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PERSPECTIVE

What would a population-level approach to dementia risk reduction look like, and how would it work?

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Abstract

Dementia is a leading global public health challenge. Prevention approaches have traditionally focused on individual-level strategies. However, such approaches have limited potential, particularly for resource-constrained populations in which exposure to risk factors is greatest, and exposure to protective factors is lowest. A population-level approach to dementia risk reduction is therefore essential to meet the scale of the challenge and to tackle global inequalities in risk and incidence of disease. Such approaches can be highly cost effective. In this viewpoint article, we describe what such an approach should look like, barriers and facilitators to success, and how we should go about achieving it. We include 10 strategic goals to achieve population-level dementia risk reduction and protection enhancement, targeted at researchers, professionals, funders, science communicators, governments, businesses, and policy makers. If we are to significantly reduce the prevalence of dementia there must be increased emphasis on population-level approaches.

KEYWORDS
dementia, public health, risk reduction

Highlights

- Dementia risk reduction is a global public health priority
- Population-level approaches change societal conditions to make them less conducive to dementia's modifiable risk factors, and increase exposure to protective factors.
- Urgent development of population-level approaches is required to reduce the prevalence of, and inequalities in, dementia
- Action is required from researchers, governments and business, funders, public health professionals, and science communicators.

1 | INTRODUCTION

Dementia is a leading global public health challenge of our times. Incident cases, and associated health and social care costs, are forecast to rise exponentially in the coming decades. An increasing majority of that burden is predicted to occur in low- and middle-income countries (LMICs)[1] due to rapid population aging and rising prevalence of non-communicable diseases (NCDs).

Dementia is a clinical syndrome characterized by a progressive cognitive decline, for which available, symptomatic treatments are minimally effective at best.[2–6] Results from trials of potentially disease-modifying drugs indicate that effective amyloid clearance in early disease is associated with no, or very small and likely not clinically relevant, cognitive benefits.[7–9] Significantly, these trials have been highly selective and lacked ethnic diversity,[10] and have focused on relatively younger people with Alzheimer's disease (AD)–type neuropathologies. In contrast, population studies have demonstrated that most dementia occurs in older people[11] with mixed neuropathologies, of which AD-type pathology accounts for only a fraction,[12] limiting the population relevance of such drugs, even if clinically meaningful effects are achieved in future trials. Moreover, there are significant safety concerns and cost and practical implications, including prohibitively expensive diagnostic and monitoring equipment.[9] The overall assessment is therefore that a globally available, clinically meaningful treatment is not on the horizon.[7–10]

Prevention approaches to dementia are therefore of critical importance. Encouragingly, evidence from high-income countries (HICs) suggests that, at a population level, age-specific dementia incidence has reduced over recent decades.[13] Moreover, modeling suggests that 40% of all dementia is associated with 12 potentially modifiable life course risk factors: low education, hearing loss, traumatic brain injury, hypertension, excess alcohol, obesity, smoking, depression, social isolation, physical inactivity, air pollution, and diabetes.[14] While elimination of these risk factors is implausible, even a modest reduction at the population level could produce significant benefits. Further, due to inequities, both within and between countries, the potential for risk reduction, and the benefits of it, are much greater in resource-constrained settings.

In this viewpoint, we consider what population-level dementia risk reduction strategies would look like, the evidence that supports their implementation, and what needs to happen next.

1.1 | What would it look like?

We define population-level dementia risk reduction as "measures applied to populations, groups, areas, jurisdictions, or institutions with the aim of changing the social, physical, economic, or legislative environments to make them less conducive to the development or maintenance of dementia and its modifiable life course risk factors."[15] This places the onus for change at the structural, rather than individual, level, thereby making the conditions in which people grow, live, work, travel, play, and age more brain health–promoting.

These structural changes would be designed to make the brain-healthy choice the default choice, or easiest option. This drives "unconscious" behavior change,[16] which would enable population-level strategies to improve brain health across society, including so-called "hard-to-reach" groups. In some cases, unhealthy choices may be restricted, for example laws mandating helmet or seatbelt usage, and public smoking bans. This can be controversial, and particularly unpopular with libertarian-leaning politicians and electorates. However, evidence suggests that public approval of such laws, for example smoking bans in public places, tends to increase post-implementation.[17,18]

Effective action will require policy change at all levels of governance in a given state (i.e., national, regional or state, and local government). For example, to tackle the obesogenic environment in England, the national government has implemented an industry levy on sugary drinks,[19] a regional transport authority has implemented a ban on advertising unhealthy foods on its network,[20] and a local government has used planning and licensing legislation to limit the density of fast-food outlets in local neighborhoods.[21] It will be important to integrate dementia risk reduction into other non-communicable disease prevention strategies, where there are co-benefits. International cooperation will also be required, for example, tackling pollution. The onus for change would also be placed on large employers, to create healthy work policies, such as flexible working hours to allow workers to exercise during daylight hours and promote good mental health.

Box 1: Key components of a population-level dementia risk reduction approach.

1. Onus for change placed at the structural (not individual) level: Policies change people's living conditions.
2. Policies make it easier for everyone in a population to make brain-healthy choices.
3. Policies at all levels of governance (from local to international).
4. Policies target individual risk factors, clusters of risk factors, and population inequalities.

In some cases, population-level dementia risk reduction policies will target specific modifiable risk factors (e.g., legislation to mandate plain cigarette packaging). Others will be multi-pronged to recognize the clustering of risk factors in certain populations (e.g., co-produced built environment changes to increase active travel, while also providing families in need with healthy food vouchers, and improving the quality of school meals). But to be truly transformative and long-lasting, policies also need to address *why* certain risk factors cluster in certain populations—the causes of the causes. These include: socioeconomic inequalities and lack of social mobility, institutional racism, patriarchy, ageism and social cohesion, commercial interests, and corruption. These social, economic, cultural, and political factors are the ultimate upstream determinants of health; aging; and, in part, dementia. They not only define the populations' likelihood of developing risk

factors in the first place, but also shape the ability of individuals to mitigate those risk factors, and how they experience disease.[22,23] Fittingly then, to tackle a disease that poses one of the greatest challenges to our aging societies, we require a truly holistic, radical, population-level risk reduction approach that directly addresses what kind of society it is that we want to live in.

1.2 | Why would it work?

There are several reasons a population-level approach to dementia risk reduction would be expected to be successful.

1.2.1 | Because the observational evidence is in support

Pooled analysis across 25 years of follow-up in seven longitudinal population-based cohorts in the United States and Europe observed a 13% drop in the incidence of dementia per decade. This means millions of people did not have dementia who otherwise might have been expected to.[13] These data give hope that dementia may be prevented in populations, but they raise the key question, how? Why was someone aged 80 in 1990 more likely to have dementia than someone aged 80 in 2010? How do we re-create (or enhance) that in future generations? We suggest that the drop in incidence is likely to have been caused by some changes to the average brain healthiness across the life course of these two generations, such as reduced exposure to first- and second-hand tobacco smoking, increased education levels, and improved cardiovascular health (including better medical treatment).

1.2.2 | Because the epidemiological evidence is in support

Many have suggested that we rise to this challenge by equipping individuals with knowledge of their dementia risk, and providing support for them to reduce it. Notwithstanding the fact that the incidence reduction described above occurred before such approaches were introduced (meaning that they cannot be the explanation for the observed drop), and that randomized trials of such approaches have so far not demonstrated a reduction in dementia incidence,[24] there are two key reasons why population-level approaches are preferable. The first is scale. Proposed modifiable risk factors, such as obesity, physical inactivity, depression, and hearing loss are extremely prevalent in our societies. Others, such as education and pollution affect everyone (there is no demonstrated "safe" level of education or pollution reduction, beyond which health gains could not be realized). Accepting that almost all interventions only reduce risk factors by a small absolute amount, only measures that reduce risk across the whole population can hope to produce significant reductions in disease burden. Second, changes to the lifestyle choices of an individual generally only benefit that individual (in some cases there may be small effects on their close relatives), and often only benefit the individual for the duration that the intervention is applied. This limits the long-term sustainability and cost effectiveness of such approaches. Imagining that an individual, equipped with knowledge of their risk and support to change it, manages to overcome the environmental barriers to a more brain-healthy lifestyle and maintain that new lifestyle in the long term, further intervention will still be needed to support the next generation who continue to be exposed to the same barriers. Instead, population-level approaches offer the ability to create a legacy effect which, due to the cumulative accumulation of risk and protection across the life course, may actually increase in effectiveness (and therefore cost effectiveness) over time,[25] without needing to be continually re-implemented (and funded).

1.2.3 | Because the behavioral science evidence is in support

It is possible to choose to live a healthier life, for example, on receipt of "personalized" advice that if you don't you are likely to become ill. However, in the presence of living conditions that actively discourage a brain-healthy lifestyle, such as living in an area with a high density of fast-food outlets, a lack of built environment infrastructure to support physical activity, high levels of pollution, and limited educational opportunities, actively (or "consciously") choosing to make these brain-healthy choices is very difficult. Moreover, the groups most often affected by these factors are those of low socioeconomic status, who generally have the least resources to draw upon to make these brain-healthy choices. As a result, interventions that place the onus on individuals to make healthy choices tend to be ineffective and widen health inequities.[16,26,27] Population-level approaches that change these conditions can be more equitable, both within HICs and LMICs.

1.2.4 | Because the pathophysiological evidence is in support

Pathological changes in the brains of people who develop dementia begin decades before symptom onset,[28,29] while both the modifiable risk factors and contributors to cognitive reserve accumulate across the life course. It is therefore unsurprising that approaches focusing only on supporting individuals to make healthier choices, which are generally only affordable to run for a few years, have produced no, or very small, effects on cognitive performance, and no trials have demonstrated significant reductions in dementia incidence directly.[30–32] Interventions should instead reflect the lifelong accumulation of risk[33] across the whole population.

1.2.5 | Because the public health evidence is in support

Attempts to reduce dementia incidence by targeting the modifiable risk factors for dementia should be rooted in what has previously been

shown to be effective in reducing those risk factors. The World Health Organization (WHO) have collated the "best buys" (the interventions with the greatest cost effectiveness evidence in support) for non-communicable disease prevention, which target smoking, alcohol, diet, and physical activity.[34] The vast majority of the included interventions are population-level interventions, for example, increasing taxation on unhealthy products, advertising bans, availability reduction, product reformulation. Despite this, the dementia prevention agenda has been dominated by individual-level interventions only.

1.3 | Why wouldn't it work?

Recognizing the importance of addressing limitations of any approach, in this section we consider the key challenges to this approach with reflections on how these may be tackled.

The proposed modifiable risk factors may not actually be causally related to dementia. It is always the case that observational evidence cannot demonstrate causation, only association. While there is a sound biological rationale for why the risk factors could be causal, it is also true that our pathophysiological understanding of the complex dementia syndrome is incomplete, and we should be honest with the public about what we do and don't know for certain. However, each of the proposed modifiable risk factors are public health concerns in their own right, many of them are well-established risk factors for other age-related diseases; and therefore, actions against these risk factors are fully justified as a means to their own ends. Moreover, the evaluations of effectiveness and cost effectiveness of the population-level interventions against these risk factors, for example the WHO best buys,[34] are generally conducted without including the effects on dementia; in other words, any reductions in dementia prevalence would simply be a bonus that would make them even more cost effective. Additionally, the epidemiological data clearly point to reductions in age-specific incidence of dementia in HICs. So, while we cannot say for certain exactly what societal changes contributed, we do know that population prevalence reduction is a possibility. Given the human and financial costs associated with dementia, how certain do we need to be before we act? In particular, primordial prevention policies that tackle the root causes (e.g., societal inequality) will have enduring action across multiple aspects of health and well-being, and are therefore likely to impact development and maintenance of multiple risk factors.

Population-level interventions present challenges to implementation and research that individual-level interventions do not.[15] Building the case for, gaining political traction for, implementing, and evaluating complex population-level interventions is difficult. From a research perspective, linear, clinical academic models have limited utility in this complex space.[35] From an implementation perspective, tackling the social, commercial, and geopolitical determinants of health can be viewed as difficult by policy makers, who may feel that short-term damage to political capital outweighs the long-term potential of such policies. We therefore need to draw on a systems thinking approach that embraces the complexity, as has been recognized for other NCDs.[25] This includes dedicated work to understand the perspectives and motivations of policy makers, co-production of relevant evidence with those that will implement it, and use of a range of research designs beyond the clinical gold standard of a randomized controlled trial.[35] It also requires an academic infrastructure that supports the long-term, and holistic nature of these goals,[36] producing public health researchers that are adept at operating within the political paradigm.[37]

Because policy-maker attention and resources are pulled in other directions, a policymaker or research funder interested in tackling dementia is presented with several choices before investing in population-level risk reduction. Those that see past the apparent lucrative potential of drugs, biomarkers, and early detection, and look to prevention, are offered futuristic sounding "personalized" or "targeted" prevention from those who favor placing the onus on individuals. Despite the enduring dominance of the biomedical perspective, this paradigm has limited application to primary prevention. We need to build momentum around a global movement of dementia researchers, public health professionals, health policy experts, and others to advocate for population-level risk reduction in the dementia prevention space.

1.4 | How do we achieve it?

Achieving this agenda will not happen overnight. Instead, concerted efforts from multiple actors with shared responsibility are required. Here, we set out 10 strategic goals, detailing who has a role to play, and the actions needed (Figure 1). Addressed together, the goals can build a movement that develops, advocates for, implements, and evaluates population-level approaches to dementia risk reduction and prevention.

1.4.1 | Researchers

1. Develop global networks of researchers, spanning HICs and LMICs, from a range of academic disciplines (including public health, epidemiology, gerontology, biostatistics, economics, sociology, clinical medicine, and health policy) focused on producing evidence of what works to reduce the population's dementia risk profile. Anyone interested in working with this authorship group is invited to visit our webpage: https://coghealth.net.au/population-based-approaches-to-dementia-risk-reduction-research-group/
2. Produce actionable dementia risk reduction research that is relevant to the populations who need it most, including LMICs and socially excluded groups in HICs.
3. Engage policy makers and policy influencers in dementia risk reduction research, to understand their perspectives and motivations, and to ensure that the research directly addresses the barriers to adoption of population-level approaches.

FIGURE 1 Ten strategic goals for population-level dementia risk reduction and protection enhancement.

1.4.2 | Funders

4. Fund research collaborations that connect academics with public health professionals and those who work in health policy, across HIC and LMICs, and seek to apply systems thinking approaches to complex problems like inequalities, commercial determinants of health, and the obesogenic environment.
5. Provide sustainable funding for research collaborations, without overemphasizing proximal outcomes that drive research toward short-termism and individualized solutions.
6. Mandate the use of co-production methods with communities and policy makers, and prioritize research that is likely to benefit the populations who need it the most.

1.4.3 | Science communicators (including journals and conferences) and advocacy organizations

7. Be vocal advocates for, and increase the emphasis placed upon, population-level approaches within the dementia risk reduction space and be receptive to reports, publications, and conference coverage of this agenda.
8. Ensure that panels and committees presiding over dementia risk reduction debates are not exclusively from the individual-level, biomedical perspective.

1.4.4 | Government and business

9. Address inequalities in dementia risk by implementing interventions against the modifiable risk factors for dementia, and the upstream determinants of these risk factors, where there is already sufficient evidence for policy action.

1.4.5 | Public health and policy professionals

10. Build relationships between researchers, professionals, and policy makers, to increase the ease with which future population-level interventions can be implemented, as the evidence base matures.

AUTHOR CONTRIBUTIONS

All authors conceived this viewpoint article. Sebastian Walsh drafted the article and the figure. All authors edited the article and the figure.

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CONFLICTS OF INTEREST STATEMENT

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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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