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Public brain health: a framework for action to promote and safeguard brain health

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Abstract

The promotion of brain health has generally been undertaken at the level of individuals, for instance, in the quest for precision treatments for persons with, or at high risk of, neurological disorders. But the growing global burden of neurological conditions and the increasing understanding of the brain's central role in all facets of human life have spurred interest in public health approaches to the brain that emphasise population-level strategies benefitting everyone as part of a *"brain health for all"* vision of society. This article defines the emerging concept of public brain health as intersectoral action to establish brain health priorities, empower communities, and reduce health inequities, with the ultimate goal of improving brain health at the population level across the lifetime. We propose a framework to promote and safeguard population brain health with the following key elements: co-defining priorities with communities, balancing prevention strategies, and reducing global gaps in brain health through ambitious policy-making. Public brain health calls for collective responsibility to maximise brain health equity across the life course.

Keywords Brain health, Public health, Brain health equity, Prevention, Collective responsibility, Research, Policy, Neurological conditions, Intersectoral action, Brain health for all

The emergence of public health approaches to neurological conditions

Over recent decades, the large and growing burden of conditions affecting the nervous system [1] across the ageing globe has inspired increasing interest in the brain from researchers, governments and broader society [2]. Most approaches to the brain have tended to propose individual-level solutions to people thought to be at high risk of transitioning to a state of disease [3], rather than focusing on brain health as a goal in itself. The implicit conclusion drawn from this literature base is that brain health is more critical to promote and protect for some

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people, such as middle-aged or older adults at high risk of developing neurological disorders like dementia [4], than for others, such as younger adults or children [5].

Meanwhile, some researchers have long called for more widespread public health solutions to support brain health across the lifetime [6], beyond focusing on individual people at-risk or already living with a neurological condition. This shift in framing is now underway more broadly in the field. The World Health Organization (WHO) recently launched its first public health approach to the brain: the Intersectoral Global Action Plan 2022—2031 on Epilepsy and other Neurological Disorders (IGAP) [7]. IGAP presents a key feature of public health approaches: its efforts explicitly acknowledge the shared health needs of the one in three people worldwide with *any* neurological condition [1]. While those needs provide a vital starting point for reflection, public brain health considers that brain health concerns everyone in society equally, regardless of whether a person is living with or at high risk for a neurological condition. We contend that going beyond individual cases of sickness or risk and moving to a population-level view of health disparities will make it easier to find solutions for the unmet needs of everyone, including current and future patients. The purpose of this article is to provide empirical and conceptual arguments in favour of this population-wide, all-of-society position.

Speaking more generally, there are several reasons to frame health as necessary for *all* people, rather than just for certain at-risk groups. It strengthens public support for society-wide solutions, avoids stigmatising or marginalising sick and/or vulnerable communities, and places responsibility for health at the political and societal level rather than upon individuals [8]. Moreover, it may be more effective. That is, a focus on determinants of population health rather than individual risk of disease has the potential for greater impact on public brain health for two reasons. First, these determinants can affect multiple diseases and dimensions of brain health at once. Second, a large number of people exposed to a lesser risk can be responsible for a far greater population burden of ill health compared to a small number of people exposed to a greater risk [9]. The reality of this "prevention paradox" has been demonstrated empirically in the case of dementia [10] and stroke, leading the World Stroke Organization in 2020 to abandon using the label "high-risk" [11]. Still, whole-population life-course approaches to brain health have been under-studied [12].

We define public brain health as the intersectoral action to establish brain health priorities, empower communities, and reduce health inequities with the ultimate goal of improving lifelong brain health at the population level.

Here, we operationalise a multidisciplinary perspective on brain health within the framework of the 2024 revision of The Global Charter for the Public's Health by the World Federation of Public Health Associations (WFPHA) developed with the WHO [13]. The WFPHA 2024 Charter is composed of services (promotion, prevention, protection), enablers (good governance, effective advocacy, adequate information, capacity building), and values (equity, inclusivity, justice, and solidarity). We start with a discussion of services—promotion, prevention, and protection—before integrating them with their enablers and values that drive public brain health within a coherent framework for action in both research and policy. The broader social goal of public brain health is to contribute to societies which are structured to ensure optimal brain development and maintenance across the life course so that individuals and communities can live fulfilling lives for as long as possible, having been kept as healthy as possible for as long as possible by the broader context of their society.

Promotion: defining health priorities with society is necessary for adequate promotion policies

Effective brain health promotion requires co-defining and co-implementing priorities with diverse interest holders rather than relying solely on expert-driven approaches. It is the belief of public brain health that better health will not happen to, but should instead happen *with*, society through "intersectoral action" [7]. This is co-ordinated action between interest-holders, including the healthcare sector (professionals and patients), policymakers, civil society, and the private sector, to drive sustainable changes.

As part of IGAP, the WHO published its very-first definition of brain health in 2022 [14], building on conceptualisation that began in the 2000s. The recent WHO definition suggests that brain health is not a binary concept opposing health and disease, but a continuum across several dimensions relevant to well-being and neurological function, including cognitive, sensory, social-emotional, behavioural and motor domains [14, 15]. The broadness of the WHO definition in particular requires accommodating different forms of discourse around brain health in terms of different goals within public health: for example, it might be most useful to stress the cognitive domain of brain health when talking about dementia prevention; it may be most useful to stress the social-emotional and behavioural domains when discussing addiction. Given that how we define brain health shapes how we promote it [16], and that brain health concerns everyone, health promotion initiatives should conceptualise priorities by bringing together academic researchers, public health practitioners, policy makers, and civil society, including people with diverse exposure

to brain health determinants and lived experience of conditions affecting the nervous system [17], as well as actors from governments and the private sector [18].

The WHO recognises five priority classes of brain health "determinants," that is, different factors that can either improve or worsen brain health. These are physical health; social and physical environments; safety and security, learning and social connection, and access to quality services [14]. Without inclusive priority-setting to take action with respect to brain health determinants, policies will likely reinforce narrow biomedical definitions that overlook how societal structures–education, environmental pollution, social inequity–actively shape brain health across all life stages from conception and parental health to later life.

The United States health system illustrates this problem: its disease-centric model leads to chronic underinvestment in action to address social determinants of health, both protective and harmful [16]. Promoting brain health effectively requires expanded definitions of determinants and priorities that justify directing resources beyond clinical treatments to address broader societal factors. A co-produced definition of priorities for brain health promotion can counterbalance increasingly reductionist approaches that focus narrowly on biomarkers [19] or individual lifestyle factors [20]. Public brain health promotion should reflect what communities value and need and what public health services can do to meet health needs and help communities and individuals to thrive. This approach creates a productive cycle: community-informed definitions guide interventions, and successful interventions then help to refine what brain health means to those who benefit from them.

This reciprocal process demands co-production and co-implementation with communities to ensure that policies reflect lived realities of people facing different levels of risk and protection. These factors operate across multiple levels–biological, interpersonal, organisational, community, environmental, and socio-political [21]. Without meaningful community engagement, the brain health promotion risks remaining confined to biomedical siloes and may inadvertently perpetuate the inequities it aims to address [16]. Finally, promotion of brain health must evolve with local needs and not be static. This approach requires ongoing adaptation to shifting demographic realities and social determinants within each community. Local priority-setting with practitioners and communities provides stronger justification for resource allocation towards public brain health goals. A country's sociodemographic profile – life expectancy, age distribution, and burden of adversities – fundamentally shapes what "brain health promotion" means for its population.

Consider the contrast between different global contexts. Colombia's decades of civil war and ongoing tensions [22] make trauma a high public brain health priority, while India faces increasing air pollution challenges with small particulate matter concentrations currently 10 times higher than WHO recommendations, which meta-analyses have found to be associated with increased risk of dementia and stroke [23]. These contexts require different approaches to brain health promotion. Similarly, ageing societies like Japan, may prioritise dementia prevention and elderly care infrastructure, while younger, conflict-affected populations, might focus on building resilience to trauma or addressing malnutrition during critical developmental periods.

This context-specificity means universal priority-setting approaches are unlikely to achieve desired brain health outcomes. Priority-setting must also meaningfully involve historically marginalised populations, such as indigenous peoples, and incorporate deep understanding of adversity stemming from sociopolitical conditions, such as the aftermath of apartheid in South Africa. Brain health should be iteratively redefined through inclusive, participatory processes that address historical and current injustices as structural inequities shift and new evidence emerges. This vision aligns with positive definitions of health as a capability conditioned by societal context. As an example, the ComPHAD (community public health approaches to dementia research) approach at Cambridge Public Health is attempting to address the influence of historical injustices on priority setting.

Prevention: balanced prevention to achieve empowerment

Effective brain health prevention requires moving beyond traditional approaches to embrace a comprehensive, equity-focused strategy that addresses upstream determinants of health. Public health experts have called for rethinking brain health prevention approaches for several years, recognising that conventional approaches that have focused primarily on individual risk factors are insufficient [6]. The concept of "public brain health" builds on work by Hussenoeder and Riedel-Heller [24] who argued for expanding "dementia prevention" beyond modifiable risk factors to address broader social determinants.

Prevention (meaning '*to come in front of*') is the basis of anticipating health needs. It encompasses five distinct levels: primordial, primary, secondary, tertiary, and quaternary prevention [25] (see Fig. 1; Table 1).

Primordial prevention refers to prevention of the risk factors developing altogether, whereas primary prevention refers to controlling risk factors that are already present. Given the current dominance of primary and secondary prevention approaches in brain health [12], public brain health emphasises primordial prevention as essential for achieving health equity because it targets upstream factors that influence how risks are

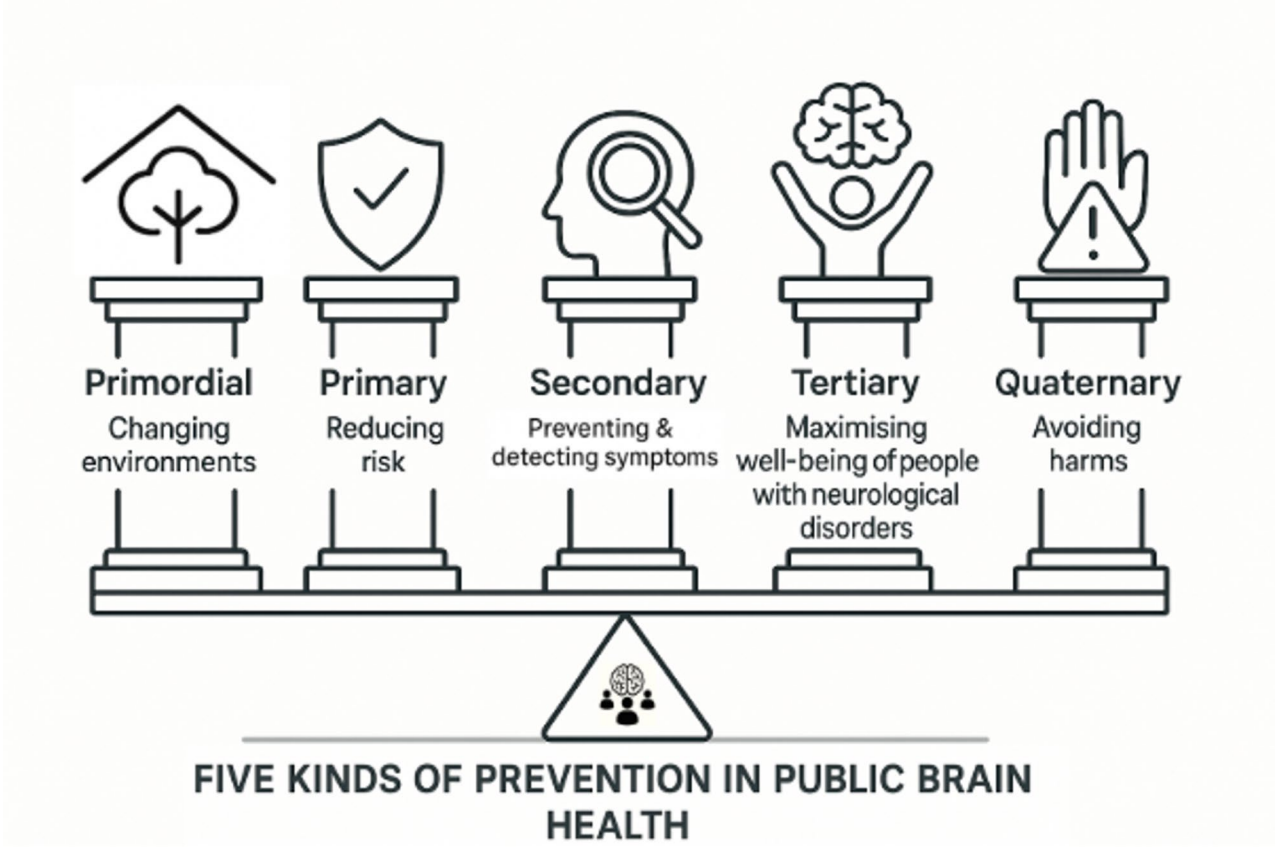


Fig. 1 - Balanced prevention across five priority areas is necessary to achieve public brain health. Adapted from Keyes et al. [25]

Table 1 Priorities to achieve balanced prevention in public brain health

Level of prevention	Aim	Example priorities for public brain health
Primordial prevention	Changing physical, social, and legal environments so that they are more conducive to lifelong brain health before risk factors develop.	Urban design [26], such as the Barcelona Superblock model combining sustainability and liveability considerations to favour physical and mental health [27]. Salt-reduction laws for heart and brain health [28]. The UK government's "plan to create a smokefree generation" through legislative proposals [29].
Primary prevention	Promoting protection and reducing disease susceptibility in people who are exposed to known risk factors and other obvious sources of ill health.	Action against the 14 modifiable risk factors associated with approximately 45% of cases of dementia [23].
Secondary prevention	Early detection of neurological signs/symptoms and their prompt treatment to halt or slow disease progression.	Acute assessment and intervention with antithrombotic therapy, carotid revascularisation, and control of risk factors to prevent recurrent stroke [30].
Tertiary prevention	Maximise quality of life and minimise contributors to disability for people living with a neurological condition.	Access to proven, inexpensive WHO essential antiseizure medication for people with epilepsy worldwide [31]. Cognitive stimulation therapy as a low-resource therapy in neurocognitive disorders in low-resource settings [32].
Quaternary prevention	Avoiding overmedicalisation and unnecessary or harmful interventions.	Warning against pseudoscientific promotion of brain health supplements and unvalidated therapeutic protocols [33].

distributed across populations. Addressing upstream determinants–such as education, environmental quality, and social policies–would create conditions where downstream interventions become more accessible and effective for all population groups. A balanced prevention approach is based on empowerment rather than behaviour change [34]. Empowerment fosters both individual and community agency over determinants of brain health, rather than relying solely on individual behaviour change. A behavior-change paradigm focused on primary prevention risks trapping brain health in a biomedical cul-de-sac, addressing surface-level behaviours

rather than examining deeper societal gradients of brain health that may offer more accessible targets for lasting public health gains. Evidence supports this shift in focus: for lifestyle-related behaviour change alone–including healthy eating, increased exercise, and social and cognitive activities–show weak effects on brain health in older adults [20]. The strongest recent evidence suggests that significant and sustained external support is essential for behaviour change to attain even short- to mid-term positive impacts on cognition [35]. Balanced prevention, made possible by adequate primordial prevention, avoids unfortunate trade-offs, for example, between "cure" and "care" priority setting on one hand [36], or the ongoing imbalance that favours individual-level interventions over population-level approaches [12]. Moreover, balanced prevention also insists on quaternary prevention, that is, a precautionary assessment of the benefits and risks of innovations to people affected by them before their widespread implementation.

The empowerment approach is more effective and less paternalistic than behavior-change approaches. Aside from the evidence on their modest impact, empirically, most behavior change programs do not lead to lasting changes in desired health outcomes [37]. Moreover, they risk perpetuating paternalism, victim-blaming, and health inequities rather than addressing deeper contributions to risk and unhealthy behaviours [38]. Even well-intentioned programs tailored for specific communities often impose external health goals while ignoring systemic barriers such as poverty, pollution, and trauma, as well as local values [34]. These approaches can inadvertently undermine autonomy and widen health gaps, as groups with more access to resources benefit disproportionately from initiatives requiring conscious behaviour changes [3]. Rather than relying on these problematic behavior change approaches, public brain health prioritises empowerment strategies that target the "causes of the causes"—factors such as education [23], urban design [53], and access to services [14]—since sustainable and lasting health gains require shifting power to communities to define and address their own needs. This will require access to resources for communities, so that access to basic needs and amenities for public brain health can be met locally for cost-effective solutions for brain health [40], bringing us to the question of global resource inequalities.

Protection: reduce the global brain health gap through reasonable and actionable means

Decades of robust research on social determinants of health support the position that health inequalities that are preventable by "reasonable means" are unfair as a matter of social justice, as previously argued by Sir Michael Marmot and colleagues [41]. Identifying "reasonable means" that are practically actionable is something that should be done with, rather than to, society.

Thus, an initial question is: where are the most important brain health gaps to be found? Substantial health disparities exist both within and between countries worldwide, and brain health gaps typically mirror overall health disparities. Life expectancy provides a robust indicator of health gaps between countries, and current trends suggest these disparities will persist for decades [42]. Understanding brain health gaps requires adopting a life-course perspective [6] that recognises causal links between early life opportunities and later health outcomes, including stroke and neurodegenerative diseases. This perspective reveals how social protection throughout the lifespan can prevent brain health inequities from taking root.

To understand these global health disparities, we can examine specific evidence from neurological conditions. The Global Burden of Disease study reveals both progress and persistent inequities in brain health worldwide. Across 37 neurological conditions from 1990 to 2021, age-standardised rates of disability-adjusted life-years decreased by an average of 27%, even though overall burden increased due to population aging [1]. However, these promising rate reductions mask profound geographic and demographic inequalities. For example, 96% of neonatal encephalopathy following birth asphyxia cases occurred in low- and middle-income countries (LMICs) in 2010 – cases that universal obstetric care and neonatal resuscitation could largely prevent [43]. Similarly, stroke incidence and mortality have declined steadily since 1990 in high-income countries (HICs) [44], likely due to improved preventive care and treatment of medical risk factors like hypertension. Dementia rates in HICs have decreased by up to 13%/decade, though estimates differ between studies and the difference between men (24% reduction) and women (8% reduction) remains unexplained [45]. These trends for stroke and dementia incidence have not occurred in LMICs, where the overall burden has increased over three decades.

But how should these gaps be overcome? We envisage two perspectives for addressing this gap through policy: a "brain-first" perspective that targets specific evidence-based actions to improve brain health, and a "brain-too" perspective that recognises the potential of brain health improvements as beneficial effects of broader health and social policies. Current evidence strongly favors the "brain-too" approach, based on broader shifts in policy that have indirectly protected the brain across the lifetime. However, because those changes were unintentional, the evidence base for their impact on brain health is only indirect. Indeed, dementia incidence has declined in many HICs without intentional dementia-prevention

policies [46]. Though scientific consensus on underlying biopsychosocial mechanisms is lacking, Bambra identifies three policy mechanisms that constitute "reasonable means" to reduce brain health inequities: expanding the welfare state, improving healthcare access, and increasing political incorporation of working class and marginalised groups [47]. Post-World War II Europe and the United States illustrate this "brain-too" approach's potential. As Brayne argues, populations experiencing the introduction of socialised health and welfare systems saw corresponding reductions in health inequalities and better population-level health outcomes [48]. Expanded education access, improved child health through immunisation and access to health care, and better nutrition, life-long job security, and community ties enabled people to live longer in better health at older ages (Fig. 2), consistent with, and extending, a biopsychosocial model of brain health promotion, by stressing the need to address the socio-political determinants of brain health [48].

Given this evidence that broader social policies can improve brain health outcomes, how can public brain health strategically move forward? The purpose of research in public brain health is to bridge the divide between "brain-first" and "brain-too" approaches by revealing the specific mechanisms responsible for brain health improvements across different policy domains. Indeed, while promising trends towards reduced prevalence of neurological conditions demonstrates that reasonable means exist to reduce brain health inequities, the evidence supporting specific brain health interventions remains obscured within broader policy changes [49]. Unearthing the sources of risk and protective factors within broader health improvements represents a major research priority for public brain health. This work is the focus of several international research initiatives, which include, amongst others, MELODEM (http://www.melodem.org/), PLADRR (https://coghealth.net.au/population-based-approaches-to-dementia-risk-reduction-research-group/), GBHI (https://www.gbhi.org/), and COSMIC (https://www.cheba.unsw.edu.au/consortia/cosmic). Such research is critical given the profound impact of social, structural and commercial determinants of brain health [50] and the increasing recognition of early-life poverty as a risk factor for later-life cognitive decline [51].

Public brain health: a framework for action to promote and safeguard brain health

The three priorities of promotion, prevention, and protection require a coherent framework that articulates the enablers and values necessary for fair and far-reaching public brain health action. Building on the 2024 WFPHA Charter, we now offer a comprehensive framework for delivering public brain health and achieving optimal neurological function and well-being for all, across the life course (Fig. 3). This framework recognises that effective promotion, prevention, and protection depend on four key enablers: (1) generating robust, relevant information; (2) embedding brain health into governance and policy across sectors while protecting health policy from political upheaval; (3) conducting effective advocacy to raise brain health's political and social priority; and (4)

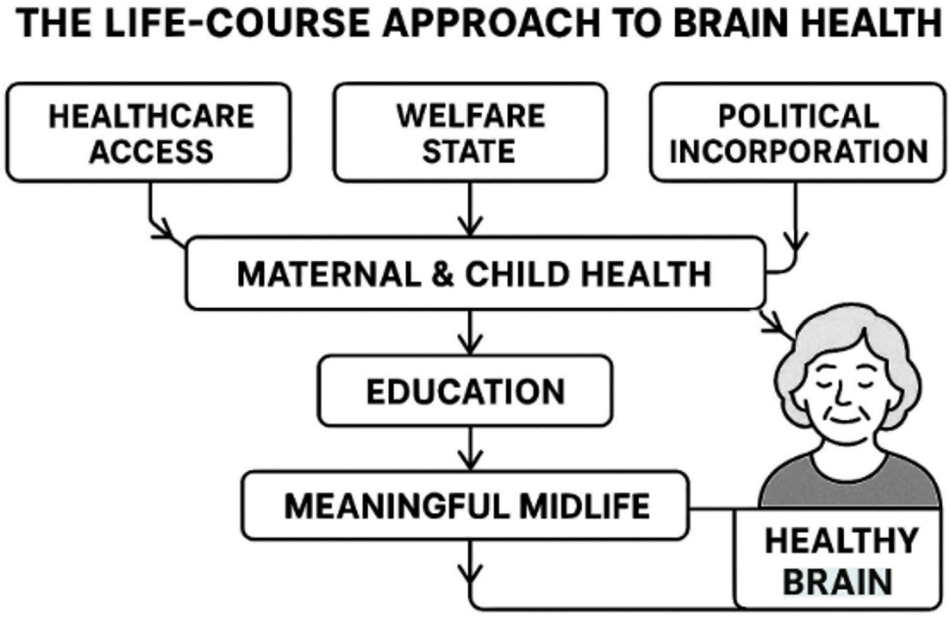


Fig. 2 — The life-course approach to brain health that may explain the improvements in brain health evidenced in age-related incidence of dementia found in post-War cohorts in Europe and the United States. Sources: [46–48]

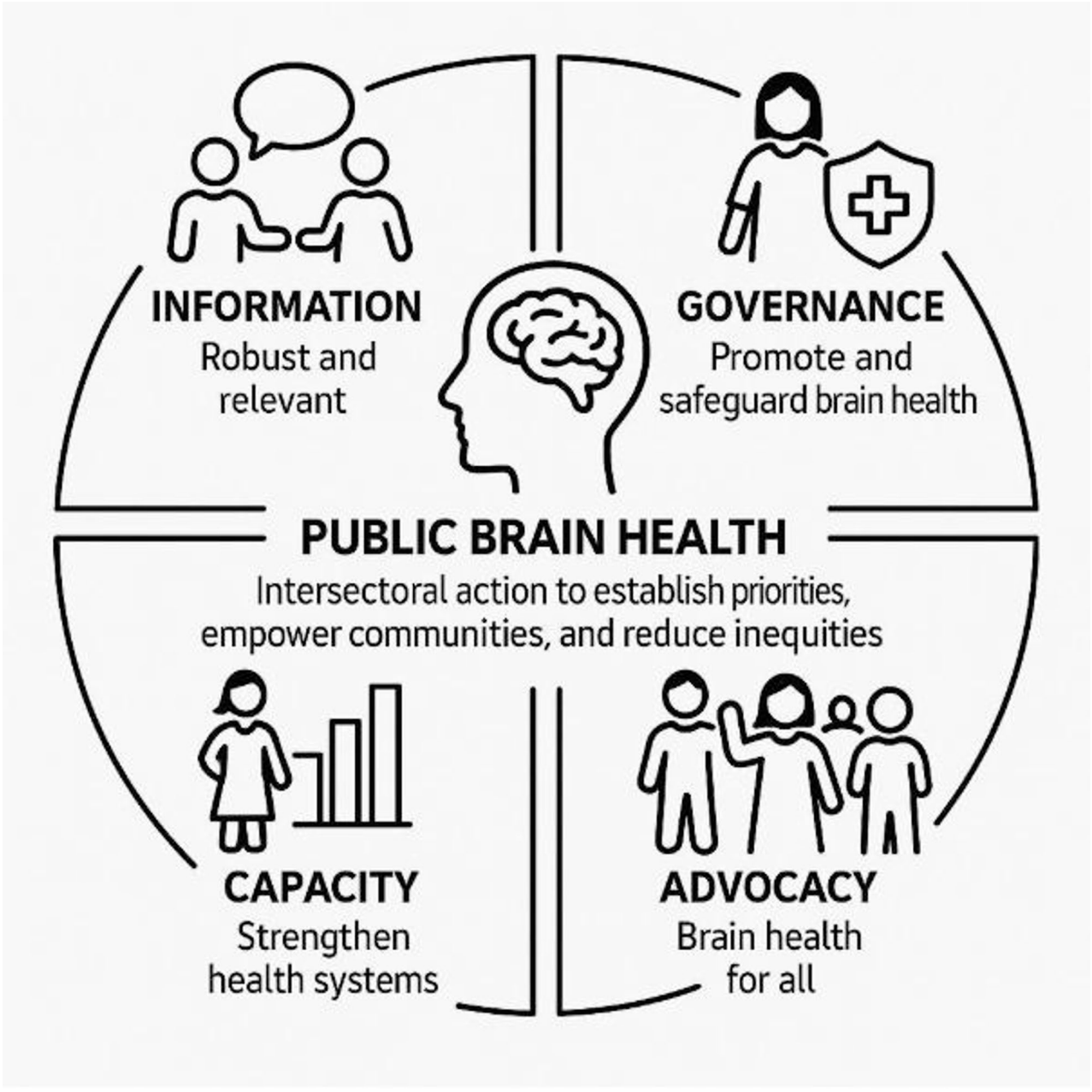


Fig. 3 - A bird's-eye view of public brain health, based on the World Federation of Public Health Association/World Health Organization 2024 revision of "The Global Charter for the Public's Health" [13]

building capacity through a skilled, diverse workforce and sustainable use of resources (Table 2).

Good brain health shares features of a valuable societal resource, like infrastructure, because it subserves all our other human endeavors, both individual and collective. Promoting and protecting brain health and preventing brain diseases is therefore not just about reducing health care costs or increasing productivity. That said, the economic argument for investing in collective brain health is increasingly made and discussed both within research and beyond it at diverse global fora [18]. Given that stakeholder engagement and effective advocacy across all of global society are central to the implementation of public brain health, economic considerations should be taken into account, particularly to maximise the long-term feasibility of brain health promotion within robust and resilient health systems, particularly where resources are more limited.

Underpinning the approach to public brain health are the Charter's core values of equity, inclusivity, justice, and solidarity. These values aim to ensure that brain health benefits reach everyone, incorporate diverse

Table 2 — Public Brain Health Actions as operationalised within the World Federation of Public Health Associations's 2024 "Charter" [13]

Core services: the promotion and safeguarding of brain health	
1. Promotion - Establish priorities	• Conceptualise brain health priorities with different interest holders [17]. • Five WHO priority areas: physical health, healthy environments, safety and security, learning and social connection, access to quality services [14]. • Co-create healthy, inclusive environments (e.g., workplaces, schools) [52].
2. Balanced Prevention — Empower communities	• Support changes to built environments [53]and housing [54]. • Maximise prevention strategies with high population reach that do not require high individual agency [55]. • Adopt a life-course approach [6]. • Sleep diplomacy initiatives for shift workers [56]. • Use innovative behavioral and communication approaches for people with neurological disorders and their families [57]. • Warn against unvalidated screening [58] and treatments [33].
3. Protection — Reduce inequities worldwide	• Unearth sources of risk and protective factors in broader policy changes (e.g. extensive political reforms; the non-communicable diseases agenda) [49]. • Increase access to early-life safety nets (e.g. safe obstetric care to prevent neonatal encephalopathy in LMICs) [43], increased food security via anti-poverty measures [51]. • Implement regulations to protect the human brain from sources of ill health (e.g. pollution [23], traumatic brain injury [59]).
Four Enablers of intersectoral action in public brain health	
1. Good Governance — Protect health policy from mistrust and political changes	• Safeguard and support trust in public health [60]. • Ensure health service delivery throughout political changes [61]. • Develop national, intersectoral plans for brain health that align with global action plans [62] (e.g. UN SDGs, WHO IGAP). • Strengthen ethical frameworks for brain health interventions, including those supported by AI, to promote agency, cognitive health and privacy [63]. • Dissuade against misleading social narratives that worsen people's health [64].
2. Effective Advocacy — Improve agency and activism[65]	• Promote national awareness campaigns as part of IGAP [62]. • Advocate for the right to care for approved treatments [31]. • Develop charters for aspirational rights by patients [66] and neurodivergent people [67]. • Emphasise brain health as an intrinsic component of well-being and flourishing, with positive downstream impacts on the economy [18, 68].
3. Capacity Building — Strengthening healthcare systems	• Train diverse workforces, equipped with adequate resources and tools [69]. • Consider task-sharing to train workforces in low-resources settings [70]. • Use cost-effective diagnostic methods [71] and insist on relevant, sustainable and accessible uses of technology [72]. • Strengthen global research collaborations (e.g., Worldwide FINGERS, GBHI).
4. Accurate Information — Robust and relevant[73]	• Use several research methods to answer the same question to increase robustness of conclusions about factors relevant to brain health [74]. • Provide accessible syntheses of complex evidence to policy makers [75]. • Expand knowledge of risk factors for neurological conditions beyond dementia, stroke, Parkinson's disease, multiple sclerosis, and epilepsy [49]. • Understand the needs of policy makers through qualitative research [76]. • Counter misinformation about brain health [33]. • Ensure measured language about approved treatments without hype or spin [77].
Four values: - **Equity: close the global brain health gap** - **Inclusivity: respect community needs and neurodiversity** - **Solidarity: collective responsibility for brain health** - **Justice: address rather than deepen historical injustices**	

perspectives, provide fair access to enabling environments, and promote collective responsibility for brain health across societies and generations. Narrower and more specific objectives can and should be articulated within this ambitious values-based framework, and where resources are limited, may require starting small at a local level and building up by coordinating and integrating existing programs or initiatives. We contend that the conceptual overlap of brain health with other aspects of health (such as heart health and mental health) is fruitful. For example, it is not only that initiatives aimed at improving mental health by intervening in people's social environments also have an impact on brain health, but also that insights from research into brain health could help inform the design of initiatives aiming to promote heart and mental health by expanding the range of variables they are expected to affect, thus identifying new, shared health goals.

Conclusions

The framework we have outlined represents a fundamental shift in how we approach brain health–from individual, biomedical interventions towards comprehensive, equity-focused public health action that promotes the

building of trust by working with the community on priority setting. Far from being merely idealistic, the core components of public brain health (working with communities to empower them and reduce health inequalities) can be implemented even on a small scale. That said, intersectoral traction would be needed to achieve improvements in population-level brain health.

Various intersectoral initiatives indicate clear momentum in this direction. Policymakers increasingly recognise brain health as central to societal wellbeing, as evidenced by growing attention at forums like the World Economic Forum in July 2025 and the Brain Health at the Science Summit of the 80th United Nations (UN) General Assembly in September 2025. Just as "what's good for your heart is good for your brain" has moved from a fringe concept to mainstream wisdom [78], we now see an emerging consensus that "what is good for the brain is good for society." All intersectoral action should be thoughtfully articulated alongside existing initiatives.

Brain health is a necessary condition of sustainable development [18], requiring advocacy efforts beyond disease-focused campaigns towards comprehensive narratives encompassing homes, schools, and workplaces. Effective advocacy must mobilise cross-sector action, ensuring that investments in prevention, care, and research generate measurable improvements in health equity and long-term social and economic stability. This approach demands moving beyond traditional health sector boundaries to engage education, planning, law and administration, social services, and economic policy.

Public brain health aligns with a "One Health" ethos, which emphasises the interdependence between the health of people, animals, and ecosystems [79]. Public brain health has great potential for integration into broader policy agendas, including UN Sustainable Development Goals, e.g. via action against non-communicable diseases, whose goals cannot be achieved without brain health, and vice versa. The vision of public brain health considers that people with thriving brains working together are the foundation of thriving, sustainable societies [68]. This vision requires the collective commitment to equity, inclusivity, justice, and solidarity that we have outlined, thus transforming brain health from an individual concern into a shared society priority for the benefit of all people and the planet.

There is still much work to be done. Our review of different definitions of brain health from sources including existing literature reviews and definitions used by leading public health initiatives and professional and patient associations (Table 3) revealed two major findings. First, the definition of brain health has not reached full consensus and still requires further refinement, particularly regarding the concept of mental health. Indeed, brain health transcends disciplines and requires their integration. Second, no definition that we found explicitly involved interest holders from broader society. Public brain health argues in favour of working alongside communities to establish priorities and take action.

Finally, the complexity of translating research into effective policy is exemplified by Latin America's experience in addressing brain health gaps, which illustrates the research-policy partnerships required to close global brain health disparities. Latin America is a region known for its rich cultural diversity, but also its persistent inequalities stemming from its colonial past. These inequalities translate into major disparities in life expectancy, for example, across cities in the region [91], and have important repercussions for brain health [92]. Researchers from across the region are developing new methodologies to build the evidence base for the impact of the 'exposome,' the sum of lifetime exposures to environmental sources of risk and protective factors, on brain health. In particular, recent landmark studies have used deep learning techniques to develop algorithmic biomarkers of brain health gaps in populations exposed to poverty, pollution, reduced access to healthcare, and where indices of political instability are high [93, 94]. Moreover, certain countries like Colombia have been exposed to significant trauma caused by decades of civil war and tensions, leading to crises of despair [95]. Despite the growing evidence base for brain health inequalities that could be reduced by reasonable means, it is notoriously difficult to change health policy. For example, in Chile, public policy is fragmented, and while national dementia policy has allowed for significant advances in diagnostics and treatment for dementia, prevention and continuity of care, research, and capacity building have not progressed sufficiently, leading to limited support for those living with dementia now and in the future [96]. Nevertheless, there are examples of successful initiatives to guide future efforts. These include research across the region on multi-domain interventions for primary prevention of dementia, the "LatAm FINGERS initiative" [97], and the example of 'neurorights' [63] to protect against the harmful uses of neurotechnology, which have been written into the Chilean constitution and could be expanded to include protections relevant to brain health [98, 99]. Finally, researchers from the region have been building on the growing evidence base on brain health inequalities to argue in favour of new priorities for brain health promotion, such as dementia prevention [100]. Thus, it is not only that action to protect the brains of Latin Americans is urgent, but that innovative insights from Latin America and other global regions [101] can inform approaches to brain health promotion worldwide.

Table 3 Conceptual refinement of 'brain health' since 2006, showing the absence of consensus that requires a holistic definition across disciplines. Based on previous reviews [80, 81], public health initiatives, and patient associations

Reviewed source	Definition of brain health
The NIH Cognitive and Emotional Health Project (2006) [82]	Cognitive health is "the multidimensional cognitive structure that allows the older adult to maintain social connectedness, an ongoing sense of purpose, and the abilities to function independently, to permit functional recovery from illness or injury, and to cope with residual functional deficits"
Healthy Brain Initiative/ US CDC (2007) [83]	A healthy brain "can perform all the mental processes that are collectively known as cognition, including the ability to learn new things, intuition, judgment, language, and remembering"
American Heart Association (AHA; 2017) [84]	Optimal brain health is "an optimal capacity to function adaptively in the environment. This could be assessed in terms of competencies across the domains of thinking, moving, and feeling, encompassing, for example, the abilities [to] pay attention, perceive, and recognize sensory input; to learn and remember; to communicate; to problem solve and make decisions; to have mobility; and to regulate emotional status."
Global Council on Brain Health (2017) [85]	"peoples' ability to think and reason as they age, including aspects of memory, perception and judgment"
Wang et al. (2020) [86]	"The preservation of optimal brain integrity and mental and cognitive function and the absence of overt neurological disorders that affect normal brain function."
Chen et al. (2021) [80]	"A lifelong dynamic state of cognitive, emotional, and motor domains underpinned by physiological processes; it is multi-dimensional and can be objectively measured and subjectively experienced. Brain health is influenced by eco-biopsychosocial determinants, resulting in a continuum of quality of life and wellness"
Hachinski et al. (2021) [87]	"A state of complete physical, mental, and social wellbeing through the continuous development and exercise of the brain"
WHO (2022) [14]	"The state of brain functioning across cognitive, sensory, social–emotional, behavioural and motor domains, allowing a person to realize their full potential over the life course, irrespective of the presence or absence of disorders."
World Federation of Neurology (2023) [88]	"Brain health … underlies your ability to communicate, make decisions, problem-solve and live a productive and useful life."
Owolabi et al. (2023) [81]	"the complete functioning of the brain across the life course to support the full physical, mental, social and spiritual wellbeing and quality of life of an individual towards attaining and maintaining the epitome of a meaningful, impactful, purposeful and productive life."
Alzheimer's Association [89] (2025)	"Protecting your brain health — how well you think, learn and remember — is important at every age."
World Dementia Council (2025) [90]	"the optimal functioning of the brain across cognitive, emotional, and physical domains"

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No datasets were generated or analysed during the current study.

Declarations

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Not applicable.

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Competing interests
TD declares honoraria as Associate Editor from the BMJ Group. MI has received honoraria from the Council of Europe, serves on the ethics advisory board of IDUN Technologies (a company producing in-ear EEG earbuds), and receives royalties from books published with Oxford University Press, Cambridge University Press, and Routledge. CES reports that she is the Vice Chair of the ISTAART Diversity and Disparities Professional Interest Area and Co-Chair of the ISTAART Sex and Gender Interest Group, Diversity and Disparities Professional Interest Area. The remaining authors declare no competing interests.

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