and the social determinants of health. The link between sugar consumption and NCDs requires a more focused examination, with researchers in the field of oral health and dentistry being very well placed to lead this field of research. In a systematic review of the evidence of the effect on caries of reduction in sugar consumption, Moores et al<sup>42</sup> have shown that moderate evidence exists to limit the 'free sugars to <10% energy intake (E)'. The authors concluded that more data is needed to examine the link between sugar intake and caries, and identified that considerable heterogeneity remains in research in this field. Clearly more research is needed both into the quality of the evidence and the effectiveness of public health interventions directed at reducing sugar intake and NCDs such as caries.

Overall, studies included in this review were predominantly focused on the 'Global North' (focusing on the economically wealthy regions of North America, Europe and Australia), which is problematic given global development patterns and the rising importance of NCDs in developing countries.<sup>43</sup> This may be because the current study excluded papers not published in English, which could be an important limitation. Borde and Hernández have recently pointed out this limitation and consequently criticized the PU approach for "failing to clarify these 'causes of the causes', that is, the processes that historically created and systematically reproduce inequities".<sup>44</sup> For these authors, the PU approach does not go far enough to explore social and political contexts that affect the Global South directly, for example, structural racism, discrimination and global stratification.<sup>44</sup> Consequently, an alternative approach has been proposed in developing countries termed 'The Social Determination of the Health-Disease-Care Process' with a different approach to the epistemology of epidemiology. This approach argues that epidemiology itself is subject to the power relationships at the heart of society, hence different versions of epidemiology reflect progressive/conservative clashes.<sup>45</sup> Epidemiology in Latin America, affected as it is by the impact of authoritarianism, reflects a deep awareness around how social phenomena shape disease. This involves a longstanding critique of epidemiological methods focused on multiple causation and risk factors in favour of analyses that examine collective determinants over free will and lifestyle. This includes an active inclusion of power relationships into epidemiological analysis and involves an examination of how factors such as 'disaster capitalism', class, gender and ethnic inequities also affect health.<sup>45</sup> Further examination of this work is beyond the scope of the current review. This review simply reveals that the PU approach is geographically limited in its scope and as Borde and Hernández<sup>44</sup> state, tends to defend universal access to health care. The PU approach is however not universally applied in global health debates.

Due to the lack of studies that pursued direct evidence on upstream interventions aimed at whole populations related to sugar consumption, it may not be possible to assess the effectiveness and potential benefits of a PU approach in this field. This finding is

surprising, as PU is currently believed (in the Global North) to be the best approach for all social strata to benefit from resource allocation and health action.<sup>12,13</sup> Without more research into complementary strategies for PU to improve health inequalities and dietary practices, there is a risk that progress on improving health outcomes for disadvantaged populations may be limited. Clearly, more debate is needed to explore what constitutes 'appropriate evidence' to assess such strategies, which should be a key priority for public health research. These results are in keeping with previous findings in the public health literature, highlighting that most research has been carried out with 'high-risk' groups.<sup>46</sup>

Cross-disciplinary consensus (in the Global North) has been developing in research into health inequalities over the last decade, pointing strongly towards proportionate and universal interventions as the most promising strategy for groups to fairly benefit from resource allocation and health action.<sup>12,13</sup> Evidence also shows that some upstream policy interventions, in particular taxation on sugar-sweetened beverages, have gained traction at a remarkable pace, with around 50 countries and jurisdictions currently enforcing similar measures, and others requesting voluntary recipe changes.<sup>47</sup> Sugar taxes are recommended as a 'win-win' by the World Health Organization (WHO) to prevent NCDs and are considered key to meet global NCD targets by 2025 including Sustainable Development Goals.<sup>48</sup> In light of these developments, the absence of direct research into 'Proportionate Universalism' within research on sugar intake and health inequalities is challenging.

When categories were applied to explore how prevalent the concept of 'Vulnerable Populations' was, the search identified a limited number of relevant papers. However, it became apparent that the term 'Vulnerable Populations' was used generically, ambiguously and inconsistently, without reference to any explicit conceptualisation. This highlights a need to develop coherent criteria that might define the 'vulnerable populations' approach or where such criteria exist to ensure these are disseminated more widely and consistently. An example could be Froehlich and Potvin's own definition,<sup>19</sup> which defines a vulnerable population as a sub-group or sub-population who, because of shared social characteristics, are exposed to a higher 'risk of risks'.<sup>19</sup> Their approach further recognizes that certain groups are, due to their position in the social strata, commonly exposed to contextual conditions that set them apart from the rest of the population.

Finally, this review highlights the predominance of papers using quantitative cross-sectional studies. Whilst 24% of articles adopted a mixed methods approach, only 14 (8%) were qualitative. This leads to an important conundrum, as, on the one hand, more evidence is needed to examine the link between sugar consumption and NCDs, yet it is also possible that more theory-building and exploration could happen in this field. An example is offered by Moores et al.<sup>42</sup> who argue for more appropriately designed cohort studies with improved dietary reporting methods. Likewise, consumption studies is a growing field of research that has examined food consumption practices but, as yet, has not really been applied to the consumption of sugar.<sup>49</sup> So, whilst calls for more radical action on global oral



health are welcome, new approaches,<sup>50</sup> including critical discourse analysis,<sup>51</sup> consumption studies,<sup>52</sup> and social practice theory,<sup>53</sup> could also be appropriate.

## 5 | CONCLUSION

This research demonstrates that despite growing consensus that inequalities in health are socially determined and appropriate policy responses are needed, very few studies directly inform upstream strategies for sugar reduction. It also demonstrates that contemporary strategies for policymakers appear to be limited to research in the Global North. More research directly addressing the evidence for contemporary strategies in public health policy is therefore needed.

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### CONFLICT OF INTEREST STATEMENT

The authors declare that there is no conflict of interest with this study.

### DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

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## SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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