INTEGRATING THE PREVENTION AGENDA FOR BRAIN AND BODY HEALTH

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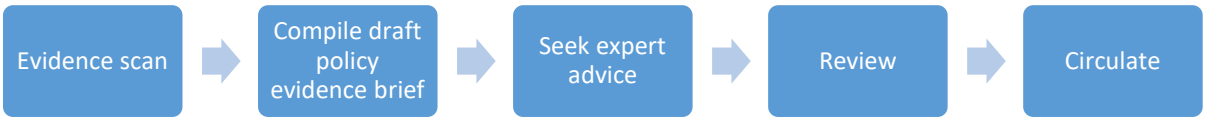
The Mitchell Institute for Education and Health Policy at Victoria University is one of the country's leading education and health policy think tanks and trusted thought leaders. Our focus is on improving our education and health systems so more Australians can engage with and benefit from these services, supporting a healthier, fairer and more productive society.

The Australian Health Policy Collaboration is led by the Mitchell Institute at Victoria University and brings together leading health organisations and chronic disease experts to translate rigorous research into good policy. The national collaboration has developed health targets and indicators for preventable chronic diseases designed to contribute to reducing the health impacts of chronic conditions on the Australian population.

Process

The Mitchell Institute's policy evidence briefs are short monographs highlighting the key evidence for emerging policy issues. We work with our partners in the Australian Health Policy Collaboration to seek expert advice on topics, content and context.



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Purpose

This briefing has been prepared by the Mitchell Institute at Victoria University for the Australian Government.

The briefing summarises the main findings of the mounting scientific evidence regarding the shared risk factors for brain and body health and for prevention.

The briefing addresses some of the policy implications of these findings for consideration by policymakers, by administrators and professional and education and training organisations. It should be noted that these policy proposals are made as interim measures only. An extensive process of consulting on the implications of this evidence for health policy is currently underway with a broad range of expert individuals and bodies. This will inform the development of a more extensive policy framework for the prevention of cognitive decline and dementia, supported by a broad consensus of expert opinion.

The information set out here is extracted from a longer summary of the evidence, published as a technical paper by the Mitchell Institute in 2019.

Research and development strategy

The evidence summarised in this briefing was identified through a wide-ranging, though non-systematic, scholarly review of the published literature. A range of search terms were used to build a comprehensive evidence base. Wherever possible, efforts were made to identify high-impact factor research publications.

The policy implications emerged through a series of formal and informal conversations with both Australian and global experts in the fields of public health, chronic disease prevention and dementia and one well-attended round table discussion held in 2018.

The policy problem

Societal ageing is a challenge for Australia and most countries in the world. Most health systems are poorly prepared to respond to the needs presented, including increasing dementia prevalence. However, fatalism in the face of these circumstances is not an appropriate response. Dementia is not an inevitable consequence of ageing. There is good - and growing - evidence that it is possible to delay or prevent a significant proportion of this burden of disease and disability by tackling a number of known risk factors at individual and population levels. Several of these risk factors are common to chronic conditions of both the body and brain, especially cardiovascular disease. Yet there is poor public understanding of these risks and their impacts on both brain and body health.

Finland has taken a unique national strategic approach to the prevention of dementia and the promotion of brain health, which could provide an evidence-based model for similar initiatives in Australia. In 2013, the Finnish Ministry of Social Affairs and Health published its national plan, *Creating a Memory-Friendly Finland*, which addresses both dementia and brain health.[1] However, apart from this notable example, dementia policies worldwide tend to emphasise social care and other service provision, clinical and management practices for people with dementia, support for carers and 'information', broadly defined.[2] These are all essential to address the needs of individuals with dementia, carers and communities. However, complementary policies and further investment in prevention are required urgently to avoid the costs, both human and economic, which will accrue by 2050.

Similar barriers may apply to dementia research.[3] Most research is directed towards understanding biomedical causes and developing treatments and cures. Even within this narrow focus, dementia research has gaps in several critical areas, including the role of and interactions with other conditions such as diabetes and the effects of interventions to control vascular risk factors for declining cognition.[4] Like biomedical research, chronic disease prevention programs often operate in silos, addressing risk factors for single chronic physical diseases such as diabetes or CVD without attending to the risks these pose for other disorders, particularly those affecting the brain.[5]

The Australian Government's 2014 Budget allocated an additional $200 million over five years to boost dementia research capacity.[6] The National Health and Medical Research Council's Dementia Research Initiative maintains a focus on "*strengthening coordination of Australia's dementia research effort, implementing research findings into policy and practice and evaluating impacts*." This focus includes dementia prevention. The evidence suggests that the impact of this investment would be strengthened if the research priorities were clearly and demonstrably aligned with a national strategic approach to dementia prevention.

The evidence summarised below makes a strong case for a new, integrated approach to risk reduction. Science is increasingly clarifying the pathways through which brain and body interactions take place and shedding light on the impacts of disease on the brain and other organs. Australia urgently needs a coordinated, integrated prevention strategy for brain and body health.

The evidence

Dementia is a public health crisis

Dementia is a group of disorders characterised by a decline from a previously attained cognitive level. Dementia may be diagnosed at any time of life and in any population, but it is more common after the age of 65. Dementia is one of the main causes of disability in later life in Australia, affecting the ability to undertake the activities of daily living with symptoms including memory loss, confusion, and problems with speech, understanding, and controlling emotions.[7] Comorbid vascular disease is commonly observed in both older and younger people with dementia, including 80% of cases of people with Alzheimer's disease.[8 9 10]

The growing incidence of dementia is a global public health crisis, posing significant challenges to health and social care systems worldwide. The World Health Organization (WHO) estimates that 50 million people (5% of the world's population of people over 60 years of age) are living with dementia; with this number expected to more than triple by 2050.[11]

Dementia is feared

Research by Dementia Australia has revealed that dementia is the most feared condition after cancer.[12] A survey of over 1000 adult Australians in 2014 suggests that whilst people think that dementia is very important, many people consider it an inevitable part of ageing and do not understand the role of vascular health in dementia risk-reduction.[13] There is an urgent need to engage with and inform the community of the association between dementia and cardiovascular risk factors, as well as the possibilities and options for prevention.[14 15] There is increasing evidence that risks in the population can be reduced so that fewer people, at all ages, develop dementia.

Dementia in Australia: current trends

- An estimated **447,115 people have dementia**. Based on trends in population growth and ageing and the current lack of any curative interventions, the number of people with dementia will reach almost 1.1 million by 2056 [16]
- The Australian Bureau of Statistics (ABS) projects that dementia **will soon supplant heart disease as the leading cause of death in Australia.** Dementia is, currently**, the second leading cause of death,** contributing to 5.4% of all deaths in men and 10.6% of all deaths in women each year**.**[17]
- **Around 244 people per day are newly diagnosed with dementia**.[18]
- The number of **new cases of dementia** is estimated to increase to 318 per day by 2025 and over 650 per day
- An estimated **27,247 people have younger onset dementia**, expected to rise to 41,249 by 2058. [19] This term is used to describe any form of dementia diagnosed in people under the aged of 65.[20]
- The risk of dementia in **Indigenous Australians** is 3–5 times that of non-Indigenous persons.[21]
- People with dementia aged 65 and over have **a substantially higher average number of health conditions** than all people in this age group (5.4 and 2.9 respectively).[22]

Costs of dementia

The direct and indirect costs of dementia in Australia are estimated by the National Centre or Social and Economic Modelling (NATSEM) to increase to **$18.7 billion in today's dollars by 2025** and to **$36.8 billion by 2056**.[23] This will place health care systems under significant additional strain. NATSEM suggests that a 5% reduction on the numbers of people over 65 with dementia could achieve immediate savings of nearly $6 billion to 2025 and a 'staggering' $120.4 billion by 2056.

Contributing risk factors for dementia

Biomedical and behavioural risk factors

Risk factors for dementia, as for heart disease and other chronic diseases, are classified as modifiable and non-modifiable. The scientific and policy literature documents significant associations between the modifiable risk factors for some dementias and those for other major chronic diseases, including heart disease, stroke, chronic obstructive pulmonary disease, diabetes and some cancers.[24] The WHO has recently reviewed the evidence on risk factors and provided guidelines for preventive interventions where the evidence is considered to be strong enough.

Physical inactivity

Physical activity has many health benefits and is a key modifiable factor involved in the development of many chronic diseases including dementia.[25] [26] [27] There is evidence that the highest levels of physical activity are the most protective and may have direct beneficial effects on brain structures. [28] [29] [30] Indirectly, it is suggested that the impacts of physical activity on brain health arise from the underlying impacts on cardiovascular risk factors including hypertension, insulin resistance, high cholesterol and other biological mechanisms.[31]

Smoking

Smoking is a major risk factor for a number of chronic conditions including heart disease, respiratory diseases, and many cancers. A large body of evidence highlights associations between smoking, including in mid-life, and subsequent disorders in later life including cognitive decline and dementia.[32] [33] There is good evidence for the effectiveness of smoking cessation interventions in reducing all of these health risks.[34] [35]

Nutrition

Healthy eating is an important contributor to optimal health across the life course as well as in the prevention of chronic diseases, including those that increase the risk of dementia.[36] Evidence suggests that diet may be involved both directly and indirectly in the development of dementia through its effect on other risk factors.[37] A range of high-quality studies have concluded that high levels of adherence to a Mediterranean diet, including consumption of fruit, vegetables, fish, nuts, olive oil and other unsaturated fats, whole grains and coffee may be associated with better cognitive performance and reduced incidence of dementia.[38] [39]

Alcohol

Evidence is increasing about the complex relationship between alcohol use and cognitive health and dementia. Previous reviews point to a possible beneficial effect of light to moderate alcohol use on cognitive health.40 However, even moderate drinking has been associated with detrimental effects on brain structure, and heavy drinking is detrimentally related to dementia risk, whatever the dementia type.41 42 43 44 45 There is increasing evidence in support of the contention that heavy alcohol use (>12g per day) is associated with increased dementia risk.46 Alcohol use disorders are characterised by the harmful and chronic consumption of alcohol. People who consume harmful amounts of alcohol are three times more likely to develop younger onset dementia.47 48 49 50 Alcohol use disorders are also associated with a range of associated risk factors for dementia, including smoking and poor nutrition and physical inactivity. [51]

Weight
Overweight and obesity are direct risks for a wide range of chronic diseases including Type 2 diabetes and cancer.[52] [53] They are also indirect risks for other cardiovascular risk factors including high cholesterol and hypertension.[54] There is evidence that obesity at mid-life increases the subsequent risk of dementia.[55]

Diabetes
Late life diabetes has been linked to an increased risk of cognitive decline and dementia.[56] [57] In addition, secondary health problems arising from diabetes including kidney disease, eye disease, hearing impairments and CVD have all been associated with increased risk of dementia.[58] [59] There is only inconsistent evidence yet for a direct impact on cognitive outcomes from glucose-control interventions.[60] There is evidence that treating the cardiovascular comorbidities associated with diabetes may mediate risks for dementia.[61]

Hypertension
Hypertension in mid-life has been associated with an increased risk of dementia later.[62] The evidence for a direct impact on blood pressure reduction in mid or later life on subsequent cognitive decline or dementia is not yet established. However, it is clear that reducing hypertension is highly beneficial in reducing cardiovascular disease and premature mortality and therefore on improving the overall health of the older population. [63]

High cholesterol
Dyslipidaemia (high cholesterol) is an important modifiable risk factor, linked to a third of the burden of heart disease globally as well as premature mortality and disability. A number of epidemiological studies have found a link between high cholesterol and dementia, although this has not yet been demonstrated definitively.[64] [65] Other studies have identified an association been the control of cholesterol in midlife and a reduction of dementia risk.[66] [67]

A summary of these risks is provided at Appendix 2.

Potential risks

The WHO has not provided guidelines for the management of depression and mid-life hearing loss. A number of studies, including the Lancet Commission, have identified additional, modifiable risks for cognitive impairment and dementia.[68] [69]

Social risk factors

The World Health Organization guidelines do not address the influence of broader social determinants on dementia risk. Many other studies have, however, explored and described an inverse association between socioeconomic position and chronic conditions such as cardiovascular disease (CVD) and dementia.[70] The social gradient in CVD persists even after adjustment for health behaviours and clinical indicators, suggesting that other processes are involved.[71] [72]

Immune responses to chronic ‘social stress’ may explain some of the socioeconomic gradient in CVD and other inflammation-associated conditions, including dementia.[73] In support of this argument there is some evidence that social interventions, particularly higher educational attainment, may exert a protective impact. People who leave high school before year 8 have a 2.2 - fold higher risk of dementia in later life and those leaving between years 8 and 11 have 1.5 times the risk of individuals who complete high school.[74] [75] [76] [77] [78]

There is evidence that loneliness and isolation are associated with poorer cognitive function among older adults.[79] [80] Interventions to reduce social isolation, promote social engagement and increase levels of physical activity among older people may reduce dementia risk.[81]

Interventions that foster social connections may be particularly beneficial for individuals with low levels of education.[82] In addition, hearing loss may be associated with both social isolation and the incidence of dementia.[83] [84]

The *Lancet* Commission suggests that the protective effect of education and social engagement is related to variations in levels of 'cognitive reserve' (brain resilience), which is enhanced by early-life experiences, including education and intellectual stimulation.[85] [86] [87] There is evidence that higher socioeconomic status during gestation and early childhood has a protective association with late-life dementia risk. [88] [89]

Cost benefits of a risk reduction approach

Up to half of the total dementia burden in Australia may be due to the effect of vascular and other modifiable risk factors.[90] [91] [92] A reduction in these risk factors would lower the cost of dementia by $24.8 billion over the next 20 years (by avoiding direct costs of $17.6 billion and indirect costs of $7.2 billion) and $120.4 billion by 2056 (by avoiding direct costs of $76.6 billion and indirect costs of $43.8 billion).[93]

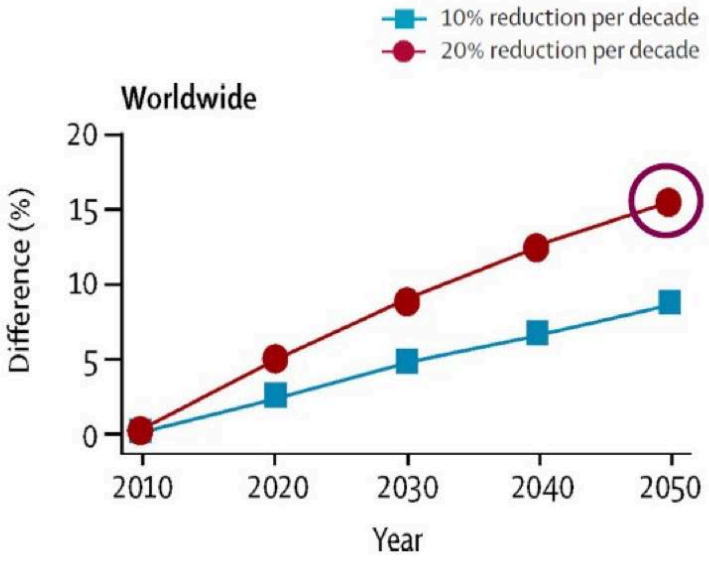
A decline in the physical inactivity rate by 5% every five years would reduce dementia prevalence by 11% in 2051,[94] meaning 100,000 fewer Australians living with dementia by addressing just one risk factor. This effectively provides a recommended "dose" or "prescription" for effective preventive treatment that is feasible and achievable.

A much larger, cumulative reduction would be expected if more than one risk factor were reduced simultaneously, and these benefits would be enhanced by concurrent reductions in the incidence and prevalence of CVD and other chronic diseases affecting the body.[95] [96] Mounting international evidence supports these findings. Norton et al. (2009) suggested that reducing the incidence of seven risk factors (diabetes, hypertension, obesity, physical inactivity, depression, smoking and low education) by 25% would prevent three million cases of Alzheimer's disease per decade worldwide (see Figure 2).[97]

Figure 2. Potential for prevention of Alzheimer's disease. Source: Norton et al. 2015 [98]

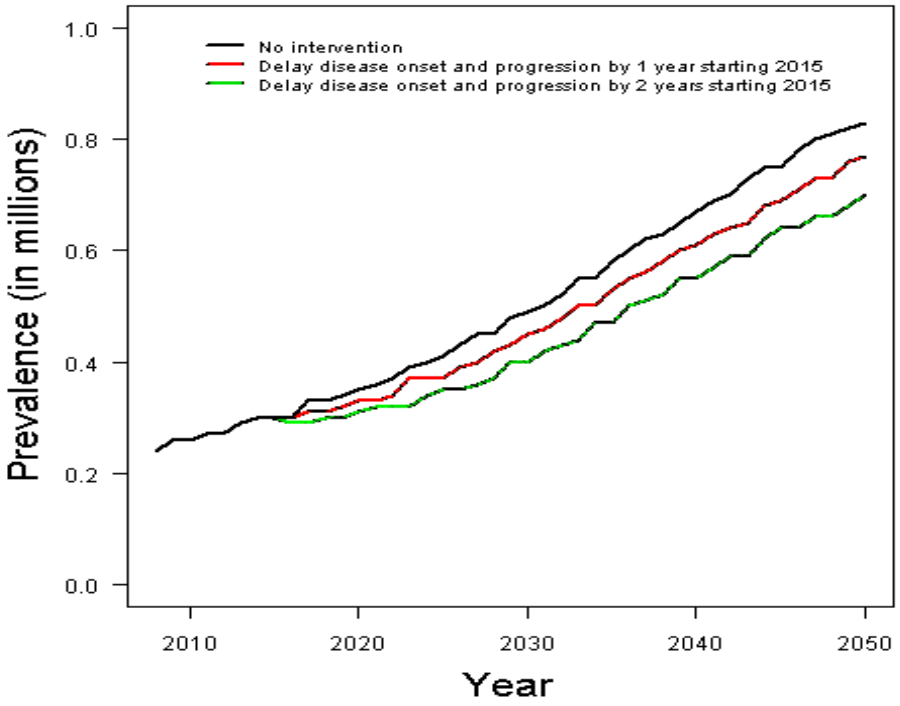
Risk factor	PAR
Diabetes mellitus	2.9%
Midlife hypertension	5.1%
Midlife obesity	2.0%
Physical inactivity	12.7%
Depression	7.9%
Smoking	13.9%
Low education	19.1%
Combined PAR*	28.2%

PAR=population-attributable risk.
*Adjusting for non-independence of the risk factors.



Other studies estimate that a one-year delay in the average age of onset of Alzheimer's disease due to preventive strategies could result in nearly 12 million fewer cases worldwide by 2050.[99] See Figure 3 for modelled comparisons between disease onset and progression with no risk reduction intervention and with a hypothetical risk reduction intervention from 2015.

Figure 3. Modelling data on impacts of postponing the onset and progression of Alzheimer's disease in Australia. Adapted from Access Economics 2009 **[100]**



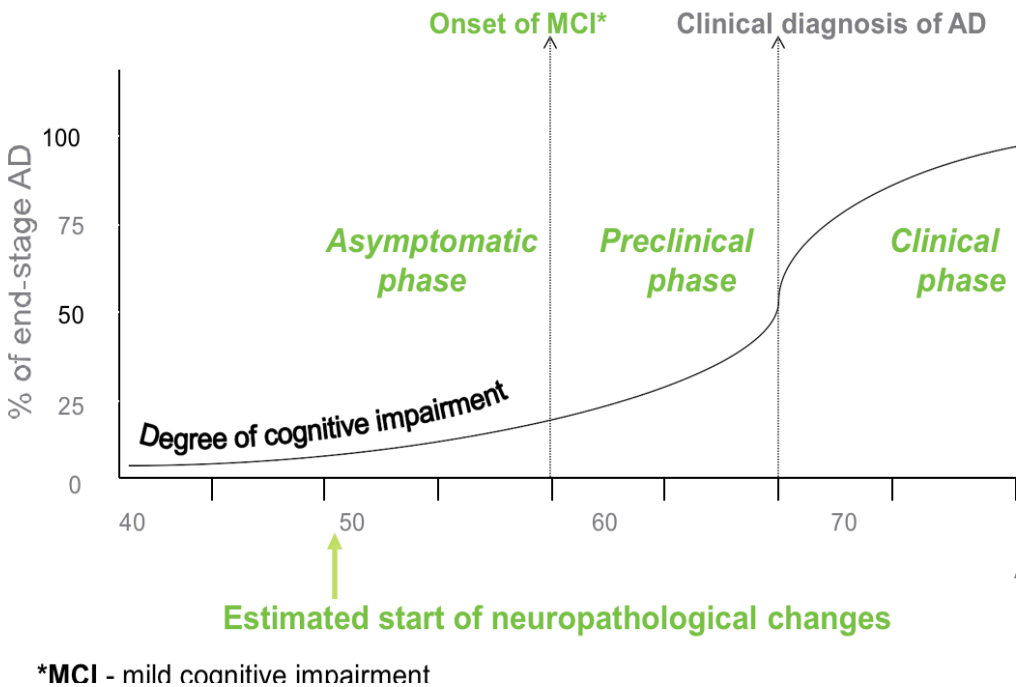
Tackling alcohol abuse

There is some evidence that dementia prevention could produce even greater results if it includes action to reduce levels of heavy drinking in the Australian population.[101] The evidence base for the impact of alcohol on brain health is not yet settled, but it is accumulating.

The need for a life-course approach

There are important life course considerations for both risk and protective factors for dementia. These diseases have a long latency period and pathology may be present for decades before cognitive symptoms are evident. The life course progression of Alzheimer's disease is described in Figure 4.

Figure 4. Life course progression of Alzheimer's disease

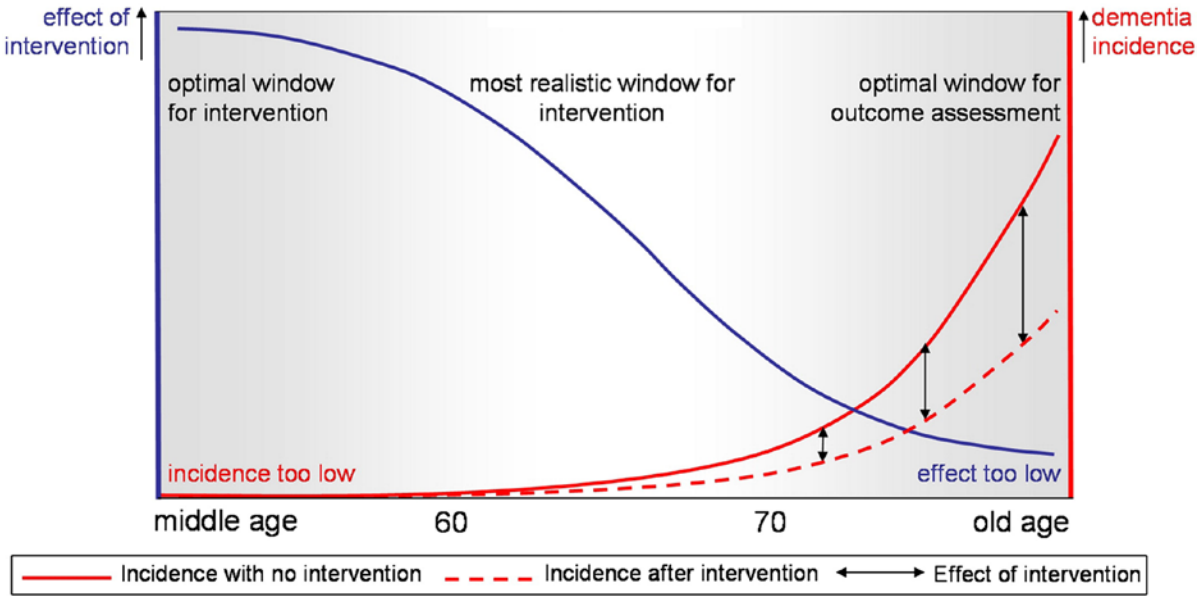


***MCI** - mild cognitive impairment

Source: Ngandu et al. 2015

The life course nature of disease onset and progression means that there may be optimal 'windows' for intervention. Research increasingly indicates that the presence of risk factors in midlife, but not late life, is associated with an increased risk of dementia.[102] There is international evidence that, even at age 50, cognition is affected by risk behaviours. Figure 5 identifies the optimal life course periods for preventive dementia intervention based on current knowledge. Further research, focusing on cognition in younger population cohorts, in addition to current research into diagnosed dementia in older populations, is required to improve understanding of how and when to target preventive interventions.[103]

Figure 5. Optimal time window for preventive interventions. Source: Richard et al. 2012 [104]



Other research indicates that middle-aged people with multiple vascular risk factors such as obesity, hypertension, diabetes, high cholesterol and smoking have elevated levels of brain amyloid (the plaques and tangles in the brain associated with Alzheimer's disease and other dementias) in later life.[105] These researchers recommend aligning policy and clinical practice to target cardiovascular screening and risk reduction strategies at people in middle age.

The need for a life course approach has been acknowledged by the Australian Government. In 2016 the Parliament of the Commonwealth of Australia stated that the absence of longitudinal data (and in particular longitudinal biomedical data) about people's health as they progress from midlife into later life is an impediment to tackling chronic disease in Australia.[106]

The strength of the evidence?

There is good evidence from Australia and internationally that preventive interventions have significant returns on investment at both individual and population levels, particularly when compared with investment in healthcare.[107] [108] [109] [110] There is also convincing evidence of the cost-effectiveness of interventions targeted at people at highest risk of chronic diseases.[111] As the population ages the costs of chronic diseases of the body and brain will continue to rise.[112] [113] The available evidence suggests that it is feasible to attempt to prevent or delay up to a third of the anticipated rise in incidence of dementia through a mix of population and individual-level interventions. Moreover, an integrated focus on better population health will reduce the prevalence of multiple chronic diseases which are, cumulatively, responsible for substantial disability and loss of independence in ageing and which are extremely costly economically, socially and individually.[114] If the potential for prevention can be grasped, there will be significant returns on investment for the Australian taxpayer arising from increased productivity and reduced costs of health and social care.[115] [116]

In 2014, 190 leading international scientists, including several eminent Australians, wrote a letter to the *Journal of Alzheimer's Disease* making a compelling case for the preventability of dementia and calling upon the governments of the G8 countries to adopt an integrated, strategic approach to dementia prevention.[117] These scientists were unequivocal in stating, "*there is already sufficient evidence to justify immediate action.*" The WHO and the Lancet Commission have both reinforced this position.

The evidence about dementia prevention is now sufficiently robust to be made more widely available and acted upon. The public should know what the scientific evidence demonstrates: certain healthy behaviours are known to be effective for preventing diabetes, CVD, cancer and for reducing the risk of dementia and other forms of cognitive decline.

Next steps

The Australian government has an ambitious National Strategic Framework for Chronic Conditions, and has initiated a wide range of supportive programs to address risks to heath in line with the goals of the Framework. These programs, in the areas of physical activity, sedentary behaviour, better ageing, alcohol harm-reduction and importantly, the development of a forthcoming national strategic action plan for reducing heart disease and stroke will all contribute to reducing risks to cognitive health.

It is appropriate to ask whether more could and should be done at policy level to grasp the full potential of these investments for brain and body health. The concern is that in the absence of a proactive effort to raise awareness of the risks to brain health and of the evidence for prevention, the challenges for health policy posed by dementia will continue to be obscured by a focus on other conditions.

The Australian Health Policy Collaboration and collaborating experts are in the process of developing an evidence based policy framework for brain health. In the interim, the evidence suggests that the following components, which are aligned with current policy approaches in Australia and are feasible and would signal serious national commitment to the prevention of dementia and cognitive decline.

1. Embedding the best evidence for dementia prevention interventions in all chronic disease policies and accompanying strategies including the forthcoming National Strategic Action Plan for Heart Disease and Stroke and the Absolute Cardio Vascular Risk Assessment Guidelines.

2. Ensuring that policies and guidelines reflect the evidence that the presence of vascular risk factors double the chances that asymptomatic, neurodegenerative pathology will lead to dementia. This requires identifying opportunities for intervention along the life course and targeting of screening and risk reduction interventions at people in their 40s and 50s who have vascular risk factors and earlier amongst Aboriginal and Torres Strait Islander groups.

3. Promoting and supporting the implementation of the WHO Guidelines on the prevention of Cognitive Decline and Dementia.

4. Integrating dementia prevention goals in the narrative and scope of relevant health improvement initiatives including physical activity and nutritional strategies and programmes, and tobacco and alcohol reduction programmes.

5. Identifying effective, cultural and gender-sensitive methods for raising public understanding of the shared risk factors for brain and body health with appropriate targeting of at-risk groups.

6. Maintaining and extending support for dementia prevention research through the NHMRC's Boosting Dementia Research initiative and enlarging the scope to address the impact of social, economic and environmental risk factors and preventative interventions.

Appendix 1. Australia's international commitments on dementia

Signatory to the G8 Dementia Summit Declaration, 2013 [118]

Signatory to the first WHO Ministerial Conference on Global Action against Dementia 2015. [119]

Signatory to the WHO Global Action Plan for Prevention and Control of NCDs 2013–2020 [120]

Signatory to WHO Global Action Plan on the Public Health Response to Dementia 2017–2025. [121]

In 2018, the OECD reviewed progress on translating these aspirations into meaningful action amongst member nations. The OECD has concluded that '*The priority given to dementia is too low given its impact on society*'. [122]

Appendix 2. Collaborating experts

The authors would like to thank the following people for helpful advice and contributions during the preparation of this report.

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Ms. Kaele Stokes, Dementia Australia

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Appendix 3: WHO Guidelines: Reduction of Risk of Cognitive Decline and Dementia

Summary of key recommendations

1. Physical Inactivity

The WHO recommends that adults aged 65 years and over should do at least 150 minutes (rising to 300 minutes) of moderate intensity aerobic physical activity on at least three days each week; involving muscle strengthening and balance training. Adults of this age group whose health conditions prevent them from doing the recommended levels of activity should be as physically active as their abilities and conditions allow.

2. Smoking

The WHO recommends that interventions for tobacco cessation should be offered to all adults who use tobacco to reduce the risks of cognitive decline and dementia as well as other health benefits

3. Nutrition

The WHO recommends offering a Mediterranean -like diet to adults to with normal cognition or mild cognitive impairment to reduce the risk of cognitive decline and/or dementia

4. Alcohol

The WHO recommends that interventions that interventions aimed at ceasing or reducing harmful drinking should be offered to adults with normal cognition or mild cognitive impairment to reduce the risk of cognitive decline and/or dementia as well as other health benefits

5. Weight Management

The WHO recommends that interventions for mid-life overweight and/or obesity be offered to reduce the risk of cognitive decline and dementia but emphasises that lifestyle interventions that include dietary changes and increased physical activity have the best results

6. Diabetes Management

The WHO recommends that management of diabetes in the form of medications and/or lifestyle interventions should be offered to adults with diabetes to reduce the risk of cognitive decline and/or dementia.

7. Hypertension Management

The WHO recommends that hypertension reduction interventions be offered to adults with hypertension to reduce the risk of cognitive decline and/or dementia.

8. Dyslipidaemia Management

The WHO recommends that management of dyslipidaemia at mid-life should be offered to reduce the risk of cognitive decline and dementia.

Source: World Health Organization 2019, Risk Reduction of Cognitive Decline and Dementia*: WHO Guidelines.*
https://www.who.int/mental_health/neurology/dementia/guidelines_risk_reduction/en/

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