

From micro to macro: Structural determinants and oral health

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Abstract

The structural determinants of health include social, economic and political mechanisms which generate social stratification and the socioeconomic positions of individuals within society. Despite their importance, these 'causes of the causes' are still relatively under-studied within oral health research. Yet it is important to assess the effects of these 'upstream' determinants, given that most individuals cannot influence or change them. It is also important to move beyond focusing primarily on downstream determinants and approaches at the individual or household level. This review will offer a brief overview of what is currently known about structural determinants and upstream interventions in relation to oral health. The review starts by briefly summarizing oral health focused studies of structural determinants, including welfare regimes, governance and macroeconomic, social and public policies. Current knowledge on upstream interventions associated with oral health such as community water fluoridation, sugar sweetened beverage taxes and dental payment structures will also be covered. The article will then assess gaps in the research base, including current limitations and barriers—as well as opportunities—in analysing the effects of structural determinants and upstream interventions. The review finishes by suggesting next steps for better understanding and addressing these determinants and interventions—including considerations around theory, data and approaches from other fields such as systems science—with the hope that these can help make contributions to future policy decision making processes.

KEYWORDS

determinants, inequalities, intervention, oral health, policy, upstream

1 | WHY ARE STRUCTURAL DETERMINANTS IMPORTANT?

Structural determinants of health are the social, economic and political mechanisms that generate and maintain social stratifications and, in turn, determine individual socio-economic positions according to income, education, occupation, gender, race and ethnicity.¹ Determinants include labour markets, education systems and political institutions that operate through socio-economic positions and intermediary factors (e.g., psychosocial, behavioural) to shape

exposure and vulnerability to health-compromising conditions.¹ They are sometimes termed macroeconomic, contextual, global, upstream, distal or 'causes of the causes'.² Despite their importance for inequalities, structural determinants of oral health remain under-studied. Individual or household-based risk factors, whilst important, ignore social structures that shape these risk factors,³ and only through paying attention to upstream political and economic priorities (e.g., tax regulations, distribution mechanisms, social policies, political ideologies) can we begin to address what puts people at 'risk of risks'.²

According to the World Health Organization, structural determinants are comprised of five key categories that contribute to the 'socioeconomic and political context': Governance (and its processes in the broadest sense, such as definition of needs, discrimination, civil society participation, and accountability and transparency); macroeconomic policy (fiscal, monetary, trade and labour market structures); social policies (influencing labour, social welfare, land and housing); public policy (in areas such as education, medical care, water and sanitation); and culture and societal values.¹ It is important to distinguish between structural determinants and the intermediary determinants of health, which include the material circumstances in which people live, behavioural and biological factors, and psychosocial factors.¹ These determinants can influence exposure to intermediary factors related to oral health, but not an individual's socioeconomic position (within the social hierarchy).

Previously, factors linked to macroeconomic policies such as type of economy and national income, economic crises, labour markets, the balance of economies (nationalized, privatized and social), market regulation of health-related goods and international trade, population income inequality and social policies such as welfare provision have been directly linked with health outcomes and inequalities.⁴ A number of these (labour markets, privatized economies, market regulation of health-related goods, international trade) could also be classified as the commercial determinants of health, which include private sector activities that affect people's health in some way.⁵ As individuals are often unable to influence these determinants, it is important to assess their impact in order to understand mechanisms affecting population oral health, and help us move beyond individual or household-level approaches,⁶ which have dominated oral inequalities research.

2 | WHAT DO WE KNOW ABOUT STRUCTURAL DETERMINANTS AND ORAL HEALTH?

Despite methods to examine upstream oral health determinants still emerging, a number of the five key categories of the socioeconomic and political context have been researched, with social policies such as welfare states having been the subject of several studies.⁷⁻⁹ When discussing welfare states, this can refer to provision for the protection of health, social and economic wellbeing of citizens by a state, particularly those in most need. These studies have found that a large proportion of differences in oral health across 31 European countries could be attributed to welfare regime type.⁸ More redistributive and universal welfare schemes (Scandinavian, Social Democratic) reported better self-reported oral health than other regimes (Eastern European), while dental non-attendance was highest among Southern European welfare states and lowest in Scandinavian regimes.⁹ Welfare state coverage and generosity have also been linked to population inequalities in oral health-related quality of life.⁷ In our recent paper, factors related to social policies (human development index), public policy (out of pocket healthcare

expenditure) and macroeconomic policies (employment ratios, GDP, income inequality) were strongly associated with DMFT and self-reported oral health-related quality of life (OHRQoL) in children in 11 countries, with public health expenditure also associated with OHRQoL.² Additionally, governance-related factors such as measures of democracy and quality of governance (political regime and governance type, accountability, rule of law) were strongly linked with children's self-rated oral health, but less consistently with DMFT.² Governance-related factors have also been related to early childhood caries (ECC) prevalence in 193 countries,¹⁰ with higher perceptions of voice and accountability directly associated with a lower ECC prevalence, and control of corruption being indirectly associated with a lower ECC prevalence via female gross national income. Perceptions of the likelihood of political stability and/or absence of terrorism were associated with a higher prevalence of ECC. To the best of our knowledge, no research on the effects of culture and societal values as a structural determinant on oral health has been conducted.

3 | UPSTREAM INTERVENTIONS FOR ORAL HEALTH

The upstream interventions presented in this section could also be classified as intermediary determinants, as while they can impact exposure to intermediary factors related to oral health, they do not influence position in the social hierarchy (as structural determinants would). The most notable oral health-related upstream intervention is community water fluoridation (CWF), with studies generally concluding CWF can have a whole-population impact; preventing and reducing caries in deciduous and permanent teeth and helping to reduce social gradients in decay.¹¹ A further upstream intervention with oral health impacts is the introduction of sugar-sweetened beverage (SSB) taxes. There is evidence that SSB taxes have been beneficial to population health, with market regulations leading to companies reformulating products with lower sugar content, meaning purchasers consumed less sugar while the amount of SSBs consumed did not decrease.¹² Four modelling studies found associations between tax introductions and reductions in caries in Germany,¹³ The UK,¹⁴ Australia¹⁵ and the Netherlands,¹⁶ with several also finding SSB taxes led to reductions in associated healthcare expenses and treatment costs¹³ and caries-related expenditure.¹⁶ A fifth study¹⁷ found that a SSB tax alone was not enough to reduce the prevalence or distribution of caries without wider, comprehensive public health policies that targeted sugar consumption from non-SSB sources, such as street food cultures that disproportionately contribute to sugar consumption in some countries. Empirical studies of impacts of SSB taxes across numerous countries have also found these to be a deterrent to SSB consumption.¹⁸

A third, and final upstream intervention relates to changes in dental payment structures, which would also be classified as an intermediary determinant according to the WHO framework¹ ('health system' is placed in the intermediary category). Findings suggest

that increased fees can negatively affect utilization in low- and middle-income countries, although unfortunately such studies have not included measures of oral health outcomes.¹⁹ Some evidence suggests however that implementation of fees alongside service quality improvements could be beneficial.¹⁹ In contrast, introducing free dental check-ups has been associated with modest but significant increases in service utilization.²⁰ Given that the examples in this paragraph are classified as intermediary determinants, the question remains as to what would it mean for the oral health community to advocate for true structural interventions (at a societal and political level)?

4 | CURRENT GAPS

The evaluation of oral health in relation to structural determinants and upstream interventions is gaining pace, particularly in relation to intermediary determinants such as research on SSB taxes. Such studies are at the forefront; applying the common risk factor approach—vital for linking oral and general health²¹—and complex systems thinking.¹² Complex systems approaches are typically underpinned by inclusion of (or consideration of) heterogeneous agents at various hierarchical levels, contact between agents in these structures, adaptation, non-linearity and stochasticity, and how interactions lead to emergent behaviours and patterns.²² Other social sciences approach society in different ways, such as political science which looks at government institutions and systems, the power associated with these, and the allocation and transference of power. Anthropology, economics, psychology and sociology also have their own focuses, on both individuals and aggregated systems, yet it can be argued that a complex systems approach would allow for elements of all of these to be included. However, this is not without limitations. Complex systems approaches can be very difficult to replicate and represent (a question of model accuracy versus model simplification), while concerns exist about translating complex and systems science approaches into achievable actions. Challenges such as data sharing, defining the boundaries of a given system, and the need for sophisticated modelling to implement complex systems research also need addressing.²³ Randomized controlled trials and more traditional statistical approaches offer alternative approaches of investigation; however, the lack of inclusion of ecological and contextual effects, and assessment of narrower, linear representations (respectively) may make these approaches less suited to the study of complex systems.²³ Inclusion of complex systems approaches should also not prevent or obscure the needs for specialized studies, which add to the evidence base needed to establish the aforementioned relationships.²³

Project such as those approaching SSB taxes using complex systems thinking will also take time due to the timescales involved in caries development. It is also unclear what impact SSB taxes will have on the social gradient in tooth decay—will they, for example, lead to greater reductions in caries in lower income groups as they are unable to afford higher SSB prices? In addition, studies to date

have mostly focused on high-income OECD countries, so questions remain as to whether similar findings will be present in lower income countries. In relation to CWF, approaches to implementation are changing. A recent green paper published in the UK²⁴ would make implementation of CWF the responsibility of government rather than local authorities. This may enable easier implementation, expand coverage of CWF schemes, as well as removing some of the current financial barriers. Each of these situations presents opportunities for researchers and public health specialists to assess potential impacts of such upstream interventions in ‘real-time’ on key oral health-related behaviours (e.g., sugar consumption), service utilization and clinical outcomes (e.g., caries). At the same time, gathering relevant data will enable researchers to apply modelling approaches to help understand effects of complex interventions at the individual, group and population level.²⁵

5 | WHERE NEXT?

Attempts to model complex scenarios must be underpinned by theory to properly represent established associations,³ with construction of theoretical pathways on the effects of structural determinants across multiple hierarchical levels (policy, business, neighbourhood, community and individual) required. Filling knowledge gaps by working with collaborators from a variety of fields and sectors through participatory research with a systems science lens is also key.²⁶ Existing models with a focus on intermediary determinants such as the Framework for Reconstructing Epidemiological Dynamics demonstrate what can be achieved in collaboratively built systems-based (agent-based) modelling platforms, which are suited to modelling frameworks and dynamic individual interactions. The model's demographic, geographic and social network characteristics, obtained from existing data and data synthesis, demonstrate an approach rarely used in dental public health, but which could be extremely beneficial.²⁵

Systems science approaches have been demonstrated, in practice, by projects such as SIPHER (<https://sipher.ac.uk/>), taking an upstream approach to investigating structural determinants related to healthy public policy with programmes of research spanning disciplines, sectors (local, regional and national government, universities, charities), and outcomes (economic growth, adverse childhood experiences, housing, mental health). In oral health, these approaches are rare. One example is the ADVOCATE project²⁷ which investigated intermediary determinants through strategies for a system transition toward more patient-centred and prevention-orientated oral healthcare delivery across six EU member states. This involved collaborators from universities, health care providers, insurance companies, dental teams and patients.

Data are also a fundamental requirement. Good quality data on structural determinants at national and international levels is required to model determinants and is perhaps one reason why little research has been conducted in this way.² Databases including numerous intermediary determinants of health such as the Consumer

Data Research Centre (<https://www.cdrc.ac.uk/>) demonstrate the potential of collaborative approaches to data sharing in understanding societal patterns. Combining and sharing theory, expertise, (systems) methodologies and data² on structural factors could help dental public health become more pro-active in starting to analyse more complex issues using these approaches²⁸—including the effects of structural determinants—and pave the way for frameworks and modelling infrastructure to investigate planned and hypothetical scenarios to aid future policy decisions.

AUTHOR CONTRIBUTIONS

Both authors were involved in the conceptualization of the paper, as well as drafting and critically reviewing the manuscript. Both authors reviewed and approved the final manuscript.

CONFLICT OF INTEREST

The authors have no conflicts of interest to declare.

DATA AVAILABILITY STATEMENT

Data sharing is not applicable to this article as no new data were created or analysed in this study.

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