PRIME MINISTER'S SCIENCE, ENGINEERING AND INNOVATION COUNCIL

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AGENDA ITEM 4

PROMOTING HEALTHY AGEING IN AUSTRALIA

An independent working group, supported by the Department of Health and Ageing and the PMSEIC Secretariat, prepared the following paper.

A presentation on the paper will be introduced by Professor Nick Saunders, former Chair of the NHMRC and Dean, Faculty of Medicine, Monash University, and presented by Professor Allan McLean, Director, National Ageing Research Institute.

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Executive Summary

This paper presents a vision for an additional 10 years of healthy and productive life expectancy by 2050. Research evidence indicates that there are effective actions that can be taken to enable people to live longer in good health, staying mentally and physically active and able to participate and enjoy life until they die at an advanced old age. The report also outlines a research agenda that would provide information to assist in achieving this vision.

Achieving this vision of healthy and productive ageing is crucial for Australia's future because of the unprecedented ageing of the population. By 2050, a quarter of the population will be over 65. The large baby boom cohort, now in mid-life, is setting the lifestyle and health trajectories which will carry them into their old age in the next two decades. This report takes age 45 years as the starting point, because decisions about lifestyles taken from that age will have far reaching effects on the health of Australia's future older population. Older people can remain healthy and independent well into their eighties. Those over 80 represent particular challenges and their numbers are increasing.

Healthy ageing will benefit both individuals and Australian society. Individuals can expect an additional two to three decades of life beyond the current retirement age with more years in good health. Healthy ageing should bring the choice of spending longer in paid work, more opportunities for contributing to the community and engaging with their families and more years of independence in their own homes.

For Australian society there will be access to the resources of older people at a time when there will be dramatically fewer younger people entering the labour force. More years at an older age spent in good health will reduce cost and other pressures on the health and aged care systems.

These gains will come from preventing or delaying the onset of the diseases and disabilities of ageing and managing them better; from changes in the social environment to support greater participation by older people; and changes in the built environment to enhance independence. These changes need to be supported by research evidence from a variety of disciplines.

Health, wellbeing and independence of older people can be sustained and enhanced by actions on the part of older people themselves, and by a society that values them, through positive action by whole of government policies, and partnerships including responsive industries and employers.

Science and technology will make a major contribution to healthy ageing, both in new discoveries in the physical, biological, social and behavioural sciences, and in translation of existing knowledge into action.

Format of the report

Healthy ageing is a relatively new and diverse field, which cannot be covered comprehensively in a single report of this kind. This report focuses particularly

on the promotion of health and wellbeing, the prevention of ill-health and the contribution of the social and the built environment to healthy and productive ageing.

Chapters 1 to 3 set the scene by outlining a vision for healthy ageing in Australia, providing a context and background information and considering the research agenda for science and technology in terms of discovery, translation and technology.

Chapters 4 and 5 address the issue of health promotion and disease prevention. There is a well-established body of evidence that physical activity and good nutrition over the whole of the lifecourse have a major influence on health and functional capacity in older people. A major challenge is to discover the best ways to apply this evidence, together with evidence about behaviour change and supportive environments to encourage people to adopt healthy actions.

Chapter 6 examines the work and social environment. Research suggests that many Australians have inaccurate and negative attitudes to ageing that, if modified, can increase opportunities for older people. Given Australia's low rates of mature age labour force participation it is important to understand ways to enable flexible work opportunities as well as continuing high levels of family and voluntary contributions. Education and training, and mobility aids and communication technology are important for increasing the personal capacities and the social participation of older people that have widespread benefits for health and well being.

Chapter 7 addresses ways in which the built environment can be improved to enable vulnerable older people to remain at home with a good quality of life. Research is required to identify and promulgate better housing design, urban and rural planning, and transport systems for older people. Improved use of the built environment infrastructure is significant for the economy and public investment as well as for people growing older, particularly in decentralised, low density suburbs designed for cars. Assistive technology has considerable promise to overcome disabilities and enable continued mobility.

Chapter 8 discusses priorities for advancing research to inform healthy ageing initiatives. A multi-disciplinary approach is recommended given that individual ageing is a complex bio-psycho-social process. Maximum benefits are likely to emerge from a balanced research approach that includes the full spectrum from basic and clinical research through to population surveys and policy analyses. Longitudinal studies are crucial to understanding the multi-dimensional, age-related changes and ways in which health promotion can improve outcomes. Effort is needed to improve funding arrangements for research that crosses the boundaries of disciplines and funding bodies. There is the need to organise better collaboration among researchers and better dissemination of findings to government, industry, and community organisations.

The report stresses the importance of a multi-disciplinary and multi-sectoral approach to both research and action in promoting healthy ageing.

Important messages from the report

1. Ageing is an opportunity

Healthy ageing is not just about health; health is a resource for quality of life and participation in society. The increasing numbers of older people constitute a resource of talents, skills and experience which is of great benefit to society. To realise this benefit, the years of healthy life need to be extended and healthy ageing needs to be supported by the social environment in which people live and by the built environment.

2. There are adverse trends in risk factors for chronic disease

Currently, there are adverse trends in factors causing chronic disease that will undermine the health gains of recent years, particularly in heart disease mortality. Dramatically rising rates of obesity and diabetes, mainly due to poor diet and physical inactivity, will have a serious longterm impact on ill health and health care costs. Urgent action is needed.

3. A whole-of-life approach to healthy ageing: never too early and never too late

People's health and ability to function in older age depend on their exposure to various influences throughout their life, so it is never to early to start with healthy behaviour. It is also never too late. The good news is that adopting a healthy lifestyle in middle age, and later, can dramatically improve one's health and life chances, and the effects can be seen quickly.

4. Small improvements in disease risk across the whole population have major benefits

Identifying and treating those individuals at high risk of disease is important, but actually has less impact on the overall health of the population than a population-based approach which produces small decreases in risk (for example in high blood pressure, cholesterol) across the whole population. That is why national leadership in health promotion is so important; we are trying to achieve major health improvement by relatively small changes across the whole population in physical activity and diet.

5. Making healthy choices easy choices

Public campaigns aimed at healthy behaviour are only part of the picture. To produce changes across the whole population and not just the affluent and well educated, there need to be structural changes and supportive environments so that the healthy choices are easier for people to make. It is easier for people to eat healthily when healthy food is cheaper and more accessible than unhealthy food. It is easier for people to walk for exercise when there are safe and interesting places to walk and public transport is

accessible. Making healthy choices easy choices is not just the responsibility of health departments. It needs multi-sectoral action including agriculture, transport, local government, as well as industry and the non-government sector.

6. A multi-disciplinary collaborative approach is needed

Research in healthy ageing involves many scientific disciplines, and multi-disciplinary collaboration provides great synergy. A large national multi-disciplinary longitudinal study of healthy and productive ageing would act as a catalyst to bring together and focus the best scientists from a range of disciplines. This study could provide a focus for a National Network on Healthy Ageing Research.

7. There is a major research agenda to promote healthy ageing

Much still needs to be discovered about the basic biology of ageing and the causes and progression of chronic diseases associated with older age. Much still needs to be understood about the best ways to intervene to improve the health status of older people, to promote healthy behaviour across the population and to enhance the social, work and built environments of older people.

Summary of Recommendations

In presenting these recommendations, the Working Group acknowledges the considerable work already being done in relation to healthy ageing through the National Strategy for an Ageing Australia, the Commonwealth, State and Territory Strategy, and healthy ageing initiatives in the States and Territories. It acknowledges the comprehensive reviews of research already undertaken for the Community Services Ministers Advisory Council and the NHMRC.

This report is not intended to duplicate any of these initiatives, but to draw attention to some particular issues in healthy ageing and to suggest a way forward for advancing the research agenda. The establishment of the National Research Priorities is a welcome development, and a number of the recommendations of this report align closely with the proposals for development of these priorities, particularly in relation to co-ordinated multi-disciplinary approaches.

The recommendations are presented in the order in which they appear in the report.

Physical activity

Recognising the importance of physical activity throughout life in maintaining physical capacity, in modifying the physiological changes associated with ageing, in enhancing psychological health and well being and reducing the risk of many of the chronic diseases associated with ageing and assisting in their management, the Working Group recommends:

1a) That a national strategy be developed aimed at increasing levels of physical activity among older Australians, so that the health, social and economic benefits of physical activity are made available to all older Australians. This strategy should include the following elements:

- *a focus on people aged 45 years and older;*
- *consideration of the impediments in the social and built environment to increasing physical activity and ways in which they may be overcome;*
- *a multi-sectoral approach, involving all levels of government, various government portfolios, non-government organisations and community groups; and*
- *in view of the considerable advances already made by some States and Territories in creating strategies for increasing physical activity, development of the strategy with oversight of the Australian Health Ministers' Advisory Council, Community Services Ministers' Advisory Council, National Public Health Partnership Group and the Positive Ageing Task Force.*

1b) That the national strategy be informed by well-designed intervention studies to examine the effectiveness of strategies to increase physical activity among people over 45 years, with a view to wider implementation of effective strategies.

Nutrition

Recognising that with its expertise in food production, food sciences, biotechnology and biomedical and behavioural research, Australia can move to a globally competitive position in the understanding of the health potential of foods and nutrients and its application to the reduction in the burden of chronic diseases, the Working Group recommends:

2) That a major multi-disciplinary and multi-agency initiative be established to harness Australia's strengths in biotechnology, biomedical research, food sciences and behavioural sciences by:

- *using emerging biotechnologies to help identify, at production, candidate foods for testing for health potential*
- *identifying foods, nutrients and dietary practices and patterns with protective health potential and substantiating their effects*
- *integrating genomics and proteomics with a program to identify early markers of disease onset (biomarkers) and use these markers in developing new strategies for intervention*
- *expanding our knowledge of the roles of nutrition, physical activity and gene and phenotypic expression in facilitating healthy ageing;*

- *examining personal, social and structural influences on dietary patterns, including more informative labelling of healthy foods;*
- *undertaking well-designed intervention studies to examine the efficacy and effectiveness of strategies to produce dietary change; and*
- *fostering multi-disciplinary training of scientists and health professionals in the fields of health, ageing and nutrition.*

Work and the social environment

Given the importance to the economy of labour force participation and the contributions to the community and family made by older people, and the importance to healthy ageing of continued participation in society, whether in paid work, volunteer work or family contributions, the Working Group recommends:

3) *That a multi-disciplinary collaborative research program (involving economics, social and behavioural sciences, and health sciences) be established to explore the determinants of labour force participation and community and family contributions by older people, to build an evidence base to inform policy and practices that seek to increase participation and productivity.*

   That this research program take into account factors such as:

   - *the state of the economy;*
   - *government welfare policies and superannuation arrangements;*
   - *the nature of work, the workplace, employer attitudes and practices towards older workers;*
   - *opportunities for community contributions and factors that facilitate or impede them;*
   - *the preferences, expectations, resources and health of diverse groups of older people; and*
   - *opportunities for older workers in education and training and in assistance with transitions to retirement*

   The aim would be to help develop policies and practices that would:

   - *reduce barriers to the continued workforce participation and community contributions of older Australians raised by negative attitudes;*
   - *support a graduated and flexible transition between paid and unpaid work in later years;*
   - *provide for more adaptable and flexible workplace and management practices, taking into account older people's health and their caring responsibilities; and*

- *maximise the use of the workplace as a setting for health promotion*

The built environment

In view of the impact of the built environment on mobility, independence and autonomy in old age, and in facilitating or impeding healthy choices in relation to physical activity, the Working Group recommends:

4) *That a multi-disciplinary strategy be developed, to build a more age friendly built environment, supporting innovation in planning, design and technology to assist older Australians to maintain their independence at home with good quality of life.*

   That the strategy include:

   - *examination of the impacts and options for improvements in land use planning, transport investment, building regulations (in-fill, building of granny flats), design of public spaces (to allow safe walking), and community crime prevention;*
   - *developing ergonomic information and standards for design and technology that help overcome the limitations presented by the ageing process including sensory loss; and*
   - *development, evaluation, and promotion of innovative products and materials, assistive technology and building and transport design that will assist older people to maintain their independence. Incentive grants to industry and design awards could be used to promote innovation.*

A National Network for Healthy Ageing Research

Given the importance of a mulltidisciplinary approach for research into healthy ageing and in recognition of the diverse range of disciplines involved, the Working Group recommends:

5) *That a National Network for Healthy Ageing Research be established, in order to:*

   - *recommend priorities for the research agenda in healthy ageing, taking into account the discovery, translational and technology agendas identified in this report;*
   - *facilitate collaboration between researchers from various disciplines; and*
   - *develop strategies to consult with and disseminate findings to the policy, services, advocacy, industry, and education sectors.*

   That the Network be established and funded with the joint involvement of the NHMRC, the ARC, CSIRO, and the Department of Health and Ageing.

That membership of the Network Board comprise researchers from a diverse range of disciplines and fields, as well as nominees of auspicing bodies and key consumer and industry groups.

Longitudinal studies of healthy and productive ageing

Given the importance of longitudinal research studies in understanding the process of healthy ageing in individuals and communities, and in providing valuable information for decision making to enhance healthy and productive ageing, the Working Group recommends:

6a) *That an Australian Longitudinal Study of Older People (ALSOP) be established*

That the study be the base platform for research by many disciplines into all aspects of ageing including that conducted by genomic and basic biological sciences, social sciences, public health and clinical and services research

That it take into account and build on the experience of existing Australian longitudinal studies, and the substantial expertise of the researchers, exploring opportunities to connect the work of ALSOP with existing studies;

That the ALSOP research agenda be developed through a multi-disciplinary approach, by consultation with the National Network for Healthy Ageing Research and a wide range of policy makers, practitioners and consumer groups

That the study give priority to areas that are potentially improvable and important for the health, functioning and wellbeing of older people. It should take into account, but not be limited to, the areas of research identified in this report, including the behavioural determinants of health in older age (particularly mental activity, physical activity and good nutrition); work environments, retirement, social involvement and family and community contributions; and housing, land use and assistive technology

Recognising the value of the unique information provided by longitudinal studies and the fact that longitudinal studies do not fit well into the usual shorter range research funding schedules, the Working Group recommends:

6b) *That the NHMRC, ARC and relevant Government Departments develop a process for on-going funding of longitudinal studies of ageing, so that maximum value is obtained from the effort in establishing and maintaining new and existing cohorts.*

Such funding would include sufficient funding for analysis of the wealth of data generated by these studies and for dissemination of findings, linking them with policy makers, practitioners and community organisations.

Chapter 1: A Vision for Healthy Ageing in Australia

Introduction

The ageing of the Australian population presents unprecedented challenges and opportunities to our society in relation to the economy and living standards, health and welfare, and the wellbeing and quality of life of all Australians, regardless of their age or state of health.[1]

The challenge of an ageing population can be approached in one of two ways.

On the one hand, it can be considered as something unchangeable, a demographic timebomb which will place a great burden on health and welfare services and younger taxpayers. [2]

An alternative view is the 'active, healthy, productive, positive or successful' ageing approach that sees ageing in terms of opportunity and capacity rather than decline and degeneration. This approach recognises that there are actions to be taken which can improve the outcomes for ageing individuals and Australian society.[3]

Opportunities for healthy and productive ageing, with full participation in society, depend on many factors, but the three most important, to be addressed in this report, are people's health, their social environment and the built environment.

Many of the chronic diseases and conditions that impose the heaviest burden on ageing societies are to a considerable extent preventable. Certainly their impact can be attenuated or deferred to a later age. Many of these conditions have common contributing factors. The World Health Organisation has estimated that over a third of the burden of disease in developed countries is attributable to a small number of risk factors, including tobacco, poor diet, physical inactivity and alcohol misuse.[4]

Relatively small and achievable improvements across the entire population in these factors would not only provide significant returns in terms of better

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[1] It should be noted that this report does not deal with Indigenous Australians who have an average life expectancy 20-30 years less than for non-Indigenous Australians. Many do not even reach the ages under discussion in this report. The issues in Indigenous health are of great importance, but it is not possible to do justice to them in this report.

[2] Leveratt M. The discourses of ageing *Brotherhood Comment*. August 1998, 1-3.

[3] The importance of actively addressing the issues of ageing is recognised by governments around the world. The concept of healthy ageing was introduced by the World Health Organization in the early 1980s, and later broadened to the more inclusive term Active Ageing. In Australia the healthy ageing or positive ageing approach has been adopted by the National Strategy for an Ageing Australia, and the Commonwealth, State and Territory Strategy on Healthy Ageing.

[4] *The World Health Report. 2002. Reducing risks, promoting healthy life*. Geneva: World Health Organization, 2002

health for individuals and increased healthy life expectancy, but also reduce cost and other pressures on health and aged care services.

The work environment and the opportunities for labour force participation, together with the social environment and attitudes of the community towards older people, are major influences on the health and well being of older people.

Opportunities for healthy and productive ageing can be increased substantially through improvements in the built environment, not only in providing a supportive physical environment for older people, but also in the opportunities provided in the built environment for a healthy lifestyle through increased physical and social activity.

Planning for population ageing is a major investment in Australia's future. It can yield benefits for future generations of younger as well as older Australians.[5]

The vision

This paper presents a vision for an active and productive Australia in which people not only live longer but live longer in good health, staying mentally and physically active and able to participate and enjoy life until they die at an advanced old age.

THE VISION

An additional 10 years
of healthy and productive life expectancy
by 2050

Achieving the vision outlined in this report will mean improved health, wellbeing and quality of life and increased participation by older people in all aspects of society. It will also mean increased independence, autonomy, mobility and dignity for all, including those who are frail and in need of care.

These gains will come from actions that prevent or delay the onset of the chronic diseases and conditions of ageing; from better management of these; and from improvements to the social and built environments to support healthy ageing.

Science and technology will make a major contribution to these gains, both in new discoveries in the physical, biological, social and behavioural sciences, and in translation of existing knowledge into action.

The benefits to individuals and to society as a whole will be considerable. For the individual there are the benefits of improved health and wellbeing and

[5] 2002-2003 Budget Paper No. 5 The Intergenerational Report

quality of life. If people spend more of their life in good health, they will have the opportunity to participate more fully in society for a greater part of their life.

Society will benefit from older people making contributions to the community and the economy through paid and volunteer work and in domestic and family life, as well as contributing to important social, cultural and political aspects of community life. More people will be able to stay in their own homes and be independent as part of their local community.

Increasing healthy life expectancy will mean a healthier older population, with lower rates of chronic disease, reducing the need for costly medical treatment.

Widespread lifestyle changes across the population, such as increasing physical activity, healthy eating and not smoking, will play a key role not only in enhancing well being but also in preventing and managing many diseases and health problems.

Achieving healthy and productive ageing will need social as well as health strategies. There are major obstacles to be overcome such as negative (and inaccurate) attitudes to older people in the workplace and in the community.

Aspects of the built environment can enhance or impede healthy actions and the quality of life for older people and their participation in society.

All these deserve attention when considering how best to achieve ageing with vitality.

There are already some positive signs. Attitudes to older people are changing, and older people themselves by their own actions are changing perceptions of the roles of older people. Organisations such as COTA National Seniors are playing an important advocacy role.

The context

The *National Strategy for an Ageing Australia* has been developed, after extended community consultation, to provide a policy framework for a co-ordinated national response to the issues arising from the ageing of the Australian population.[6] It is seen as the vehicle for engaging the Australian community on the issue of ageing across all sectors. An earlier document, the *Commonwealth State and Territory Strategy on Healthy Ageing* provides a planning framework for the Commonwealth, State and Territory Governments to work together to address these issues[7].

A number of the areas considered in this report are comprehensively addressed in these strategies, including health and wellbeing, community

[6] *National Strategy for an Ageing Australia: an older Australia, challenges and opportunities for all.* Commonwealth Department of Health and Aged Care, 2002.

[7] *Commonwealth, State and Territory Strategy on Healthy Ageing*. 2000. Prepared by the Healthy Ageing Task Force, comprising senior officials from the Commonwealth, and all State and Territory Governments

attitudes, work and community participation, inclusive communities and research and information.

The importance of healthy ageing has also been acknowledged in the National Research Priority of *Promoting good health and preventing disease, particularly among young and older Australians*. Two of the three priority goals under this priority, *Ageing well, ageing productively* and *Preventive healthcare* are directly relevant to this report.

The scope of this report

Healthy ageing is a very diverse field, which cannot be comprehensively covered in a report of this kind.

This report focuses particularly on the promotion of health and wellbeing and prevention of ill-health, with reference to the key risk factors of nutrition and physical activity, where there is the potential for major health gains. It also considers the role of the social environment and the built environment in supporting healthy and productive lives.

Chapters 1 to 3 set the scene by outlining a vision for healthy ageing in Australia, providing a context and background information, and considering the research agenda for science and technology in terms of a discovery, translational and technology agenda.

Chapters 4 and 5 address the issue of health promotion and disease prevention, with an emphasis on physical and mental activity, nutrition and pharmacological interventions, where there are particular opportunities for action in promoting the health and well-being of older people.

Chapter 6 examines the role of the social environment, with particular reference to community attitudes, labour force participation and participation by older people in society more generally, and identifies a number of research issues to be explored.

Chapter 7 addresses ways in which the built environment can be improved to enable vulnerable older people to remain at home with a good quality of life, and how science and technology can contribute in these areas.

Chapter 8 discusses priorities for advancing research to inform healthy ageing initiatives, including research methods, research funding and research capacity, and argues for the establishment of a national longitudinal study of healthy ageing.

The report emphasises the importance of a multi-disciplinary and multi-sectoral approach to research and action in healthy ageing.

Even with the best preventive efforts there will still be many people who are ill and frail and need health care. Effective management of disease is vital to healthy ageing. The care of older people in primary care, acute care and

residential care settings deserves serious attention, but this is outside the scope of this working group.

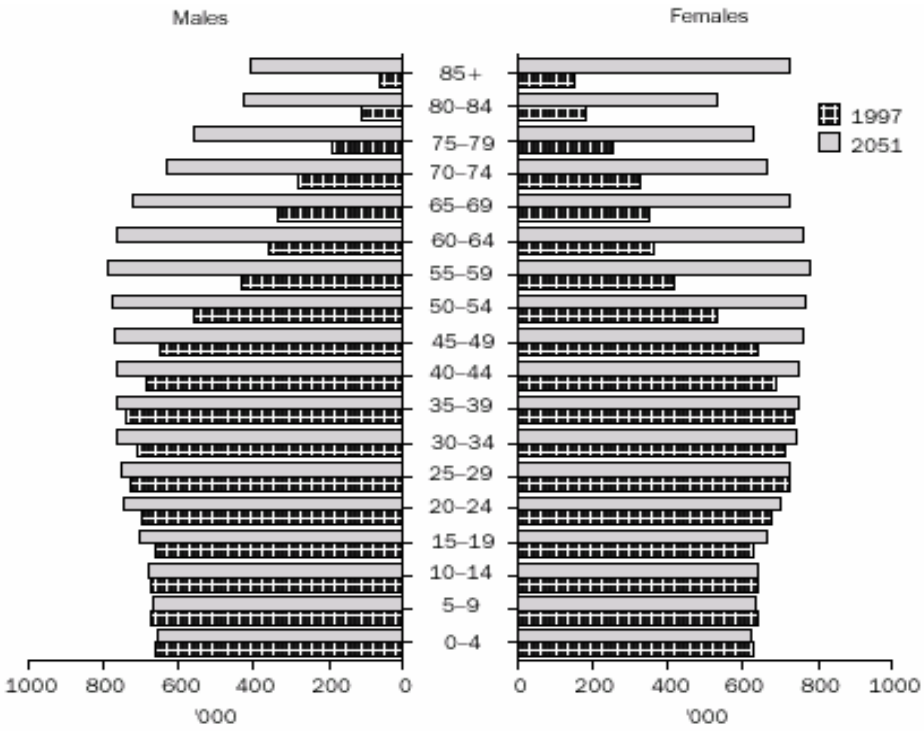
Chapter 2: Background Issues in Healthy Ageing

Impact of demographic change

Because of declines in the birth rate and increased life expectancy, Australia is facing marked increases in the proportion of the population in older age groups (Figure 1). For example, by 2051, it is predicted that a quarter of the population will be over 65 years, up from 13% in 2001. The proportion of the population over 85 years is expected to rise from the current 1.5% to over 4%, with over a million people expected in this age group by 2050[8].

The impact of these demographic changes is being accentuated in Australia by other factors, such as the decline in labour force participation among older workers, and high cost medical advances (technology and pharmaceuticals), which have increased the cost pressures on the health system.

Figure 1: Comparison of Australia's Population Pyramid, 1997 and 2051



Source: ABS Population Projections 1999-2101 Catalogue 3222.0

[8] McDonald P, Kippen R Ageing: the social and demographic dimensions. In *Policy Implications of the Ageing of Australia's population.* Productivity Commission and Melbourne Institute of Applied Economic and Social Research, Canberra, 1999.

Three generations of ageing people

Older people constitute a very diverse group. In considering ways to improve health, it is useful to consider issues as they apply to three generations of ageing people, aged 45-64 years (middle age), 65-79 years (younger old) and 80 years and over (older old). These three age groups tend to have different needs, expectations and priorities, conditioned largely by their life experiences.

Those in the '**middle age' group** (now 45-64) were born between 1939 and 1958, entering adulthood in times of great social change in the 1960s and 1970s. The post war baby boomers, born in large numbers soon after the war, will account for the large bulge in the population of 'older old' people (over 80 years) between 2026 and 2036.

As children in the 1950s, this generation grew up with expectations that included comprehensive health and social services, wide access to higher education, and almost full employment during adult life for men. The majority of women in this generation are now also in paid work outside the home, with consequent changes in family relations and financial expectations. There are declining rates of labour force participation in this age group, more marked among men. More than one quarter of this cohort is likely to experience old age without the support of a long-term partner.

Changes in transport and urban patterns, access to television and computers, together with increased working hours for many, have contrived to engineer physical activity out of daily lives.

The health problems being faced by this middle age generation largely reflect social and lifestyle changes of the last fifty years. Overweight and obesity, mental disorders (including depression and anxiety), musculoskeletal problems (arthritis, back problems), and cardiovascular problems (high blood pressure) account for the majority of visits to health services. These problems will manifest as more serious illnesses (eg heart disease and stroke) unless preventive action is taken seriously during these middle years.

Those in the '**younger old' age group** (now aged 65-79 years) were born in the period 1924-1938, in very different circumstances from those of the middle age group. Most experienced childhood during the economic restrictions of the Great Depression or Second World War.

The majority in this generation are home owners, living in their own homes, with low housing costs that have permitted a reasonable standard of living on the pension. Many of them provide care for their own parents, their spouse, a sick or disabled adult child, grandchildren, or combinations of these.

The most common health problems faced by this group include different forms of cancer, cardiovascular diseases, sensory disorders, musculoskeletal disorders and mental disorders. More than half of those aged over 70 years suffer from at least one chronic medical condition, and about one third require assistance with everyday activities such as shopping, cooking and housework.

The majority of this generation, however, still consider themselves to be in good health.

Their expectations and priorities are for staying in their own home as long as possible, staying mobile and independent, actively participating in society, having high quality health care, and continued lifelong learning.

Their health needs are to maintain physical and mental activity and good nutrition and control of cardiovascular risk factors, to modify or delay the onset of chronic diseases such as cardiovascular disease and diabetes, as well as the brain disorders of advanced ageing. Once ill, they need effective care including proper medication management. Because of increasing visual, hearing and mobility impairment, the older members of this cohort usually need aids to maintain independence.

The **older old age group** (over 80 years) represents the survivors of the generation born before 1923, who lived their formative teen and young adult years during the Depression and Second World War.

In comparison with the large baby boom cohort who will be reaching 80 years old in 2020 -2030, this cohort is currently fairly small, although the number of the older old is expected to increase rapidly in the next 30 years.

Most people in this older old group suffer from multiple chronic diseases, have relatively high levels of disability, and have a steeply rising incidence of the brain disorders that become common only with advancing age (Alzheimer's disease and other dementias; Parkinson's disease and other gait disorders). A quarter of the men and one third of the women have two or more chronic health problems.

Their needs are for support and aids to enhance their independence and mobility, and to stay in their own homes where possible. Access to high quality medical care is a priority.

Explaining the vision: an additional 10 years of healthy and productive life expectancy

Both life expectancy and healthy life expectancy are convenient summary measures of the health of a population.

Life expectancy is a summary of death rates at different ages. Increasing life expectancy (*adding years to life*) means increasing the lifespan by reducing premature death.

Healthy life expectancy is a summary measure that takes into account death rates, disease rates and the impact of various disease states on the activities of daily living. Healthy life expectancy therefore takes into account time spent in less than full health due to illness or disability. Increasing healthy life

expectancy (*adding life to years)* means increasing the number of healthy years.[9]

There is concern that increasing life expectancy could simply mean that people live longer in ill health. However, evidence from the OECD countries shows that as life expectancy increases, people actually have more healthy years. [10] Severe ill health and disability tends to be concentrated in the last 2-4 years of life, regardless of how long a person lives. This concept is referred to as compression of morbidity.

Table 1: Life expectancy and healthy life expectancy (years) for those born in 2001

	Life expectancy	Healthy life expectancy	Lost healthy years
Males	**77.4**	**70.1**	**7.3**
Females	**82.6**	**73.2**	**9.4**

As shown in Table 1, under current rates of illness and death, there are 7.3 lost healthy years on average for men and 9.4 for women.

Among the OECD countries, Australia ranks second (to Japan) in life expectancy, but fourth in healthy life expectancy, after Japan, Switzerland and Sweden. [11] The examples of these other countries indicate that Australia has not reached its potential for healthy life expectancy.

There are great differences in life expectancy for different segments of the population, with Indigenous Australians having a life expectancy 20 years less than the rest of the population, and the most disadvantaged non-Indigenous Australians having a life expectancy of six years less than the most advantaged. [12] Recent work in Victoria has shown a marked gradient in life expectancy from the most advantaged to the most disadvantaged areas. [13] The greatest potential gains are likely to arise from increasing healthy life expectancy in the most disadvantaged groups.

The notion of productive, healthy life expectancy has different meanings for the three age groups under consideration.

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[9] Mathers Cm Vos T, Stevenson C *The burden of disease and injury in Australia.* AIHW Cat no. PHE 17 Canberra: Australian Institute of Health and Welfare, 1999.
[10] OECD (1998) *Maintaining prosperity in an ageing society* OECD, Paris.
[11] Mathers CD, Murray CJL *et al.* Health life expectancy: comparison of OECD countries in 2001. *Aust NZ J Public Health* 2003; 27: 5-11
[12] John Glover, Public Health Information Development Unit, University of Adelaide, personal communication.
[13] Public Heath and Development Division, Department of Human Services *"The Victorian Burden of Disease Study: Mortality",* Victorian Government Department of Human Services, Melbourne 1999.

For the middle-aged (45-64), increasing the number of years of healthy life should help to reduce health-related withdrawal from the workforce and increase workforce participation among mature age workers, which will benefit both the individual and the economy.

For the younger old (65-79), the extra years of healthy life will improve quality of life and allow continued participation in the paid workforce (for some) and in family and community life.

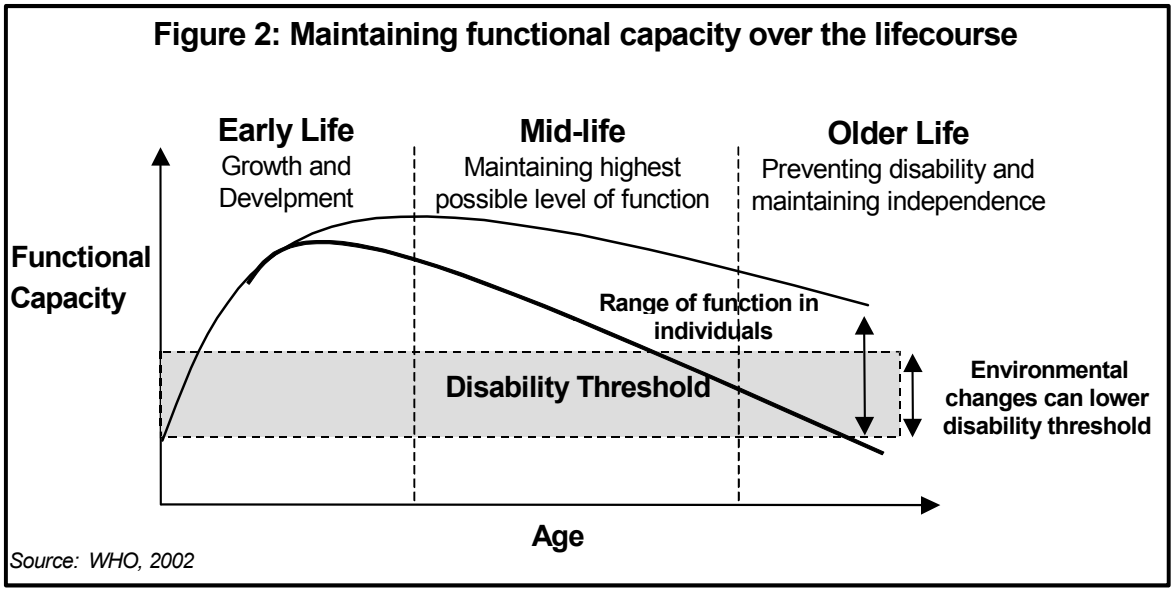
For the younger old and the older old (80 and over), additional years of healthy life will mean increased independence, autonomy and mobility, with less likelihood of admission to residential care.

There is both health and social diversity among people at any age, due to many factors other than age. Most notable among these are the different life orientations and experiences of men and women, and variability in terms of socio-economic resources, urban and rural residence, and cultural groups and migration histories. The achievement of healthy ageing requires attention to the particular situations and outcomes for diverse groups of ageing individuals.

A whole-of-life approach to healthy ageing

To maximise health and wellbeing in older age, people need to move into older age with the highest possible level of functional capacity, physical and mental (Figure 2).

Figure 2: Maintaining functional capacity over the lifecourse



Source: WHO, 2002

Functional capacity increases in childhood and peaks in early adulthood, eventually followed by a decline. The rate of decline is determined partly by genetics and individual biology, but is strongly influenced by factors related to adult lifestyle (such as smoking, alcohol consumption, diet and levels of physical activity) and by the environment in which people live.

A wide range of functional capacity is displayed among older people. If the gradient of decline in capacity is steep (bottom curve of Figure 2), the person will enter a phase of disability prematurely. On the other hand, others (top curve) will move with no disability into older age and never fall below the disability threshold.

Changes in the social and built environment can raise or lower the disability threshold. A supportive environment can enable people to remain independent even when they have substantial losses of functional capacities.

In addition to the impact of genetics and biology, people's health and functional capacity in older age depends on how exposed they have been to risk and protective factors in earlier years. Experiences in early life (even before birth) can increase or decrease the risk of chronic illness in adulthood. For example, babies with low birth weight have an increased risk of heart disease in adult life.

There is now evidence that optimal brain development and education in childhood help to protect against a decline in brain function in older age.

The work of Professor Fiona Stanley and her colleagues (presented to PMSEIC in June 2001), and other international research has demonstrated the importance of the early childhood environment and experiences, and this work will not be directly considered in this report.

But future health is not fixed in childhood; even small gains accumulated across the rest of the lifespan, and preventive steps taken in middle age and older years, can result in improvements in health status, functional capacity, independence and quality of life of older people. Action to improve the health of older people can be effective and yield benefits relatively quickly for themselves and for Australia.

Chapter 3: The Contribution of Science and Technology to Healthy Ageing

Investment in prevention and health promotion and in improving quality of life and participation for older people needs to be informed by the best possible evidence.

Many scientific disciplines contribute to knowledge relevant to healthy ageing, including biomedical sciences, epidemiology, behavioural and social sciences. Most benefit will be gained from a multi-disciplinary approach involving all research disciplines.

In considering the role of science and technology in healthy ageing it is useful to think in terms of what we still need to know (a **Discovery agenda**) and how to apply what we already know from research into policy and practice (a

Translational agenda). The **Technology agenda** considers how technology can be applied to assist in healthy ageing.

Discovery agenda

The major challenge on the discovery agenda is to understand comprehensively the bio-psycho-social influences on ageing and its consequences.

In biomedical research, there is the need for an improved understanding of cellular mechanisms of ageing, identifying early markers of disease (biomarkers), and research into more effective ways of intervening in the course of what may become chronic illness. This includes the genetic basis of disease, the effects of the social and physical environment on gene expression and on brain structure and function. Such research will involve emerging technologies, particularly in the molecular and genetic sciences. It could prove to be the foundation for exciting new non-invasive means of measuring physiological activity and responses.

The opportunities are equally promising in psycho-social research. Behavioural and social science research is needed to understand and identify personal and environmental factors, which affect the adoption and maintenance of behaviours conducive to health.

At the societal level, there is a need to identify, measure and understand those factors in the social and physical environment that enhance social participation and the quality of life of older people.

Much more research attention needs to be paid to the interaction among biological, psychological, social and environmental factors, as well as the pathways that explain how these factors operate.

Translational agenda

This is concerned with translating already available knowledge into policy and practice.

For example, much is known already about the relationships between ill health and tobacco smoking, physical inactivity, poor diet (especially excess fat and inadequate intake of fruit and vegetables) and alcohol misuse, and high blood pressure and high blood cholesterol.

We have the example of other countries that have taken effective action. In North Karelia, Finland, a 25 year community intervention spectacularly reduced an epidemic of heart disease. Dr Pekka Puska, one of the driving forces behind that intervention, has said, "*The main question for non-communicable disease prevention is not what should be done? but how*

should it be done? The key question is how can existing knowledge best be applied for prevention in real life"[14]

The research challenge is to translate the knowledge about risk factors for disease into effective behaviour change and treatment regimens to reduce the risk of ill health and increase health and wellbeing.

Similarly, we know a great deal about the important components of the social environment and the built environment in facilitating healthy ageing and enhancing health and wellbeing in older age, and that needs to be translated into effective action. For example, it is important for older people to have opportunities to continue in the labour force, but more needs to be known about the complex interplay of factors affecting labour force participation among older people, and how it may be increased.

Technology agenda

Technology is an important corollary of both the discovery and translational agendas.

The challenges posed by an ageing population will require innovation in tools or aids that restore and extend human function and that can cope with the demands placed on them by the Australian physical, social and cultural environment. The field of assistive technology can contribute to improving performance of body systems, maintain productivity, and enable cultural and social interactions. There is a challenge for industry in producing assistive devices that are affordable.

Technological innovation also encompasses the development of IT-based communication and decision support technologies designed to allow consumers to be well informed.

Innovative building design can overcome physical, sensory, and cognitive impairments that restrict functional capacities and social integration. Engineering and technology with respect to transport, urban planning and the built environment can also facilitate physical and social activity for older people.

Finally, especially among the older old, technology has an important role in the form of appropriate and well-designed prostheses as well as various aids for those with sensory and cognitive loss. Personal surveillance and alarm systems can increase security for older people and allow them to remain confidently at home.

The success or otherwise of technological innovation and uptake relies on basic research into human functional need.

[14] Puska, P Successful prevention of non-communicable disease: 25 year experiences with North Karelia Project in Finland. *Public Health Medicine* 2002; 4: 5-7.

There is great scope for innovation and capital investment in assistive technology, but there is at present no organised approach to examining the uptake of assistive devices or their limitations.

Conclusion

There is an extensive research agenda to promote healthy ageing in Australia over the next two decades, involving multi-disciplinary teams and a variety of research approaches. The next four chapters of this report will consider some of the existing evidence and explore some of the opportunities for science and technology in relation to health promotion and disease prevention, and the social, work and built environments.

Chapter 4: The Scope for Health Promotion and Disease Prevention among Older People

The key to healthy ageing is the promotion of good health and prevention of illness, as well as the effective management of those illnesses that do occur.

Biology and genetics, social factors such as education, incomes and social status, social supports, the physical environment, behavioural factors such as lifestyle choices, and access to health services all interact to determine health or illness. Health-related lifestyle choices are in turn influenced by people's social and economic circumstances, as well as the social and physical environment.

To achieve the vision of an additional ten years of healthy life expectancy will require changes in the population in relation to smoking, poor diet, physical inactivity and alcohol misuse that contribute substantially to the preventable chronic diseases associated with ageing: heart disease, stroke, cancer and diabetes, and their complications.

Although there is still much to be discovered about the common risk factors, the main challenge is applying existing knowledge to help people to change their behaviour.

We need to delay age-related cognitive decline and the onset of the major brain disorders of late life (Alzheimer's Disease and other dementias and Parkinson's Disease). Here, knowledge about risk and protective factors is less well developed but there is exciting new evidence about the protective effect of measures designed to enhance brain development in early life and of the beneficial consequences in later years of energetic mental activity throughout the whole of life.

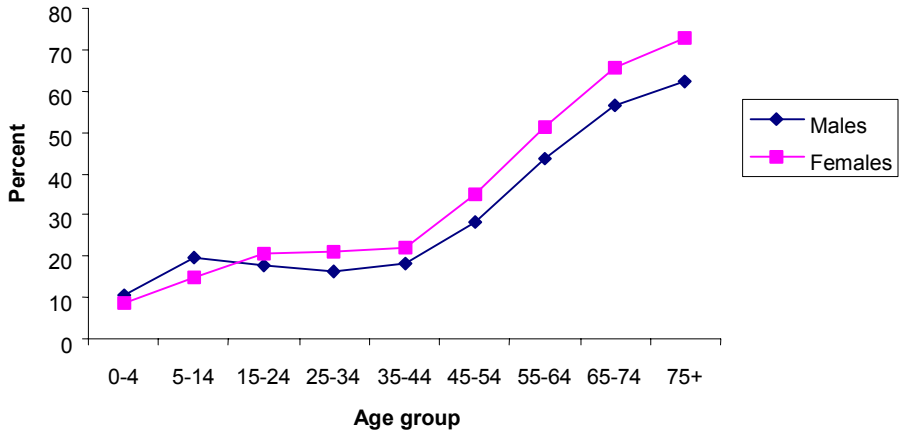
This chapter will examine the main causes of ill-health in older age, the common risk and protective factors and how these factors can be addressed in the whole population and in health care settings.

The burden of disease – causes of ill health

Cancer, heart disease and stroke are the main causes of premature death and years of healthy life lost in all age groups over 45 years (see Appendix A). Many of the chronic conditions in older age are disabling rather than fatal, and many occur together in the one person.

Rates of chronic disease begin to rise sharply from age 45-55 onwards (Figure 3)[15].

Figure 3: Persons reporting one or more chronic conditions, by age group



Source: ABS National Health Survey 2001, unpublished data

Up to age 75, the main causes of ill health are mental disorders (mainly depression) and musculoskeletal disorders (mainly arthritis), while coronary heart disease, diabetes and cancer are also prominent. After 65, and particularly after 75, there are rising rates of neurodegenerative disorders such as dementia and Parkinson's disease, together with increasing disability due to vision and hearing disorders.

Death rates for heart attack and stroke have fallen in Australia by well over 60%. This spectacular achievement is due both to prevention of coronary artery disease and its medical and surgical treatment. A recent analysis found that 70% of the decline in heart attack deaths could be attributed to a decline in the risk factors of smoking, high blood pressure and high cholesterol, with a benefit to cost ratio for public health measures of 11 to 1.[16] The remaining 30% of the decline is due to medical and surgical care.

[15] Chronic conditions include: diabetes, ischaemic heart disease, stroke, asthma, bronchitis /emphysema, kidney disease, arthritis, osteoporosis, lung cancer, colorectal cancer. Excludes depression

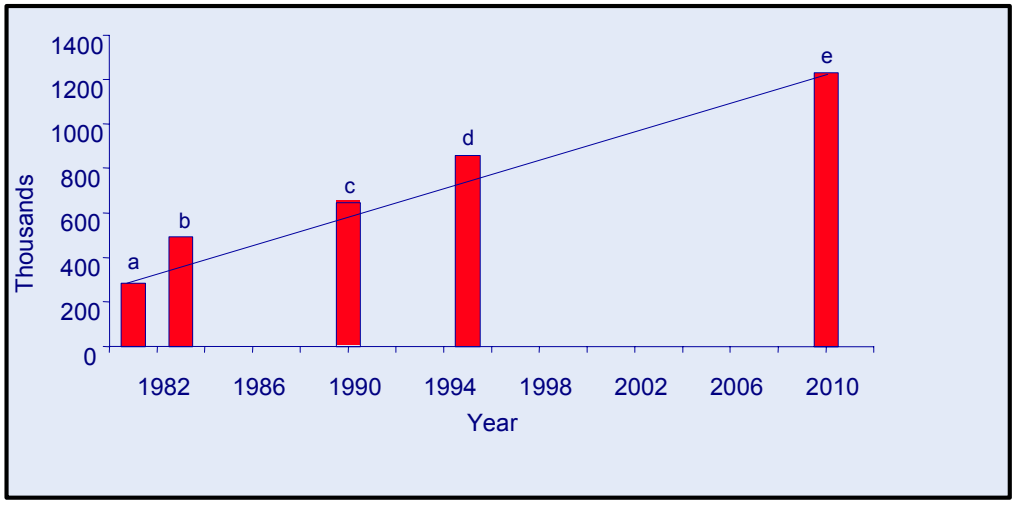
[16] Commonwealth Department of Health and Ageing. *Returns on investment in public health: an epidemiologic and economic analysis.* Prepared for the Department of Health and Ageing by Applied Economics. Canberra, 2003

Yet a consequence of fewer deaths from heart attack is that there are more people *living* with heart disease, especially in their seventies and eighties[17].

Despite these successes, heart disease remains a major killer and cause of illness in Australia as it is in the US and the UK. Some other countries have much lower rates, indicating that we have room for further improvement.

Diabetes contributes significantly to the burden of disease and the cost of the health system (Figure 4). Apart from the complications of diabetes (including blindness, renal failure and nerve damage), diabetes increases the risk of heart disease, stroke and peripheral vascular disease[18]. Rates of diabetes are increasing in Australia and because obesity, which doubles the risk of diabetes, is rising fast in this country, the prospects are grim[19]. We may lose the ground we have gained in relation to heart attack and long-term heart disease.

Figure 4: Numbers of people with diabetes in Australia 1982 – 2002, projected to 2010



Source: The rise and rise of diabetes in Australia, International Diabetes Institute 1996.

Note: Estimates based on self-reports (1983, 1989, 1995) have been adjusted for undiagnosed cases of diabetes based on the assumption that for every diagnosed case there exists an undiagnosed case (Guest et al. 1992; Dunstan et al. 2001*).*

[17] Commonwealth Department of Health and Aged Care and Australian Institute of Health and Welfare (1999). *National Health Priority Areas Report on Cardiovascular Health 1998*. AIHW Cat. No. PHE 9.

[18] Australian Institute of Health and Welfare (2002). *Chronic Diseases and Associated Risk Factors in Australia, 2001*. AIHW.

[19] . Dunstan DW, Zimmet PZ, Welborn TA, et al.The rising prevalence of diabetes and impaired glucose tolerance: the Australian Diabetes, Obesity and Lifestyle Study Diabetes Care 2002, 25:829-34)

Brain and mind disorders, frequent causes of suffering and illness in the very old, are the subject of another PMSEIC working group, but two conditions, depression and dementia, stand out and deserve mention.

Depression is an important cause of loss of years of healthy life.[20] Although always deserving assessment and treatment in its own right, depression in later life often occurs in people who have chronic disease and disability. Heart disease and stroke seem to predispose to depression.[21] So the prevention of depression in later life can be linked to the prevention and proper management of other age-related chronic diseases. As well, there is some evidence that physical activity may lessen the chances of depression in later life.[22]

Dementia, failing vision and hearing and disturbances of gait and movement, including Parkinson's Disease, are the main causes of ill-health in the older old (80 and over). Eleven per cent of 80-84 year-olds and 24% of those aged 85 and over have dementia. Dementia was estimated to account for over $3 billion per year in direct health care costs in 2002[23]. By 2020 the number of older people with dementia in Australia is projected to rise by 60% to 242,600. Apart from those with frank dementia, it has been estimated that 65% of those over 80 have problems with reasoning and memory. These staggering figures indicate the importance for energetic research of all types into these problems.

[20] Henderson AS et al Symptoms of depression and anxiety during adult life: evidence for a decline in prevalence with age. *Psychol. Med*. 1998; 28: 1321-28.
[21] Dent OF et al. A longitudinal sample of chronic disease and depressive symptoms in a community sample of older people. *Aging and Mental Health* 1999; 3: 351-357.
[22] Blumenthal JA Effects of exercise training on older patients with major depression *Arch Int Med*. 1999; 159:2349-56
[23] Access Economics The dementia epidemic: economic impact and positive solutions for Australia. Prepared for Alzheimer's Australia, June 2003.

Risk factors for chronic diseases

Table 2 shows how various predisposing factors, both behavioural and biomedical are linked to the common chronic diseases.

Table 2: Relationships between various chronic diseases, conditions and risk factors

Condition	Behavioural				Biomedical		
	Poor diet	Physical inactivity	Tobacco use	Alcohol misuse	Excess weight	High blood pressure	High blood cholesterol
Coronary heart disease	4	4	4	4	4	4	4
Stroke	4	4	4	4	4	4	4
Lung cancer			4				
Colorectal cancer	4	4			4		
Depression		4	4	4	4		
Diabetes	4	4			4		
Asthma			4		4		
Chronic obstructive pulmonary disease			4				
Chronic renal diseases	4				4	4	
Oral diseases	4		4				
Osteoarthritis		4			4		
Osteoporosis	4	4	4	4			

Source Australian Institute of Health and Welfare (AIHW) *Chronic diseases and associated risk factors. Canberra, AIHW, 2002*

Poor diet, physical activity, tobacco use and alcohol misuse are common predisposing factors for a number of the chronic conditions responsible for premature death and disability among older people. Excess weight (overweight and obesity), attributable mainly to poor diet and physical inactivity, also increases the risk of chronic diseases. Preventive action on these common risk factors can produce benefits spread across several diseases and conditions. This report will focus on nutrition and physical activity. Smoking and alcohol misuse are being addressed by government and non-government agencies through other strategies.

Table 3 shows the high levels of many of these risk factors in older people, indicating considerable scope for improvement.

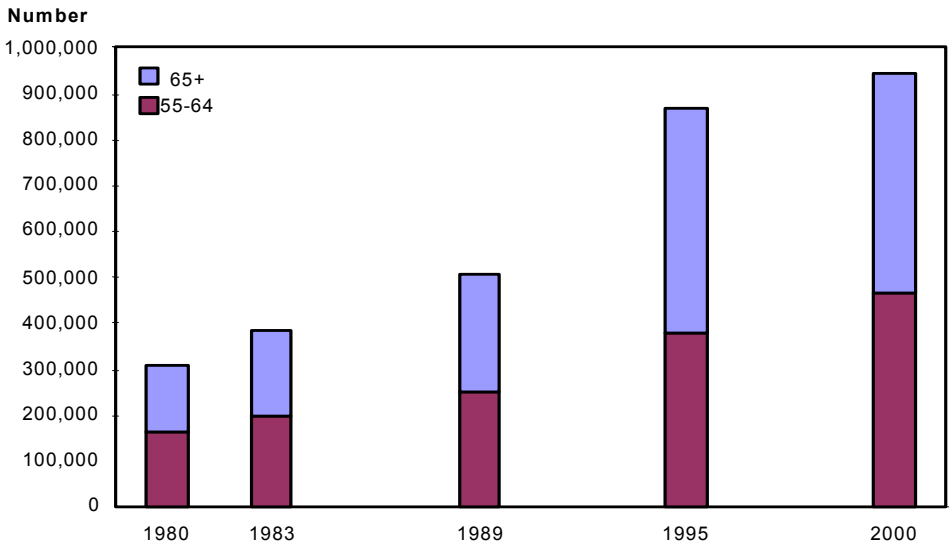
Table 3: Risk factors for illness and disease (per cent of population group)

Risk factor	Females				Males			
	45-54	55-64	65-74	75+	45-54	55-64	65-74	75+
Physical inactivity	52	47	46[a]	n.a.	48	50	46[a]	n.a.
Overweight	58	67	71	56	73	74	74	64
High blood pressure	23	42	67	77	31	47	70	75
High blood cholesterol	55	72	74	65	61	62	54	49
Tobacco smoking	18	14	7	4	22	15	11	5
Risky alcohol consumption	12	5	3	1	19	14	8	3

Source: AIHW, Older Australia at a Glance 2002 page 34

Excess weight is common among older people, with over two thirds of women aged 55-74 and three quarters of men aged 45-74 being overweight (Table 3). The number of older obese people has increased markedly in the past 20 years, as shown in Figure 5, illustrating the need to pay attention to diet and physical activity.

Figure 5: Number of obese older Australians, 1980–2000



Sources: AIHW analysis of the 1980, 1983, 1989 Risk Factor Prevalence Surveys, 1995 National Nutrition Survey; 1999-2000 Australian Diabetes, Obesity and Lifestyle Study.

Approaches to prevention

Population strategies and high risk strategies

Geoffrey Rose, the outstanding British epidemiologist, has described two complementary strategies for promoting health and preventing disease. [24]

One strategy addresses people at high risk of disease: for example, those with high blood pressure or high cholesterol are identified and treated.

The other strategy aims to produce small changes in risk across the whole population: for example, lowering the average level of blood pressure across the whole population by having everyone become a little more physically active.

Both strategies are important but, as Rose has demonstrated, greater health gains for the population can be made through small changes to the risk experienced by large numbers of people (even though that risk is small), than by finding and treating the small number of people who are at high risk.

Consider the case of high blood pressure, which increases the risk of stroke. Rose estimated that if all cases of high blood pressure were effectively treated, there would be a 15% reduction in the rate of occurrence of stroke. On the other hand, a 5% lowering of the average blood pressure in the whole population, as might be achieved mainly by diet and physical activity, would lead to a 30% reduction in the rate of strokes.

Achieving the small changes across the whole population is a challenge which needs national leadership.

Settings for prevention

Prevention, like education, can take many forms and operate in many different settings. It may be organised at the level of the whole population (e.g quit smoking campaigns); in workplaces, community settings or in residential aged care where there are very good opportunities for prevention; or in the context of one on one contact with a health professional in a health care setting (treating high blood pressure, advice on giving up smoking).

Comprehensive prevention programs work best when a variety of approaches is used, each re-inforcing the others.

Making healthy choices easy choices – population-based approaches

Population-based health promotion includes health education to help people make informed healthy choices (about food choices, physical activity for example), together with the promotion of policies and healthy environments that will help to make healthy choices easy choices, such as ensuring that healthy food is not more expensive than unhealthy, taxing cigarettes and providing safe environments for physical activity.

[24] Rose G *The strategy of preventive medicine*. Oxford, OUP, 1992

Population-based approaches are therefore not simply public health campaigns, but include efforts to break down structural and social barriers to healthy actions. Human behaviour does not occur in a vacuum. It is hard for individuals to change their behaviour, whether it is eating various foods or drinking alcohol or exercising, when it means that they will stand out from the rest of their community. It is much easier not to smoke when smoking is not the norm. It is easier to adopt a healthy diet when most people are doing so. Even those who are highly motivated to take action and are receiving advice and support from health care professionals find it easier to change if population health strategies, such as regulations banning smoking in public places, are there to support them

To quote Geoffrey Rose: "*It makes little sense to expect people to behave differently from their peers: it is more appropriate to seek a change in behavioural norms and the circumstances which facilitate their adoption"*. [25]

Population-based approaches, especially those aimed at change in the social or physical environment, may take years to work, and need long-term commitment. The dietary habits, use of transport and city design that have led to the current epidemic of obesity in Australia have been decades in the making and will likely take some years to improve. The gains are not only long-term, however. Experience in the Western Pacific has shown how quickly changes in levels of obesity in a population can be achieved.[26]

Prevention in the health care context

Prevention in the health care context can be very powerful and is capable of rapid gains. Here people are sensitised to health matters and are seeking medical care, and the health care professional is an authoritative source of advice. It is here that lifestyle advice can be offered to those who are basically well, where biological risk factors such as high blood pressure and high cholesterol can be detected and treated, and effective management given to those with existing conditions such as heart disease, to minimise complications and reduce the risk of further episodes of illness.

The yield from prevention located in health care contexts can be spectacular, particularly in those who are already ill, at high risk of further illness and thus more highly motivated to respond. A person who has suffered from one fall is at high risk of another; a heart attack survivor is, compared with people who have not had a heart attack, at very much greater risk of a second attack.

Giving up smoking, regardless of the trigger to do so, has effects within weeks on the risk of heart attack and is likely to be more successful if supported by the person's doctor. Supervised changes to the home, audit of medications, and correction of other health problems such as incontinence and high blood

[25] Rose G *The strategy of preventive medicine*. Oxford, OUP, 1992
[26] Report to World Health Assembly from Western Pacific Regional Organisation, Geneva, June 2003.

pressure can reduce immediately the risk of subsequent falls in people who have had one fall.

The health care system, especially primary care, also provides important opportunities to reach the most disadvantaged, who are hard to reach by wider population-based approaches. Older people with limited social networks have frequent contact with general practitioners and often with community nurses and other health professionals. For example, the link between chronic illness and depression in older people with its increased risk of suicide is more likely to be detected in a health care context.

Health care professionals need to be sensitised to the importance and possibility of prevention, so that those at highest risk benefit from current knowledge and skill in achieving their full health potential.

Prevention and health inequalities

Any approaches to prevention need to take into account the fact that disadvantaged groups bear the highest burden of disease and are often least able to respond to health promotion messages.

A person living in less than ideal housing, who is struggling financially, who has moderate arthritis and lives a long way from shops that sell vegetables, has far less chance of responding to promotion messages such as those about physical activity and healthy eating, than a retired, well educated, well motivated middle class person with discretionary disposable time and money, good transport, and broad social networks.

The health gradient between the advantaged and the disadvantaged is likely to be increased unless we attend to the structural and environmental barriers that stand in the way of behaviour change for more disadvantaged people, and find other ways of reaching these groups. We need to complement population-based preventive measures by other efforts to reach those at highest risk, using health care, workplace and community settings.

Chapter 5: Health Promotion and Disease Prevention: Areas for Action

This chapter will examine four areas where there are particular opportunities for action in promoting the health and wellbeing of older people: physical and mental activity, nutrition and pharmacological interventions. Existing evidence will be outlined and gaps in research evidence identified, indicating where science and technology can contribute.

Physical activity

Physical inactivity is an important contributing factor to a number of chronic diseases and conditions. The Australian Burden of Disease and Injury study estimated that overall, physical inactivity was responsible for 8% of the total

burden of disease in persons over 65 compared with 12% for tobacco.[27] For women, physical activity was ahead of tobacco as the leading cause of the burden of disease.

The direct health care costs of physical inactivity in relation to chronic diseases and conditions were conservatively estimated at $377 million per year in 1993-4.[28] In addition, the direct cost to the health system of falls in the elderly was estimated at over $400 million in the same period.[29] In the US, it has been estimated that inactivity and obesity account for some 9.4% of national health care expenditure, representing a major avoidable contribution to the costs of illness in that country.[30] Australian rates of obesity and physical inactivity are comparable to those in the US.

Physical activity can contribute to healthy ageing in a variety of ways, reducing the impact of age-related physiological changes, reducing the risk of common chronic diseases, and assisting with management of certain chronic diseases and prevention of disability. [31, 32, 33]

Current evidence indicates that half an hour of moderate physical activity, such as brisk walking, on most days of the week (150 minutes per week) is sufficient to gain health benefit. More research is needed on the dose of physical activity required for optimal prevention and management of common diseases, and particularly on the physical activity requirements for older people.

Maintaining functional capacity

Physical activity has an important role in maintaining functional capacity in older people. The physiological changes that occur with ageing are similar to those associated with disuse, and there is evidence that regular participation in physical activity minimises age-related declines in aerobic fitness. Physical activity can also minimise age-related changes in body composition such as loss of bone density (preventing osteoporosis) and accumulation of excess

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[27] Mathers Cm Vos T, Stevenson C *The burden of disease and injury in Australia.* AIHW Cat no. PHE 17 Canberra: Australian Institute of Health and Welfare, 1999.

[28] Stephenson J, Bauman A, Armstrong T, Smith B, Bellew B. *Costs of illness attributable to physical inactivity in Australia*. Report prepared for the Department of Health and Ageing and the Australian Sports Commission, 2000.

[29] Mathers C, Penn R *Health system costs of injury, poisoning and musculoskeletal disorders in Australia, 1993-94*. AIHW Cat No HWE 12. Canberra, Australian Institute of Health and Welfare, 1999.

[30] Colditz GA. Economic costs of obesity and inactivity. *Med Sci Sports & Exercise* 1999; 31 (11 Suppl): S663-7

[31] Fiatarone Singh MA, Exercise comes of age: rationale and recommendations for a geriatric exercise prescription. Journal of Gerontology 2002;57A, M1-M21.

[32] US Dept of Health and Human Services *Physical activity and health: a report of the US Surgeon General.* USDHSS, CDC and Prevention, Atlanta, 1996.

[33] Bauman A, Bellew B, Vita P, Brown W, Owen N. *Getting Australia Active: towards better practice for the promotion of physical activity*. National Public Health Partnership. Melbourne, 2002.

adipose tissue and its deposition in the abdomen (related to diabetes and heart disease).[34]

There is promising evidence of the value of resistance training in older people. These programs have been shown to increase muscle strength by 40-150%, although the research has so far been beset by problems of self-selection of subjects, and high rates of drop-out. Programs aimed at increasing muscle strength, balance and flexibility have been shown to decrease falls in the elderly, an important cause of ill-health and disability, which frequently precipitates admission to aged care facilities and hastens death.[35] [36]

Reducing mortality and preventing chronic disease

The health effects of physical activity have been well documented.[37] Epidemiological studies have shown lower overall death rates in those who are more physically active compared with those who are less active.[38] Most importantly, this applies even if people adopt a physically active lifestyle in middle age or later, indicating that it is never too late to start being physically active. One study has shown that unfit men who improved to a moderate fitness level reduced their rate of death in the five-year follow-up period by 64%. In comparison, those who stopped smoking reduced their risk by 50%.[39]

An extensive review of physical activity and health by the US Department of Health and Human Services, as well as other more recent evidence, has demonstrated that physical activity significantly reduces the risk of heart disease, stroke, diabetes, high blood pressure and colon cancer.[40, 41,42, 43]

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[34] Fiatarone Singh MA Combined exercise and dietary intervention to optimise body composition in ageing. ANN N Y Acad.Sci 1998;854: 378-393.

[35] Province MA, Hadley EC, Hornbrook MC et al The effects of exercise on falls in elderly patients. A pre-planned analysis of the FICSIT trials. *JAMA* 1995; 287:1341-1347.

[36] Gregg EW, Cauley JA, Seeley DG et al. Physical activity and osteoporotic fracture risk in older women. Study of Osteoporotic Fractures Research Group. *Ann Int Med* 1998 129, 81-88.

[37] US Department of Health and Human Services. *Physical Activity and Health: a Report for the Surgeon General.* Atlanta GA. USDHHS, Centers for Disease Control and Prevention, 1996.

[38] Blair SN, Kohl HW, Paffenbarger RS *et al* Physical fitness and all-cause mortality: a prospective study of healthy men and women. *JAMA* 1989; 262: 2395-2401.

[39] Blair SN, Kohl HW, Barlow C,Paffenbarger RS *et al* Changes in physical fitness and all-cause mortality: a prospective study of healthy and unhealthy men. *JAMA* 1989; 262: 2395-2401.

[40] US Department of Health and Human Services. Op. Cit. p4.

[41] Hu FB, Stampfer MJ, Colditz GA, Ascherio A, Rexrode KM, Willett WC, Manson JE. Physical activity and risk of stroke in women. *J Amer Med Association* 2000; 283 (22):2961-7.

[42] Rockhill B, Willett WC, Hunter DJ, Manson JE, Hankinson SE, Colditz, GA. *Arch. Intern. Med*. 1999; 159(19): 2290-6.

[43] Berlin JA, Colditz GA A meta-analysis of physical activity in the prevention of heart disease. *American Journal of Epidemiology* 1990; 132:612-628.

People with the lowest level of physical activity have almost twice the risk of heart disease as those at the highest level of activity, and people who are least physically active have a 30 per cent greater risk of developing high blood pressure than those who are most active.[44] Physical activity also lowers blood pressure in those who already have hypertension.[45] [46]

A recent review has found that those engaged in five hours per week of moderate intensity activity had a 50% reduction in the risk of colon cancer.[47] Physical activity is also important in the prevention and control of obesity, itself a contributing cause to many health problems.[48]

In view of the fact that globally, physical inactivity is estimated to be responsible for 22% of ischaemic heart disease, 11% of ischaemic stroke, 14% of diabetes, 16% of colon cancer and 10% of breast cancer,[49] it is not surprising that physical activity was cited in 1992 as "today's best buy in public health".[50]

Management of chronic disease

Physical activity also plays an important role in the management of chronic conditions such as arthritis, osteoporosis, diabetes and heart disease, and in rehabilitation and recovery from injury, surgery and illness.[51] As many of the metabolic and functional changes that are central to chronic diseases (eg insulin sensitivity, joint instability, inflammation) are improved by physical activity, activity serves as an adjunct to medication in many different cases of chronic disease. There is a need for studies of the interactions of physical activity and medication in improving overall disease outcomes and quality of life.

Psychological health and wellbeing

While there are obviously many factors that affect mental health, there is good evidence that physical activity helps to relieve symptoms of anxiety and depression, and some evidence that it may protect against the development of

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[44] Berlin JA et al *op.cit*

[45] Arroll B, Beaglehole R. Does physical activity lower blood pressure? A critical review of the clinical trials. *Journal of Clinical Epidemiology*, 1992; 45: 439-447.

[46] US Department of Health and Human Services. Physical Activity and Health: a Report for the Surgeon General. Atlanta GA. USDHHS, Centers for Disease Control and Prevention, 1996.

[47] Colditz GA, Cannuscio CC, Frazier AL. Physical activity and reduced risk of colon cancer: implications for prevention. *Cancer Causes Control* 1997; 8(4): 649-667.

[48] World Health Organization. World Health Report 2002. Reducing risks, promoting healthy life. Geneva, WHO 2002.

[49] Bull F, Armstrong T, Dixon T, Ham s, Nieman A, Pratt M. Burden attributable to physical activity: examination of the 2002 World Health Report Estimates. Med Sci Sports & Exercise 2003; 35 (5): S359.

[50] Morris JN. In: M. Marmot & P. Elliot (eds). Coronary Heart Disease Epidemiology, 1992, p252.

[51] Stewart AL, Hays RD, Wells KB, *et al* . Long-term functioning and well-being outcomes associated with physical activity and exercise inpatients with chronic conditions in the Medical Outcomes Study. *Journal of Clinical Epidemiology* 1994; 47:719-730

depression.[52] Physical activity has been shown to improve psychological wellbeing in those with chronic disease.[53]

There is important emerging evidence of the effect of physical activity on brain structure and function, reducing the rate of decline in brain function as people age.[54,55,56]

The benefits of physical activity on physical and mental function have now been demonstrated to occur across the whole adult life span, encapsulated in the axiom "it is never too early or too late".

Along with the increase in physical capacity which helps to maintain functional capacity for the tasks of daily living, physical activity also increases psychological self-sufficiency, independence and quality of life for older people, and can help to break down social isolation through participation in community based activity.

Increasing physical activity

The evidence about the relationship of physical activity to health and wellbeing is strong, and community awareness is high; about 90% of Australians believe that their health could be improved by being more active.[57] Unfortunately fewer than half of the Australian population meet even the low threshold of 150 minutes of moderate activity per week, and about 15% of the population is completely or almost completely sedentary. The proportion of the population undertaking sufficient physical activity has been declining.

As with diet, there are many social and structural factors affecting physical activity, including time use and resources, safety, security and availability and accessibility of recreational facilities such as parks. Those most disadvantaged are frequently the ones least able to be more physically active, for reasons that may be outside their control. Guidelines for physical activity need to be developed for older people and those with disabilities, to ensure that they can continue to gain the benefits of physical activity within their capabilities.

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[52] Stewart AL *et al . op.cit*.

[53] Byrne A, Byrne O Effect of exercise on depression, anxiety and other mood states J Psychosom Res 1993; 37:565-574

[54] Cotman CW Berchtold NC. Exercise: a behavioural intervention to enhance brain health and plasticity. Trends Neurosci 2002; 25 (6): 295-301

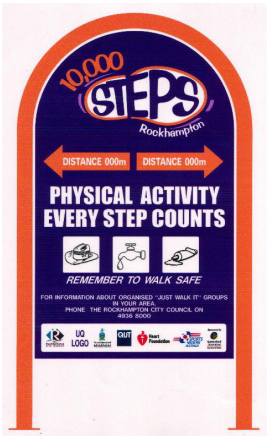
[55] Colcombe SJ Erikson KI Raz N et al .Aerobic fitness reduces brain tissue loss in aging humans. J Gerontol A Biol Sci Med Sci 2003; 58(2): 176-180.

[56] Yaffe K Barnes D Nevitt M et al . A prospective study of physical activity and cognitive decline in elderly women: women who walk. Arch Int Med 2001; 161 (14): 1703-8.

[57] Bauman A, Bellew B, Vita P, Brown W & Owen N. Getting Australia Active: towards better practice for the promotion of physical activity. National Public Health Partnership. Melbourne. Australia, March 2002.

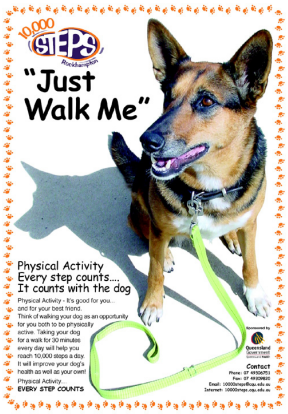
Ten Thousand Steps Rockhampton

10,000 steps Rockhampton is a multi-strategy health promotion program which aims to increase levels of health-related physical activity in this Central Queensland community. The central coordinating theme of the project is the promotion of pedometer use to raise awareness and provide motivation for physical activity, through *accumulation* of steps throughout the day.



The Strategies:

- Media campaign to raise awareness
- Promotion of physical activity by GPs and other health professionals
- Liaison with Local Government to create more 'walkable' environments and promote dog walking
- Improving social support for activity
- Community micro-grant scheme to develop innovative ways of increasing daily steps.



Preliminary results:

After 12 months:

- Project awareness has reached 97% in the Rockhampton community
- 10% increase in the proportion of adults achieving activity levels sufficient for health benefit. (This improvement seen almost entirely among women)

For more information see http://www.10000steps.cqu.edu.au/index.php

What is needed is a shift of the average level of physical activity across the whole population. Only relatively small increases in physical activity are needed to produce significant health benefits. The greatest benefits would accrue if those who are currently completely sedentary undertook a little physical activity every day.[58]

Increasing levels of physical activity will need coordinated policy change in a number of sectors, in order to raise awareness of the problem, to motivate people to move more, and to provide opportunities and supportive environments in which people are able to be more active.

Aspects of the research agenda recommended by the Working Group are shown below. There are many research issues in physical activity which need

[58] Blair SN, Connelly JC. How much physical activity should we do? The case for moderate amounts and intensities of physical activity. Research Quarterly for Exercise and Sport 1996; 67:193-205.

further exploration. The relationship between physical inactivity and various chronic diseases is well established, although more information is needed on some of the emerging issues such as physical activity and brain function. There is a need for more clarification of the threshold dose of physical activity needed for a health benefit. Most important is further work on the barriers to undertaking physical activity and the effect of multiple strategies to overcome them.

PHYSICAL ACTIVITY: RESEARCH AGENDA

Discovery

- Accurate measurement tools for assessing and monitoring physical activity in older people
- Dose and type of physical activity required for optimal prevention and management of common chronic diseases in older people
- Explore the relationships between physical activity and mental health in older people
- Determine the interactive effects of pharmaceutical agents and physical activity in the management of chronic disease
- Explore the effects of physical activity on brain structure and function
- Develop and evaluate specific intervention strategies for adopting and maintaining increased physical activity in specific groups of older people (eg migrants, women/men, rural/urban etc)

Translation

- 'Roll-out' of individual, social and environmental intervention strategies which have been shown to result in behaviour change in controlled trials
- Determine the effects of multiple concurrent strategies for increasing physical activity (individual, social, environmental)

Technology

- Use of technology (IT) to promote physical activity (web-based interventions)
- Design of activity/exercise equipment for aerobic and resistance training in older people
- Modification of community environments to facilitate physical activity for older people (covered under built environment)
- Low cost monitoring devices for monitoring of physical activity (eg pedometers)
- Improved design of low-cost knee and hip replacements to allow greater opportunities for older people with joint problems to be active

RECOMMENDATION 1: PHYSICAL ACTIVITY

Recognising the importance of physical activity throughout life in maintaining physical capacity, in modifying the physiological changes associated with ageing, in enhancing psychological health and well being and reducing the risk of many of the chronic diseases associated with ageing and assisting in their management, the Working Group recommends:

a) That a national strategy be developed aimed at increasing levels of physical activity among older Australians, so that the health, social and economic benefits of physical activity are made available to all older Australians. This strategy should include the following elements:

- *a focus on people aged 45 years and older;*
- *consideration of the impediments in the social and built environment to increasing physical activity and ways in which they may be overcome;*
- *a multi-sectoral approach, involving all levels of government, various government portfolios, non-government organisations and community groups; and*
- *in view of the considerable advances already made by some States and Territories in creating strategies for increasing physical activity, development of the strategy with oversight of the Australian Health Ministers' Advisory Council, Community Services Ministers' Advisory Council, National Public Health Partnership Group and the Positive Ageing Task Force.*

b) That the national strategy be informed by well-designed intervention studies to examine the effectiveness of strategies to increase physical activity among people over 45 years, with a view to wider implementation of effective strategies.

Mental activity

There is evidence that mental activity and the accumulation of knowledge in early life are key factors for healthy ageing, through the prevention or delay of cognitive decline and of consequent disability in later life. This has been demonstrated in a number of studies of the late-life outcomes of better brain development and higher intellectual capacity, including the American Nun Study and the Scottish cohort study of school children.[59,60] This protective effect of mental ability is independent of other well-known socio-economic and socio-environmental factors. Australian and other studies have also shown

[59] Snowdon DA, Kemper SJ, Mortimer JA et al Linguistic ability in early life and cognitive function and Alzheimer's disease in late life: findings from The Nun Study. *JAMA* 1996 275(7) 528-532

[60] Starr J M et al. Mental ability at 11 years of age and health status at age 77 years *Age and Ageing* 2000; 29: 523-528

that a larger brain size (determined in early life) is protective against cognitive decline and dementia in late life[61]

There is also evidence that cognitive training, leisure activities and physical activities improve intellectual function in elderly people and may reduce the risk of Alzheimer's Disease. [62] [63]

DOES MENTAL ACTIVITY INCREASE BRAIN SIZE?

Can specific tasks or mental activities during adult life actually increase the size and functional capacity of specific brain structures?

This has been clearly demonstrated in the case of London taxi drivers who have to acquire extensive navigational experience. The posterior hippocampus of the brain (a storage site for navigational information) was larger in taxi drivers, and the size of the posterior hippocampus correlated with the amount of time spent as a taxi driver.

Hippocampal size correlates with memory capacity in older people with normal intellectual functioning. Furthermore, the hippocampi are the brain structures responsible for the consolidation and storage of recent information and are selectively vulnerable to the earliest degeneration and cell loss in Alzheimer's disease.

This case study adds to the increasing body of evidence to support the concept of "use it or lose it" in relation to the role of mental activity in preserving and growing brain function

The evidence suggests a role for a wide range of life long educational and mental activities in promoting increased longevity, improved health outcomes, prevention of cognitive decline and delayed dementia onset in late-life.

In addition to the key role for mental development and activity, there is emerging evidence that attention to simple preventive measures such as physical activity and healthy diet, as well as control of cardiovascular risk factors such as high blood pressure, can improve cognitive function and delay the onset of dementia.[64]

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[61] Jorm AF, Creasey H, Broe GA, Sulway MR, Kos SC, Dent OF. The advantage of being broad-minded: Brain diameter and neuropsychological test performance in elderly war veterans. *Personal Indiv Diff.* 1997;23:371-3777.

[62] Wilson RS, Mendes de Leon CF, Barnes LL, et al Participation in cognitively stimulating activities and risk of incident Alzheimer disease. *JAMA* 2002; 287(6) 742-8.

[63] Maguire EA et al Navigation-related structural changes in the hippocampi of taxi drivers. PNAS 2000; 97: 4398-4403

[64] Wang L, van Belle G, Kukull WB, Larson EB. Predictors of functional change: a longitudinal study of nondemented people aged 65 and older. J Am Geriatr Soc. 2002; 50(9); 1525-34

There is much to be understood about the causes, prevention, progression and treatment of cognitive decline and dementia in older people. The Working Group places high priority on research into various factors which may affect these conditions.

COGNITIVE DECLINE AND DEMENTIA: A RESEARCH AGENDA

Research into factors affecting cognitive decline and dementia and the effect of these factors on brain structure and function, including

- role of education and mental and social activities
- effect of brain size
- role of vascular factors
- role of pharmaceutical agents

Nutrition

Good nutrition benefits almost every aspect of health, from birth to old age.

Nutrition and prevention of disease

A healthy diet reduces overall death rates independently of other risk factors, and reduces the risk of chronic diseases such as heart disease and related factors (excess weight, high blood pressure and high cholesterol), diabetes, bowel cancer and breast cancer, as well as reducing dental caries. There is increasing evidence of a link between nutrition and mental health.

Dietary factors contribute as much as tobacco smoking to the burden of disease and premature death in Australia.[65] Particular aspects of diet which have been singled out include low fruit and vegetable intake, high levels of fat especially saturated fat, and high levels of sugar and salt.

There is accumulating evidence about the importance of fruit and vegetable intake in reducing the risk of heart disease and cancers, especially cancers of the digestive system.[66] [67]

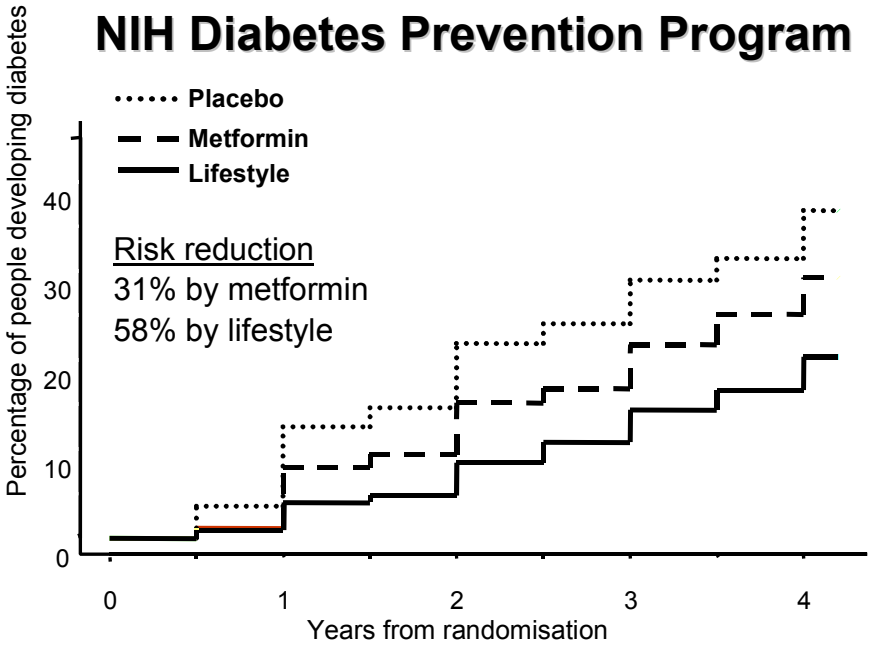
Changes in cooking and eating habits, with more consumption of easy to obtain high energy-dense foods and larger portion sizes, has resulted in an environment conducive to excess energy intake, leading to overweight and obesity.

Change in diet can quickly improve health. Recent trials have shown benefits from lifestyle changes (diet and physical activity) in preventing diabetes and in

[65] Mathers Cm Vos T, Stevenson C *The burden of disease and injury in Australia.* AIHW Cat no. PHE 17 Canberra: Australian Institute of Health and Welfare, 1999.
[66] World Health Organization. *World Health Report 2002. Reducing risks, promoting healthy life.* Geneva, WHO 2002
[67] Ness AR, Powles JW. Fruit and vegetables and cardiovascular disease: a review. *International Journal of Epidemiology* 1997; 26:1-13.

preventing further heart attacks in people with heart disease. The US and Finnish diabetes prevention studies found that changes in diet and physical activity were more effective than treatment with metformin, a drug to lower blood sugar, in preventing or delaying onset of diabetes.[68] [69](Fig.6)

Figure 6: Comparison of lifestyle change with metformin and a placebo in reducing risk of diabetes in people at high risk



The DPP Research Group, *NEJM 346*:393-403, 2002

In the Lyon Diet Heart Study of people who had had one heart attack, those assigned to the highly palatable and inexpensive Mediterranean-type diet had 72% fewer deaths from heart disease and non-fatal heart attacks over a 4 year period compared with a control group.[70] This is more effective than any drug trial so far.

While many of the diet-related health problems in Australia are due to excess energy intake and consequent obesity, the challenge among older people is often more one of ensuring adequate nutritious food. As the senses of smell and taste deteriorate, older people's appetite decreases. Dental problems often limit the ability of older people to chew nutritious foods such as fruit and vegetables and nuts unless they are pureed. The Australian Longitudinal Study on Women's Health found that 30 per cent of women in their seventies have poor nutrition as a result of factors such as teeth, mouth or swallowing

[68] Diabetes Prevention Program Research Group. Reduction in the incidence of Type 2 diabetes with lifestyle intervention or metformin. *N Engl J Med* 2002; 346:393-403

[69] Tuomilehto J, Lindstrom J, Eriksson JG et al. Prevention of type 2 diabetes mellitus by changes in lifestyle among subjects with impaired glucose tolerance *N Engl J Med* 2001;344:1343-50

[70] de Lorgirel M, Salen P, Martin J et al. Mediterranean diet, traditional risk factors, and the rate of cardiovascular complications after myocardial infarction – final report of the Lyon Diet Heart Study *Circulation.* 1999;99:779-785

problems; inability to buy food or to cook and feed themselves; irregular meals; or inadequate intake of fruit, vegetables and dairy products.

Poor nutrition has been shown to be associated with mental health problems, including dementia, particularly among older people. Deficiency in essential nutrients (e.g. Vitamin B12, Vitamin B 6, folate and some antioxidants) has been linked with an increased risk of dementia[71]. Protein–energy malnutrition and vitamin deficiencies are associated with decline in cognitive functioning in older people. The fatty acid profile of the diet, including an imbalance in the ratio of the essential fatty acids, is weakly related to depression[72].

Constituents of a healthy diet

A healthy diet does not have to be an unpalatable diet. For example, the so-called Mediterranean diet contains all the ingredients for healthy eating: a high intake of plant foods (fresh fruit and vegetables, whole grain cereals, nuts), vegetable oils high in monounsaturated fats, lean meat and regular consumption of fish. More research is needed on the effect of the various components of this diet, as well as its acceptability in Australia.

Nutritionists recommend that people eat less of high energy-density foods such as fats and sugars, and more of low energy-density foods such as fruit and vegetables, although the frail elderly need high energy-density foods to gain an adequate intake.

Much is still to be discovered about the value of the constituents of various foods and the mechanisms by which they operate to improve health and prevent disease. There is general agreement among nutritionists that a balanced diet of healthy food is preferable to ingestion of tablets of vitamins or of particular dietary ingredients. The recent events in relation to complementary medicines have drawn attention to the vast market in Australia for dietary supplements.

[71] Gonzalez-Gross M, Marcos A, Pietrzik K. Nutrition and cognitive impairment in the elderly *British Journal of Nutrition* 2001 **86** (3): 313-321.
[72] Buinsma K, Taren D Dieting, essential fatty acid intake and depression Nutrition Review 2000 58(4): 98-108.

A GOOD NEWS STORY: HEALTHY FATTY ACIDS

- Fatty acids are an essential part of human diets and play a key role in our physiology and cellular processes.
- Within the general class of fatty acids are the omega-3 fatty acids of marine and plant origin.
- Australia is playing a significant role in helping to understand the roles and importance of omega-3 fatty acids.

This research includes

- the disposition of the oils in Australian sea foods,
- their influence in human development, and
- their spectrum of activities and benefits particularly in cardiovascular disease and inflammation.

Achieving healthy dietary habits

Changing dietary patterns is not a simple matter. Food choice is not just a matter of knowledge; many complex social, economic, cultural and structural factors affect dietary patterns and eating habits. Structural barriers to healthy eating include food supply systems, food transport practices and costs, competitive food pricing and public transport affecting the ability to shop for food. Food has been shown to be more expensive in areas with higher concentrations of disadvantaged people and such vulnerable groups have fewer personal and economic resources to overcome the structural barriers[73]. Food security, simply having the resources to put food on the table, is an issue for many.

What can science and technology contribute?

Research issues in nutrition range from the biochemical to the behavioural, from investigation of the composition of food and the effects of specific components, to the behavioural and social science investigations about why people eat what they do, and issues such as the impact of food labelling. A multi-disciplinary approach linking Australia's strengths in food production, food science and nutrition and biotechnology combined with expertise in biomedical research can make a major contribution to understanding the health potential of foods and nutrients and how they can be applied in reducing the burden of chronic diseases.

[73] Strategic Inter-governmental Nutrition Alliance. Eat Well Australia; an agenda for action for public health nutrition. Canberra, National Public Health Partnership, 1999.

NUTRITION: RESEARCH AGENDA

Discovery

- Effect of dietary components on gene expression
- Understanding of optimal diet combinations for prevention of chronic diseases
- Dietary factors affecting satiety
- Primary ageing and metabolism change in the elderly and implications for dietary design
- Effect of structural, social and cultural factors on diet; how diet contributes to health inequalities

Translation

- Promotion of bulky diets with low energy density
- More informative food labelling, esp. with reference to sugar
- Alternative strategies to 'low-fat' for maintaining healthy weight
- Benefits of physical activity and nutrition for older people with specific chronic diseases
- Improving nutrition in older people – attention to food preferences, high energy density foods
- Impact of oral health on nutrition
- Improving accessibility of healthy food

Technology

- New food products and processes (e.g. palatable, healthy takeaways)
- growing of varieties of fruit and vegetables which keep better
- advances in packaging and transport of fresh fruit and vegetables

RECOMMENDATION 2: NUTRITION

Recognising that with its expertise in food production, food sciences, biotechnology and biomedical and behavioural research, Australia can move to a globally competitive position in the understanding of the health potential of foods and nutrients and its application to the reduction in the burden of chronic diseases, the Working Group recommends:

That a major multi-disciplinary and multi-agency initiative be established to harness Australia's strengths in biotechnology, biomedical research, food sciences and behavioural sciences by:

- *using emerging biotechnologies to help identify, at production, candidate foods for testing for health potential*
- *identifying foods, nutrients and dietary practices and patterns with protective health potential and substantiating their effects*
- *integrating genomics and proteomics with a program to identify early markers of disease onset (biomarkers) and use these markers in developing new strategies for intervention*
- *expanding our knowledge of the roles of nutrition, physical activity and gene and phenotypic expression in facilitating healthy ageing;*
- *examining personal, social and structural influences on dietary patterns, including more informative labelling of healthy foods;*
- *undertaking well-designed intervention studies to examine the efficacy and effectiveness of strategies to produce dietary change; and*
- *fostering multi-disciplinary training of scientists and health professionals in the fields of health, ageing and nutrition.*

Pharmacological interventions

The natural course of chronic disease, such as heart disease, is a continuum, starting with freedom from disease, progressing to biological changes (such as obesity, high blood pressure and high cholesterol), to clinical illness which if untreated can progress to complications and ultimately death.

While it is clearly preferable to prevent these biological changes from occurring in the first place, once people have developed abnormalities such as high blood pressure and high cholesterol, identifying and treating these high risk individuals to prevent disease is a critical part of prevention. This aspect of preventive health care is very costly to the health system. For example, two cholesterol-lowering drugs (both statins) account for the highest costs to government (Simvastatin, $229 million per year and Atorvastatin, $214.2 million) through the Pharmaceutical Benefits Scheme.

The good news is that in many situations, lifestyle changes (healthy diet and physical activity) can be as effective as medication in preventing heart disease. The 2001 Report of the US Expert Panel on Detection, Evaluation,

and Treatment of High Blood Cholesterol in Adults, suggests that while there will always be many persons who require lipid-lowering drugs, lifestyle changes are the most cost-effective means to reduce risk for coronary heart disease. [74] [75]

The potential for savings is great and this has important implications for the Pharmaceutical Benefits Scheme as the population ages. Little is known, however, about the interaction of medications and lifestyle change, though evidence suggests that regular physical activity, for example, would result in reduced requirements for medication for common problems such as diabetes, high blood pressure and depression.

Table 4: Cost-effectiveness of prevention for heart disease

Treatment	Cost per life year gained (Pounds Sterling)
Aspirin	50
Thiazide (anti-hypertensive)	66
Mediterranean diet	290
ACE Inhibitor (antihypertensive)	5634
Simvastatin (cholesterol lowering)	8240

Source: Ebrahim S, Davey Smith G, McCabe C, Payne N, Pickin M, Sheldon TA et al. What role for statins? A review and economic model. Health Technol Assess 1999;3: No (19)

There needs to be an optimal balance between investment in pharmaceuticals and lifestyle interventions in the prevention and management of chronic conditions, particularly for older adults. Considerable effort is expended by the pharmaceutical industry in informing doctors about new drugs. Who will carry out this task with respect to lifestyle interventions?

Other issues in the pharmaceutical aspects of prevention in older people are the relative effectiveness of the older and cheaper alternatives to the newer expensive drugs. For example, a recent American study showed that thiazide drugs, at one tenth of the price, were superior to the more expensive ACE

[74] National Institutes of Health Third Report of the National Cholesterol Education Program (NCEP) Expert Panel on Detection, Evaluation , and Treatment of High Blood Cholesterol in Adults (Adult Treatment Panel III) - Executive Summary National Heart, Lung and Blood Institute, National Institute of Health, NIH Publication No. 01-3670, May 2001

[75] National Institutes of Health *Third Report of the National Cholesterol Education Program (NCEP) Expert Panel on Detection, Evaluation , and Treatment of High Blood Cholesterol in Adults (Adult Treatment Panel III) - Final Report* National Heart, Lung and Blood Institute, National Institute of Health, NIH Publication No. 02-5215, September 2002

inhibitors for prevention of stroke, coronary heart disease and heart failure, especially for the elderly[76].

There is some evidence for the use of medications more widely as preventive measures, not just for high risk people. Mass use of a limited range of cheap medications for prevention, such as small doses of aspirin for prevention of heart attacks, has the potential for improving the health of older people. Identifying such possibilities is an important part of the discovery agenda.

The burden of proof of safety must be much higher when mass medication is proposed as the recent concerns about hormone replacement therapies and complementary medicines have shown. Even the well-known and relatively safe aspirin risks causing peptic ulcer and bleeding episodes. Such measures should therefore not be seen as a substitute for lifestyle modification.

Conclusion

The evidence presented in this chapter has clearly demonstrated that there are major gains to be made in healthy ageing of the Australian population with small improvements across the whole population in the risk factors of nutrition and physical activity. While there is still much on the discovery agenda, as outlined above, much of the contribution of science and technology needs to be in translating existing knowledge into more effective action.

Chapter 6: An Age-Friendly Australia - Work and Social Environments

Introduction

The population ageing anticipated over the coming decades is unprecedented. As individuals and as a society, we are not used to having very large numbers of older people, especially not large numbers of very old people over 80 years. These pioneers in ageing are creating new roles for an older community. It is important to explore what roles older people might play in a more age-diverse world with relatively more older people. Who are the new role models, and what do they have to teach us? We need research to understand more about the potential of an older population and ways in which Australia society can work toward achieving it.

Healthy and productive ageing depends on broad social, work, and policy environments in which individuals live, as well as on their own behaviour. The WHO concept of active ageing refers to *continuing participation in social, economic, cultural, spiritual and civic affairs, not just the ability to be physically active or to participate in the labour force.*[77]

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[76] ALLHAT Collaborative Research Group, Major outcomes in high-risk hypertensive patients randomised to angiotensin-converting enzyme inhibitor or calcium channel blocker vs diuretic – The Antihypertensive and Lipid-Lowering Treatment to prevent Heart Attack Trial (ALLHAT) *JAMA* 2002;288:2981- 2997

[77] World Health Organization. Active Ageing: a policy framework. Geneva, WHO, 2002 p 12

Recent work from the Australian Institute of Family Studies has demonstrated the value to the economy of the roles played by older people in informal and volunteer work, and their caring roles to family members and others. 'The unpaid labour of (older) people can act as a social glue'. [78]

International research has established that social and work environments are major determinants of whether the skills, expertise, and talents of the growing mature age population are used fully. These influences can be improved through actions by communities, businesses and industries, and governments. Accordingly, the Key Result Areas of the Commonwealth, State, and Territory Strategy on Healthy Ageing include community attitudes, work and community participation, and inclusive communities. [79]

Community attitudes

With mature age people covering an age range of over 50 years, there is a great diversity of resources, expectations, functional capacity (physical and mental), talents, skills and experience. The stereotypes of older people as frail, unproductive and unable to cope with the changing demands of modern society, are clearly incorrect but continue to act as barriers to people's capacity to participate in society and to their quality of life and health. Ageist attitudes have been found to leave older people feeling old and disempowered, in contrast to normal ageing with its opportunities as well as limitations.[80]

A recent study of Australian attitudes found that more than two thirds believe that our society views older people with less respect than they deserve.[81] Younger people tend to stereotype older people by their physical characteristics. Denial about growing old prevents middle aged people from planning for growing older or looking positively towards their own older years. On a more optimistic note, a follow-up survey suggested that the International Year of Older People had a positive influence in improving attitudes towards ageing and older people.[82]

Positive community attitudes and expectations about ageing and the capacities of older people are crucial to healthy and productive ageing. There is a need to move from seeing older people as a social drain, or liability, to

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[78] Gray M, de Vaus, Stanton D. *Measuring the value of unpaid household, caring and voluntary work of older Australians*. Paper presented at 4th International ResearchConference on Social Security, Antwerp, May 2003. (Australian Institute of Family Studies)

[79] *Commonwealth, State and Territory Strategy on Healthy Ageing*. 2000. Prepared by the Healthy Ageing Task Force, comprising senior officials from the Commonwealth, and all State and Territory Governments

[80] Minichello V, Brown J, Kendig H. Perceptions and consequences of ageism: views from older persons. *Ageing and Society* 2000 ;20: 253-278

[81] Worthington Di Marzio, *Ageing, community attitudes and older Australians*.. Report produced for the National Strategy for an Ageing Australia. Commonwealth Department of Health and Aged Care, 1999.

[82] Worthington Di Marzio, *Ageing, community attitudes and older Australians*.. Report produced for the National Strategy for an Ageing Australia. Commonwealth Department of Health and Aged Care, 1999

recognising them as a social gain or asset, which we do not yet utilise effectively. The social drain position leads to the false conclusion that ageing decline is inevitable, and that therefore people are not worth further investment beyond a certain age.

The social gain position views older people as being a range of individuals who wish to be largely responsible for their own quality of life, are actively involved in community activities and interactions, and have the capacity to continue to grow and to contribute. All older people, including the relatively few who are frail and living in residential care, are to be supported and valued for themselves and for the contributions they have already made.

There is an important discovery research agenda to be followed here. We need a better understanding of attitudes to older people and how they might be influenced to become more positive and inclusive. How much influence does the media have on stereotyping and what can be done to make it more positive?

COMMUNITY ATTITUDES TO OLDER PEOPLE: A RESEARCH AGENDA

Discovery

- Factors affecting attitudes to older people – strategies for fostering attitude change and changing stereotypes
- Understanding attitudes to ageing, disability and death

Labour force participation and health

The extent to which people continue in the paid workforce has a major bearing both on individuals and on society at large.

For ageing individuals, working a few years longer can bring continuing social benefits and increased income adequacy in later life. Flexible paid work opportunities can increase people's choices as to how they spend some of their additional years of productive life.

Given an ageing population with little growth in the numbers of young workers, labour force participation in mid life could be critical in the future to economic growth and the balance of government tax and expenditure[83]. It has been argued that if each age and gender cohort were to rise towards the top of the OECD countries' current experience over the next twenty years, the level of GDP per capita could be over 9 percent higher by 2041-42 than the projection in the Intergenerational Report, and most of the long term gain could be achieved by the 2020s.[84]

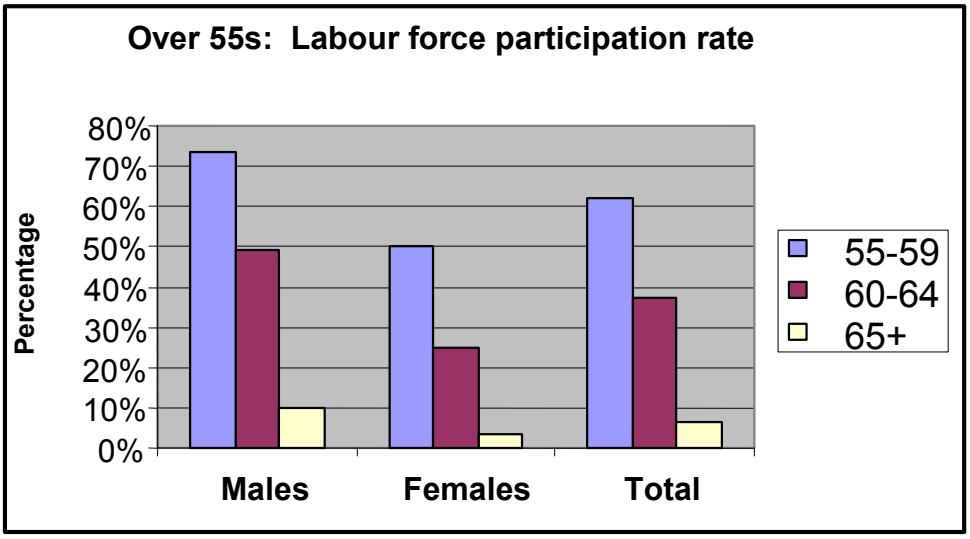
Australia, however, has a relatively low level of participation of people over 55 in the labour force (Figure 7). While labour force participation for women has

[83] Budget Paper no. 1, 2003-4. Statement 4. Sustaining growth in Australia's living standards. P4-31 Commonwealth of Australia, 2003.
[84] Ibid.

been increasing at all ages, labour force participation for men has been falling significantly in the 55 to 64 age range – a decline twice as great as in the USA over recent decades.[85] Since 1970, the full-time employment-population ratio of males 45-54 years of age has fallen by 17 per cent, with the corresponding figures of a 34 per cent decline for those 54-59, and a 52 percent drop for those 60-64. At today's population levels these declines account for 537,000 workers.

The self-reported reasons for leaving the labour force before the traditional retiring age include involuntary redundancies, targeted 'voluntary' separations, active and passive age discrimination, the availability of other income such as government benefits and superannuation, changed attitudes to work and leisure, and ill health or disability of the employee or a dependant.[86]

Figure 7: Percentage of Males and Females over 55 participating in the labour force, Australia 2002 [87]



The relationships between health and labour force participation are complex and poorly understood. There has been little comprehensive research devoted to documenting and understanding these important issues.

ABS data show that one third of Australians aged 50-59 years and a fifth of those aged 60-64 years who leave the workforce do so reportedly because of illness or disability, usually due to one of the common chronic diseases or conditions. Health problems may cause early retirement, either voluntary or involuntary.

Poor health and labour market outcomes are related. The less healthy are paid lower wages, experience higher rates and longer periods of unemployment and, in many instances, are never able to find a stable job.

[85] Ibid.
[86] ABS 6238 Survey of retirement and retirement intentions 1997.
[87] ABS *Labour Force Survey* September 2002 cat no 6291.D

The relationship between poor health and poor labour market outcomes leads to a close association between poverty and ill health. Many of the chronic health problems which affect productivity and shorten working life, such as obesity, diabetes, musculoskeletal conditions and mental health problems, are also very common in the general population. Appropriate preventive measures have the potential to reduce health-related premature withdrawal from the labour force. Maintenance of physical fitness, for example, plays a crucial role in maintaining the *capacity* for work as well as reducing the risk of a number of health problems. The picture is, however, more complicated than this.

To some extent the definition of health for the workplace is linked to fitness to do the job, which depends not only on individual fitness, but also on the demands of the job. For example, people with musculoskeletal problems may be able to work successfully in clerical jobs but be precluded from manual labour. On the one hand, changes in job requirements due to technology have lowered the threshold for health, or at least fitness. On the other hand, the increase in working hours for those who are employed is increasing demands for mental and physical stamina.

There has always been a close association between the age of the worker and ill health, and the changing labour market demands towards longer hours and more job competition may be expected to impinge on the employability of older workers. Most older workers are not as strong as younger workers and, on average, have less stamina. Older workers are more likely to take longer to recover from ill health. Measures to increase participation by older workers will have to include flexibility to take these issues into account.

Two other factors which affect the rate of workforce participation among older workers are the availability of welfare benefits and of superannuation. Superannuation arrangements may provide financial disincentives for staying on longer in the workforce. While early retirement to take up superannuation is happening, especially in the 60-64 age group, most of the reduction of full-time employment among older workers has been associated with increasing uptake of welfare payments, especially the disability support pension.

Availability of employment is another crucial factor. On the limited longitudinal evidence available, the Australian experience is consistent with findings from other OECD countries ‘‘that withdrawal from workforce participation often follows job loss, usually afflicts the poorer, less educated and less skilled, is seldom reversed and is associated with persistent poverty.”[88] In Australia this situation is reflected in the growth in the uptake of the Disability Support Pension noted above, often after long periods of unemployment. Research indicates a close association between job availability and take-up of Disability Support Pensions. It may be that this growth is associated at least as much with lack of employment opportunity for this group of workers as with ill health.

[88] Henry K. *Economic prospects and policy challenges*. Address to the Australian business economists, Sydney, 20 May 2003.

This is a serious human problem. As the Secretary of the Treasury noted in a recent address, "Improving participation outcomes is worth pursuing for its own sake – for the (constitutive) contribution it might make directly to wellbeing and not just because of its (instrumental) contribution to GDP per capita".[89] It is a complex problem, which needs further exploration, and is likely to need economic solutions as well as health solutions.

The issue of part-time work is important for mature age workers, both for managing ill health and for facilitating the transition to retirement. There is a need for greater adaptability and flexibility in the workplace in assisting people to continue working while actively managing a chronic health problem. Policies which discourage those in ill-health and those in receipt of government income support from accepting part-time employment need to be re-considered. More flexible working arrangements, including part time work and superannuation and pension arrangements, which support these, would make the transition to retirement a more gradual process.

Another potentially important factor in assisting those people who want to remain in, or return to the workforce, achieve their goals, is negative attitudes of employers to mature age workers and failure to recognise their contributions. Unskilled people may be the first to be laid off. It is very difficult for such people to re-enter the workforce and opportunities need to be provided for re-training and learning new skills. Older workers are often not given opportunities for on-going training and professional development.

Ironically, in this area the contribution of technology to healthy ageing may in fact be negative, since technology has exacerbated the decline in jobs for the less educated, less skilled older male workforce, with the consequent effects of unemployment and unwanted retirement on health.

There is a major research agenda to understand the complex factors affecting the variable ways in which older people may or may not remain in the paid work force. In this research it is important to consider the impact of factors such as the state of the economy, government welfare policies, the nature of the work and the workplace, state of the workplaces, employers' attitudes, as well as the motivations and health of diverse groups of older people.

[89] *Ibid*.

LABOUR FORCE PARTICIPATION AND HEALTH: A RESEARCH AGENDA

Discovery

- Exploration of the factors affecting the rapid growth of disability pensioners among middle aged people.
  Is growing disability created by the changing demands of the labour market?
- Effect on health of the disconnectedness of older workers from the labour market
- Likelihood of the employment levels of older workers returning to level of the 1970's
- Relative roles of economic policy and health changes
  How much of the loss of full-time employment among the older age group is created by a changing labour market and how much by deterioration of health status among older workers?
- Impact of workplace health promotion initiatives on the maintenance of health and fitness. Do workplace physical activity programs really work?

Translation

- Converting the evidence about the positive attributes of older workers into real changes in workforce hiring and personnel practice

Family and community contributions

Older Australians contribute their time and skills voluntarily in both organised activities and on an informal basis within their families, friendships and neighbourhoods.

Older people are productive members of society. A South Australian study showed that people aged 65 years and over contributed far more economic value than they receive through their family, volunteer, community and other activities.[90]

The recent national study carried out by the Australian Institute of Family Studies, based on time use data, comprehensively measured the value of the work done by older Australians in unpaid caring in their own households, to family members in other households and to non-family members in the wider community, together with unpaid voluntary work.[91] The total value of unpaid work by people over 65 was estimated at $39 billion dollars per annum, $ 72

[90] Ranzijn R, Andrews G *et al Ageing and the economy in South Australia: social capital and productive ageing.* A report prepared for the Office of the Ageing, SA Department of Human Services, 1999.

[91] Gray M, de Vaus, Stanton D. *Measuring the value of unpaid household, caring and voluntary work of older Australians*. Paper presented at 4th International Research Conference on Social Security, Antwerp, May 2003. (Australian Institute of Family Studies)

billion if people 55-64 were included. The average was approximately $23,000 per annum for women aged 65 years and over and $17,000 for older men. The economic value of unpaid work by women aged 75 years and over was higher than that of any age category of men. Among older people the value of unpaid work outside the home was significantly higher for those with relatively more education.

Older people also can contribute to society's culture. Many have the experience, temperament and wisdom to play a fundamental role in the transmission of cultural knowledge and skill in a community and in their families. This is particularly so for Indigenous communities and those from culturally and linguistically diverse backgrounds.

Given this encouraging evidence, it is important that we encourage and enable community organisations, including schools, to recognise and utilise the knowledge, skill and wisdom of older people in both structured and unstructured ways. Older people, too, need to recognise the important contributions they can make to local communities, their families and society as a whole, as well as the mental and physical health benefits of these contributions.

COMMUNITY CONTRIBUTIONS: A RESEARCH AGENDA

Discovery

- Which personal and environmental factors influence the contributions of older people to the community?
- What strategies would facilitate these contributions?
- How do these contributions relate to physical and mental health?

Translation

- Assisting 'volunteering from home'
- Matching skills of older people with community needs
- Multi-sectoral approach to recreation for older Australians

Education and training

Rapid rates of economic and social change underscore the value of high levels of initial and ongoing education to enable adaptation to changes throughout life. Re-training and life-long learning are recognised as critical to improved adaptability and labour force participation choices in mid and late life.[92] They are also important for personal and social development and in developing intergenerational links and promoting harmony.

Research demonstrates a positive impact on physical and mental health for those who attend adult education classes or undertake self-paced learning.

[92] Budget Paper no. 1, 2003-4. Statement 4. Sustaining growth in Australia's living standards. P4-29 Commonwealth of Australia, 2003.

Current evidence of the importance of continued mental activity in reducing risk of cognitive decline and dementia adds weight to the argument for facilitating education and lifelong learning for older people.

EDUCATION AND TRAINING: A RESEARCH AGENDA

Discovery

- Factors affecting participation in education and lifelong learning for older people
- Effect of education on physical and mental health
- Effect of education on mental health

Technology

- Expanding learning opportunities through new technologies

Mobility and communication

Movement and communication enable voluntary and paid work, physical and social activities and independence. The phone and IT can overcome some limitations of growing older. Technology-based surveillance, monitoring, and emergency calls from outside the home can assist housebound individuals to feel more secure about their ability to cope if they fall.

But attitudes and lack of skills of older people to technology may be a barrier to its use. A recent study found that a third of the older respondents felt some concern about using technology and felt alienated and marginalised by it.[93] Many older people will choose not to use technology, and many will not have the resources to do so. To fulfil the potential of technology to assist communication, mobility, and learning opportunities for older people, results are needed from research that identifies the barriers to use of technology by older people and how to cross them.

MOBILITY AND COMMUNICATION: A RESEARCH AGENDA

Discovery

- Factors facilitating and impeding uptake of technology by older people and how to modify them positively
- Impact of technology on social interactions

Technology

- Development of new assistive technologies for health surveillance and monitoring

[93] Minichello V, Brown J, Kendig H. Perceptions and consequences of ageism: views from older persons. *Ageing and Society* 2000 ;20: 253-278

Social connections, health and well-being

Social connectedness, meaningful social activities, and contributions to others are significant predictors of wellbeing[94]. Older people report social involvement and encouragement as significant factors in leading healthy lives. Older people can maintain good morale notwithstanding serious illness and disability. The key is to enable them to continue activities and relationships that are important to them and to have social support. Feeling valued and appreciated has a critical bearing on wellbeing.

Retirement presents both opportunities and risks for health and well-being. Overall, people are likely to report improvements to their health, well-being, and healthy life styles after retirement.[95] However, forced or early retirement can have financial, social and health risks. Working class men have been found to be at the greatest risk.

Participation in recreational activities contributes to healthy ageing. Regular, moderate-intensity physical activity is crucially important in enhancing and maintaining functional ability and quality of life. Mental stimulation enhances brain function. Social support is valuable in motivating activity and making it enjoyable. Social participation is facilitated by an environment where older people feel safe, and where there is easy access for older people to appropriate recreational facilities. Conversely, social isolation relates closely to depression, low morale, and poor health.[96] Men are at much more risk than are women.

SOCIAL CONNECTIONS, HEALTH AND WELL-BEING: A RESEARCH AGENDA

Discovery

- Implications of retirement and other transitions for healthy ways of living, health status, and well-being
- Personal and environmental factors that can enable or prevent good health and well being throughout later life

Conclusion

The work and social environment are major priorities for promoting the health and wellbeing of older people. With the ageing of the population, participation in the labour force is an important issue for individuals and the economy. Evidence about the contribution made by older people through unpaid work and caring roles is increasingly being documented. To provide evidence to inform policy, research is needed to explore the complex factors affecting

[94] Browning C, Kendig H Healthy ageing: a new focus on older people's health and wellbeing. In P Limputtong and H Gardner, Eds. *Health, Social Policy and Communities.* Prentice Hall, forthcoming.

[95] Wells Y and Kendig H., 'Psychological Resources and Successful Retirement', Australian Psychologist, 34(2),1999, 111-115).

[96] Brooke L, Davison S, Kendig H, Reynolds A. The support needs of older people in high rise public housing. Human Services Victoria, 1998.

workforce participation and also to identify other ways in which opportunities for the social participation of older people can be realised.

RECOMMENDATION 3: WORK AND THE SOCIAL ENVIRONMENT

Given the importance to the economy of labour force participation and the contributions to the community and family made by older people, and the importance to healthy ageing of continued participation in society, whether in paid work, volunteer work or family contributions, the Working Group recommends:

That a multi-disciplinary collaborative research program (involving economics, social and behavioural sciences, and health sciences) be established to explore the determinants of labour force participation and community and family contributions by older people, to build an evidence base to inform policy and practices that seek to increase participation and productivity.

That this research program take into account factors such as:

- *the state of the economy;*
- *government welfare policies and superannuation arrangements;*
- *the nature of work, the workplace, employer attitudes and practices towards older workers;*
- *opportunities for community contributions and factors that facilitate or impede them;*
- *the preferences, expectations, resources and health of diverse groups of older people; and*
- *opportunities for older workers in education and training and in assistance with transitions to retirement*

The aim would be to help develop policies and practices that would:

- *reduce barriers to the continued workforce participation and community contributions of older Australians raised by negative attitudes;*
- *support a graduated and flexible transition between paid and unpaid work in later years;*
- *provide for more adaptable and flexible workplace and management practices, taking into account older people's health and their caring responsibilities; and*
- *maximise the use of the workplace as a setting for health promotion*

Chapter 7: An Age-friendly Australia - the Built Environment

Consideration of the built environment is essential to the achievement of the vision of increased healthy life expectancy. The built environment has a powerful impact on mobility, independence, autonomy and quality of life in old age and can also facilitate or impede the quest for a healthy lifestyle at all ages. It is also a massive national investment. We need to consider how well this investment serves our needs as our population ages.

An age-friendly environment has been set as a top priority for the International Research Agenda on Ageing produced by the United Nations and the International Association of Gerontology. In Australia, the National Strategy for an Ageing Australia has made a strong a case for research and action addressing housing and locational aspects of ageing.

Ageing and the environment has been set as a top priority by the Commonwealth and State Positive Ageing Task Force and the inaugural National Ageing Research Network meeting. In its submission to the House of Representatives Standing Committee on Ageing, the COTA National Seniors emphasised the importance of community and urban planning, transport and housing, if Australia is to successfully manage an ageing population.

Australia's large baby boom cohort, many of whom have very different expectations and resources relative to those of their parents, will be ageing in Australia's distinctive urban environments and rural communities. These environments feature a predominance of single large family homes in low-density suburbs served by transport systems designed mainly for cars. Both the older population and the built environment are undergoing major changes, however. These changes need to be anticipated to ensure that we build appropriately for the future, including the needs of our older citizens.

The built environment impacts on older people's lives in many ways. The design of houses and the home environment for older people, recreational public spaces, neighbourhood facilities, public transport and urban planning all have important consequences. Technology can assist in activities of daily living and minimise disability.

There are substantial opportunities to improve efficiencies in the built environment and increase returns from national infrastructure investment – a valuable legacy to future generations of Australians. To achieve these outcomes, informed action is required by older individuals and home owners, as well as by governments and the building industries, across fields including aged care, architecture, engineering, occupational health, and urban planning.

An integrated body of evidence is needed to guide decision making by government and key industries as well as older individuals themselves.

Housing

Safe, secure, comfortable, affordable and accessible housing is the cornerstone of a good old age. Two-thirds of older Australians own their own homes outright while another 13 percent are paying off a mortgage[97]. Owner-occupied housing, while not possible for all, does enhance independence and enhance financial security. Older homeowners are more likely to live in older homes, and better quality housing correlates with fewer visits to the general practitioner [98]. Older renters are at greater risk because of insecurity and lower housing quality, [99] with Australian public housing tenants being some of the worst off.[100]

Older persons overall are a significant group of Australian property owners. The value of the current housing stock is estimated to be $2,000 billion and an increasing proportion of this substantial investment in Australia's economy will be owned by older Australians. The extent to which this housing stock meets the accommodation and locational needs of Australia's ageing population could have significant impacts on the efficiency and growth of the Australian economy.

Staying in their own homes as long as possible is a priority for most older people. Environmental familiarity becomes increasingly important as people move into older age, for maintaining self-esteem and social relations[101].

People have different housing requirements as they age and their family circumstances change. Cost-effective adaptation and renovation of existing housing, to the changing needs of ageing occupants, can be enhanced through improved building technologies and assistive living technology. Typical property modifications comprise structural changes, such as ramps, toilet, bath and laundry modification, door widening, handrails, remote controls, new or changed heating, air-conditioning, home automation systems and telemonitoring systems. [102][103]

Falls prevention is an important goal of housing modification for older people. Falls among older people, contribute significantly to health care costs. As

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[97] Australian Bureau of Statistics. *Survey of Disability, Aging and Carers*. Canberra, ACT: Australian Government Publishing Service (AGPS), 1998.

[98] Howden-Chapman P, Signal L, Crane J). Housing and health in older people: Ageing in place. *Social Policy Journal of New Zealand,* .1999;*13:* 14-30.

[99] (Silveira, E, Ebrahim, S. Social determinants of psychiatric morbidity and well-being in immigrant elders and whites in East London. *International Journal of Geriatric Psychiatry,* 1998;*13*(11):801-812.)

[100] Wiggers J, Radvan D, Clover K, Hazell T, Alexander J, Considine, R. Public housing, public health: Health needs of public housing tenants. *Australian and New Zealand Journal of Public Health* 2001; *25*(2): 111-114.

[101] Golant SM. The promise of assisted living. In B. Schwartz & R. Brent (Eds.), *Aging, autonomy and architecture.* Baltimore: The John Hopkins University Press, 1999. pp. 32-59.

[102] Kochera, 2002

[103] (Pynoos, Tabbarah, Angelelli, & Demiere, 1998)

national intervention programs have shown, many falls can be prevented through appropriate home modifications.

Even very frail older people can age at home and have their needs for services reduced, when the built environment is highly supportive and there are limited demands for maintenance and housekeeping. Compared with residential care settings supportive environments can offer more dignity and freedom for individuals at less public expense. Maintenance is an issue for many; in one study 60 percent reported having unmet property maintenance needs. [104]

There is significant scope for design and technological innovation in the new industries of retirement and life style housing and communities. The long term livability and economy of the built environment can be enhanced greatly by initial land use and building designs that anticipate, and are responsive to, the diverse needs of people over the life course.

In order for design for older people to be effective in supporting activities of daily living, comprehensive ergonomic information is required on the diverse anthropometric, strength, vision and light sensitivity, and other biological capacities of older people. This provides a sound foundation for setting performance standards for design and technology that overcome the limitations of ageing (for example, aids, the fit of furniture and the weight and grip of household appliances).

[104] Bridge C, Kendig H, Quine S, Parsons A. *Housing and care for older and younger adults with disabilities* (Final Report). Melbourne, VIC: AHURI, Sydney Research Centre. 2002.

HOUSING: A RESEARCH AGENDA

Discovery

- Ergonomic information on biological capacities of older people in activities of daily living (basis for performance standards for design and technology)
- Assess the housing suitability and quality of the full range of accommodation types in a range of locations for older people particularly those with physical and/or financial vulnerabilities.
- Effects of housing and residential location on lives of older people
- Factors affecting residential stability and moves by older people, and consequences of such moves for individuals and communities
- Aspirations and resources of baby boom cohort re accommodation and location

Translation

- Building regulations to ensure adequacy, appropriateness and adaptability of new and existing housing for people's needs
- Housing and care policies recognising interdependency between accommodation and care
- Best practice in design and adaptation of accommodation and related aids and other supports
- Information to empower older consumers in choice of accommodation and services

Technology

- Design and user friendliness of assistive technology
- Innovative building design to overcome physical, sensory and cognitive impairments
- Innovative materials developed by CSIRO to prevent slips, trips and falls; changes to Building Code
- Adaptation of private homes and residential care to facilitate informal and paid care giving of a high standard

Local neighbourhoods

The place where older people live, and the local facilities available affect the links which they have with their family, friends and the wider community. The social life of older people and their integration into support networks, including their own voluntary contributions, are crucially affected by security and fear of crime, and the age and mix of people who live nearby.

The built environment and local areas are significant influences on the physical and social activity of older people. Walking, the most significant physical activity for older people, is heavily influenced by barrier-free access

and safety of footpaths, parks, recreational facilities, and public transport. Good design and policing of public places are important components of neighbourhood crime prevention.

The level of disability of an older person can be alleviated or accentuated by local environments. For example, disabilities can be effectively created if shops are located beyond walking distance. Supportive environments and 'smart' aids can improve mobility and access for all older people, ranging from movement in their homes through to driving and public transport.

Transport and urban planning

Renewal of urban and rural infrastructure needs to be anticipated and planned for maximum benefits and cost-effectiveness over the anticipated life of these investments. The changing locations of older people – notably within capital cities, rural areas with declining populations, rapidly growing coastal communities – are having major effects not only on housing investment but also on local economies and demand for services, particularly health services.

The ageing of single people and couples in large, low density housing results in potential under-utilization of expensive urban infrastructure and building investment. When older people are enabled to move to smaller infill development, which may allow them to stay in their community, there are more housing opportunities for younger people as well as considerable savings through less need for serviced building blocks on the city fringe.

As people age and are less likely to drive, lack of adequate transport becomes a barrier. Increasing urban densities increase the viability of public transport, but innovative approaches are needed to the provision of public transport for older people.

URBAN PLANNING: A RESEARCH AGENDA

- Land use and urban planning, and transport strategies responsive to ageing
- Modification of community environments to facilitate physical activity

Technology

There is a wide variety of technology applicable to the built environment, from assistive technology (aids to independent living) to the development of new building materials and the use of information technology to assist older people to stay in contact with the world. A recent report from the Myer Foundation has outlined the potential for technology to assist frail older people and their carers. It highlights the areas of communication, mobility, and manipulation, and describes the development of the concept of the Smart House, with

electronic and computer controlled integration of assistive technologies in a home.[105]

Personal safety is also very important to people living alone. Information and communications technology in terms of home panic, and intruder alarms linked to service providers are one means of addressing these concerns.

Technology in the form of decision support systems and advanced communication systems enables more collaborative and better informed decision making on the part of health care consumers and assists with chronic disease self-management.

TECHNOLOGY AND THE BUILT ENVIRONMENT: A RESEARCH AGENDA

- The design and user friendliness of informatics (telehealth, telemedicine, telemonitoring, e-health, home telecare and other forms of medical/health related activities), prosthetic, assistive and surveillance technologies.
- Innovative building design that can overcome physical, sensory, and cognitive impairments that restrict functional capacities and social integration.
- The preventing of illness and maintenance of function by better understanding tissue and adaptive behavioural responses to differing environments.
- The design of communication and decision support technologies to allow consumers to be well-informed whilst supporting collaborative multidisciplinary and consumer driven interactions.
- The design and development of innovative products to fill new market niches that appeal to and are acceptable to older persons.

Conclusion

Opportunities for healthy and productive ageing can be increased substantially through improvements in the built environment. Supportive residential environments, together with assistive technology, can make the crucial difference in enabling vulnerable older people to continue to live independently with good quality of life in their own homes. Research can identify what is needed in the built environment to enhance mobility, independence and autonomy in old age, and what is needed to facilitate healthy behaviour.

[105] Naughtin G. Technology and its capacity to assist frail older people and their carers over the next 20 years. Paper prepared for 2020: A vision for Aged Care in Australia. Melbourne, The Myer Foundation, 2003.

RECOMMENDATION 4: THE BUILT ENVIRONMENT

In view of the impact of the built environment on mobility, independence and autonomy in old age, and in facilitating or impeding healthy choices in relation to physical activity, the Working Group recommends:

That a multi-disciplinary strategy be developed, to build a more age friendly built environment, supporting innovation in planning, design and technology to assist older Australians to maintain their independence at home with good quality of life.

That the strategy include:

- *examination of the impacts and options for improvements in land use planning, transport investment, building regulations (in-fill, building of granny flats), design of public spaces (to allow safe walking), and community crime prevention;*
- *developing ergonomic information and standards for design and technology that help overcome the limitations presented by the ageing process including sensory loss; and*
- *development, evaluation, and promotion of innovative products and materials, assistive technology and building and transport design that will assist older people to maintain their independence. Incentive grants to industry and design awards could be used to promote innovation.*

Chapter 8: Enhancing Research to Promote Healthy Ageing

Actions to achieve the vision of increased healthy and productive life expectancy need to be informed by the best possible evidence from a wide range of scientific disciplines.

High quality research in healthy ageing is needed to improve understanding of the process of ageing across the lifespan, the actions needed to support health throughout life and factors that support and impede healthy ageing. If the vision of increased healthy and productive life is to be realised, the relevant evidence base needs to be further developed, acknowledging the needs of policy makers, practitioners, and the wider community. This knowledge then needs to be disseminated effectively to support policy development, program delivery and individual lifestyle decisions.

The importance of research in the field of healthy ageing has been highlighted in a number of recent initiatives. Research has been recognised in the National Strategy for an Ageing Australia as a key component in a constructive response to ageing. The importance of the field of ageing research is also demonstrated in the identification of the National Research Priority goal *Ageing well, ageing productively* under the broader priority of *Promoting good health and preventing disease, particularly among young and older Australians*.

There have been two recent major reviews of ageing research in Australia. The Healthy Ageing Research Review was commissioned by the Office for Older Australians in the Department of Health and Aged Care, on behalf of the Community Services Ministers' Advisory Council, to determine the key research needs for policy development in healthy ageing, to review current and planned research in healthy ageing, and identify the key players. [106] The review involved consultation with researchers, policymakers, advocacy groups and other stakeholders and reported social and policy research priorities complementary to those in this PMSEIC report.

A study of Research into the Biology of Ageing [107] was commissioned by NHMRC Strategic Research and Development Committee to provide an overview of Australian research into the biological processes of ageing, to make recommendations about strategic directions in this area, and to identify those areas which would be of particular benefit to policy and practice in health services.

This PMSEIC report is not intended to substitute for either of these reviews. Its focus has been on the prevention of ill health and the promotion of health and well being, including the role of the work and social environments and the

[106] Kendig H, Andrews G, Browning C *et al* A review of healthy ageing research in Australia. Canberra, Commonwealth Department of Health and Aged Care, 2000.
[107] Le Couteur D *et al*. Study of research into the biology of ageing. An NHMRC internal information paper.

built environment. A wide variety of specific areas and topics for research has been suggested in the body of the report.

This chapter and its recommendations will take a broader view about the directions for research in healthy ageing in Australia. It will consider the multi-disciplinary nature of the field; various research approaches to healthy ageing with particular emphasis on the value of longitudinal studies; and the need for capacity building.

Multi-disciplinary approaches – a National Network on Healthy Ageing Research

Research into ageing ranges from the genetic and cellular level to personal and societal levels. To that end ageing research uses many disciplines, including ageing biology research, clinical research, the behavioural and social sciences, population-based and epidemiological research and health services and health policy research.

An integrated multi-disciplinary approach is the best way to consider the complex and interactive influences on people's health as they grow older in their social and physical environments. Links are needed among these various research fields so that knowledge gaps are bridged and great ideas are generated as disciplines interact.

The need for a coordinated effort in multi-disciplinary and cross-disciplinary research is recognised in the National Research Priorities. It is also the focus of the Building Ageing Research Capacity (BARC) Project, jointly initiated by the Department of Health and Ageing and the Australian Institute of Health and Welfare. This project aims to improve collaboration between researchers and to work towards an ageing research agenda for Australia.

Without formal structures or networks linking them, there is a tendency for scientific disciplines to work in isolation from each other. Linking researchers together in a National Network for Healthy Ageing Research will provide the structure to facilitate coordination and collaboration and the development of a comprehensive research agenda in healthy ageing, from which different groups and individuals can identify areas in which they can contribute.

As the Australian Research Alliance for Children and Youth (ARACY) established by Professor Fiona Stanley and her colleagues, has already demonstrated, such an alliance or network of researchers provides a valuable point of contact with the research community for other stakeholders such as policymakers in government. This allows research to be related to national needs and facilitates the process of interaction with the policy, services, advocacy, industry and education sectors.

A network of this type would be particularly valuable in healthy ageing, since both the research topics and the application of research results require action across traditional disciplines and portfolios.

RECOMMENDATION 5: A NATIONAL NETWORK FOR HEALTHY AGEING RESEARCH

Given the importance of a mulltidisciplinary approach for research into healthy ageing and in recognition of the diverse range of disciplines involved, the Working Group recommends:

That a National Network for Healthy Ageing Research be established, in order to:

- *recommend priorities for the research agenda in healthy ageing, taking into account the discovery, translational and technology agendas identified in this report;*
- *facilitate collaboration between researchers from various disciplines; and*
- *develop strategies to consult with and disseminate findings to the policy, services, advocacy, industry, and education sectors.*

That the Network be established and funded with the joint involvement of the NHMRC, the ARC, CSIRO, and the Department of Health and Ageing.

That membership of the Network Board comprise researchers from a diverse range of disciplines and fields, as well as nominees of auspicing bodies and key consumer and industry groups.

Capacity building for research on healthy ageing

Both the *Healthy Ageing Research Review* and the NHMRC *Study of Research into the Biology of Ageing* noted that research in healthy ageing is at an early stage of development in Australia. Excellent individuals and small research groups are working in ageing research, and several small research centres are conducting research in healthy ageing.

Building the capacity of the research community to address the research priorities should be given strong support. The important field of ageing research could be made more attractive through targeted funding. It is important to attract and retain the best research workers from a broad range of disciplines, and research training needs to be supported vigorously.

Funding for ageing research tends to be fragmented and is particularly difficult to obtain when the disciplines cross NHMRC and ARC research discipline boundaries. New approaches need to be explored for funding of multi-disciplinary research, and for fostering excellence in new and developing areas.

Research approaches in healthy ageing

Since the focus in ageing research may vary widely from the genetic and cellular to the population level, a range of research approaches is needed. The emphasis in this report has been mainly on approaches that involve studying relatively large numbers of subjects.

The information needed can be provided from existing or secondary data, by cross-sectional surveys and longitudinal studies and by intervention studies. Each has its own purposes and limitations.

Use of existing data sets

A more strategic and coordinated approach to research on healthy ageing would allow better use to be made of existing data sources such as those from the Australian Bureau of Statistics and the Australian Institute of Health and Welfare. These include national surveys such as the ABS National Health Survey, the ABS Time Use Survey, the ABS Survey of Retirement and Retirement Intentions and the ABS Survey of Disability, Ageing and Carers. Information from a number of these surveys and from other sources is collated in the useful document from the Australian Institute of Health and Welfare, *Older Australia at a Glance*.[108]

Other relevant data sources for healthy ageing research include data collected for administrative purposes, such as data on registered deaths, hospital admissions and use of pharmaceutical benefits.

Data linkage has great potential, yet to be fully exploited, while taking into account privacy considerations. For example, linkage of data from the Australian Longitudinal Study on Women's Health to Medical Benefits data has produced important information on the cost of illnesses such as diabetes.

Australia can enhance systematically its knowledge of the health and social dynamics of ageing, and monitor national progress, through regular measurement of indicators including disease and disability rates, other measures of health and wellbeing, workforce participation and other social indicators.

There is also an important role for economic modelling in elucidating various economic and social aspects of healthy ageing.

Intervention studies

Much of the research evidence described in this report about the factors affecting healthy ageing, for example in relation to nutrition and physical activity, comes from observational studies. These studies suggest hypotheses that need to be tested using intervention studies: particular preventive measures are trialled in individuals or whole communities. Randomised controlled trials are the gold standard for assessing the effectiveness of particular interventions, such as the effect of diet and physical activity or particular drugs on the risk of diabetes or heart disease.

Intervention studies in health promotion present particular challenges, which need to be recognised by the funders of such research. Many of the most effective health promotion initiatives occur in community settings, and require

[108] Australian Institute of Health and Welfare (AIHW) *Older Australia at a glance 2002* (3rd Ed) AIHW Cat No AGE 25. Canberra AIHW and DoHA, 2002.

extensive community involvement. Achieving behaviour change involves multiple strategies including raising community awareness and providing supportive environments conducive to healthy behaviour. Such interventions are not as simple as drug trials, and their evaluation is complex. Applying strict experimental design and identifying an unaffected control group may be virtually impossible without seriously compromising the quality of the intervention.

Ultimately, success in health promotion is marked by 'non-events'; the ultimate effects of preventive activities must be modelled in terms of disease and deaths averted, based on trends and comparative studies. Although the studies of preventive interventions in high risk individuals, referred to in this report, have produced an effect within three to four years, beneficial health outcomes of community level interventions take longer to be apparent. A range of intermediate outcome measures is needed such as improvements in relevant environments, changes in public policy, regulatory initiatives, improvements in health knowledge and understanding and positive changes in health-related behaviours. These complexities need to be recognised by those providing funding for trialling such interventions.

Community wide initiatives directed at healthy ageing clearly need to be supported by good evidence for effectiveness of interventions. This report has made recommendations for well-designed intervention studies in nutrition and physical activity, and, importantly, for the implementation of strategies shown to be effective.

The history of health promotion intervention studies in Australia is characterised by too many small pilot studies, often inadequately evaluated, funded for too short a time period to allow the impact to be felt. When the studies have produced positive results, it has been difficult to obtain funding for more widespread implementation. We have the examples of what can be achieved in other countries with long term community-wide initiatives. A much bolder approach is needed in Australia.

Longitudinal studies

Most of the surveys undertaken by the Australian Bureau of Statistics take a snapshot of the population at a single point in time. For scientific research, much more useful information can be obtained by following a group of people over a period of time, surveying them or taking measurements at regular intervals.

International benchmarking suggests strongly that the conduct of such longitudinal or prospective surveys of large numbers of older people is at the forefront of multi-disciplinary research on ageing. In these studies the participating individuals are followed through later life and their health experience observed in terms of personal and environmental factors that influence it.

Following individuals through later life provides essential evidence on what predicts key health and social changes and what the consequences are.

Basic biomarkers and genetic predispositions can be compared with lifestyle, economic, family, and environmental aspects and all of these related to key outcomes such as health, well-being and service use. The unique feature of longitudinal studies is that the personal trajectories of individuals can be studied. It is possible to examine the key transitions in people's lives such as the transition to retirement and the influences on it, or people's trajectories in the development of chronic illness or factors that affect the transition to residential care.

Although the value of the data from longitudinal studies increases over the years, the baseline data from the first round of a longitudinal survey can immediately provide valuable information on the differences between people at different ages.

The sample of people who have agreed to take part in a longitudinal study constitute a wonderful resource for other studies, including intervention studies, which may be nested within the original study.

The establishment of a large national, multi-disciplinary longitudinal study of healthy and productive ageing (comparable to the newly established Longitudinal Study of Australian Children), will fill a major gap in Australian research into ageing, and will provide a vehicle to bring together and focus our best scientific efforts, to link our research and researchers to leading research work overseas, and to apply the findings to health, socio-economic and policy concerns.

Australia has a good research base and the expertise to establish such a study. Expertise and findings are already available from smaller longitudinal studies under way on ageing in specific areas (Adelaide, Dubbo, Melbourne, and Sydney) as well as the large, national Australian Longitudinal Study of Women's Health. These studies are limited by being in particular geographic locations or because they involve particular social groups. It is essential, however, to make the most of these valuable investments by continuing the data collections, analyses of findings and their translation to policy, while exploring opportunities to make connections with them.

These studies are the foundation stones, but a larger and more comprehensive national study is needed to integrate the many influences on ageing outcomes for people in diverse locations across Australia. The Australian Longitudinal Study of Older People (ALSOP) would provide the platform on which innovative and exciting collaborations in research could be built. For example, in-depth research into the biology of ageing could use samples and other information drawn from participants in this study. Research into how medicines are metabolised and how they interact in older people could be done using observations drawn from the individuals in this cohort. The influence of social and environmental factors and the way they interact with personal predispositions could be studied.

Longitudinal studies, with their need for on-going resources over a number of years, have particular difficulty in securing adequate funding. The long-term funding required does not fit well into the shorter range funding cycles of most Australian research funding bodies. In order to obtain maximum yield from the investment of establishing and maintaining the cohort, the studies need to continue for years, with a secure funding base. The Framingham study in the United States, which has provided most of the world's information on heart disease and the factors which cause it, yielded some relatively quick returns, but major benefits have been continuing for over 40 years.

In Australia, considerable effort is often expended by researchers in trying to gather funds for the next round of data collection, and the vital data analysis and dissemination may be limited by insufficient resources.

RECOMMENDATION 6: THE AUSTRALIAN LONGITUDINAL STUDY OF OLDER PEOPLE

Given the importance of longitudinal research studies in understanding the process of healthy ageing in individuals and communities, and in providing valuable information for decision making to enhance healthy and productive ageing, the Working Group recommends:

a) That an Australian Longitudinal Study of Older People (ALSOP) be established

That the study be the base platform for research by many disciplines into all aspects of ageing including that conducted by genomic and basic biological sciences, social sciences, public health and clinical and services research

That it take into account and build on the experience of existing Australian longitudinal studies, and the substantial expertise of the researchers, exploring opportunities to connect the work of ALSOP with existing studies;

That the ALSOP research agenda be developed through a multi-disciplinary approach, by consultation with the National Network for Healthy Ageing Research and a wide range of policy makers, practitioners and consumer groups

That the study give priority to areas that are potentially improvable and important for the health, functioning and wellbeing of older people. It should take into account, but not be limited to, the areas of research identified in this report, including the behavioural determinants of health in older age (particularly mental activity, physical activity and good nutrition); work environments, retirement, social involvement and family and community contributions; and housing, land use and assistive technology

Recognising the value of the unique information provided by longitudinal studies and the fact that longitudinal studies do not fit well into the usual shorter range research funding schedules, the Working Group recommends:

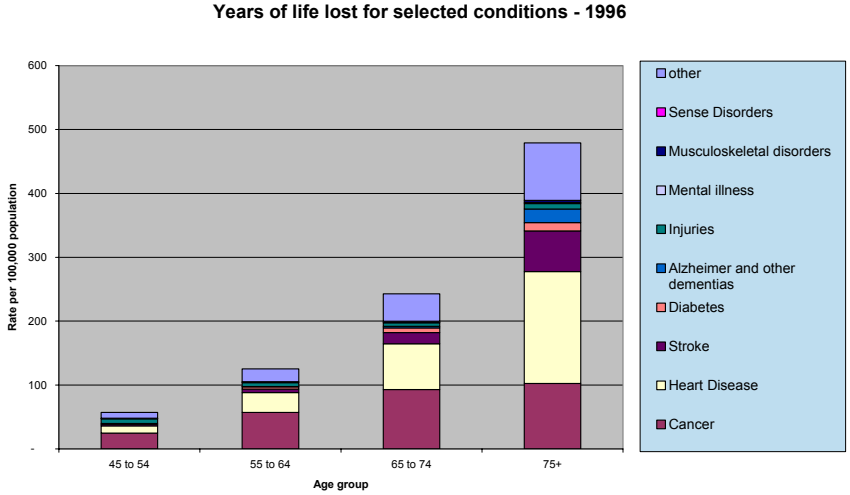
b) That the NHMRC, ARC and relevant Government Departments develop a process for on-going funding of longitudinal studies of ageing, so that maximum value is obtained from the effort in establishing and maintaining new and existing cohorts.

Such funding would include sufficient funding for analysis of the wealth of data generated by these studies and for dissemination of findings, linking them with policy makers, practitioners and community organisations.

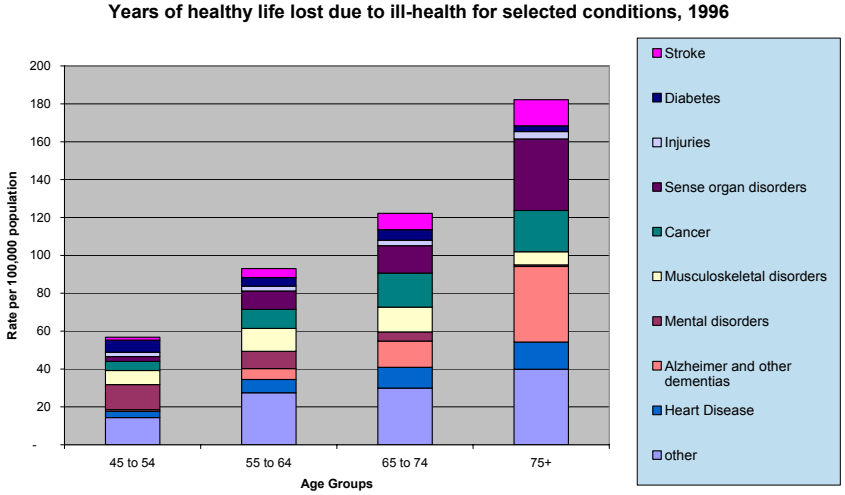
Conclusion

Australia has the scientific capacity to make a major research contribution to the vision of healthy ageing. Recent advances in ageing research, particularly in multi-disciplinary approaches, hold much promise. We can make a strong contribution to international knowledge, and also benefit from maintaining close links with international research developments. It is essential to ensure ongoing communication between research workers in ageing and key players in government, industry, and the community, so that insights gained from research can be translated into benefits for the whole community.

Appendix A: Causes of Premature Death and Years of Healthy Life Lost



This chart shows the number of potential years of life lost due to premature mortality from selected conditions, calculated on the basis of standard life expectancy. Years of life lost are calculated from age -specific death rates and standard life expectancy.[109]



This chart shows the number of potential healthy years of life lost due to the impact of illness and disability associated with the condition. The years of ill-health are calculated from age specific disease rates, weighted by the severity of the condition. They take into account time spent in less than full health due to illness or disability.[110]

[109] Mathers CM, Vos T, Stevenson C The burden of disease and injury in Australia. AIHW Cat no. PHE 17 Canberra: Australian Institute of Health and Welfare, 1999.
[110] Ibid.

Appendix B: Terms of Reference

The working group will prepare a paper and presentation for PMSEIC which will:

- Recommend how Australian science, engineering and technology can provide insights and understanding on improving the quantity and quality of life through disease prevention across the life course to effect a policy and behavioural change;
- Articulate a scientific framework for a healthy ageing research strategy focused on preventing chronic diseases as people age and maintaining their independence and productivity in their older years. The major focus will be on actions for conditions known to be theoretically preventable, such as type 2 diabetes, heart disease, injuries, some mental health problems and certain cancers; and
- Advise on new scientific horizons which suggest promising opportunities for prevention and areas for further investigation, in consultation with the working group on Brain and Mind Disorders – the Contribution of the Neurosciences Revolution.

The working group as part of its task will undertake the following activities:

- Briefly outline current activities promoting healthy ageing in Australia and preventive healthcare;
- Identify research likely to make a significant contribution to healthy ageing, giving special attention to
    - Actions that can be taken throughout life to maximise the chance of a healthy older age;
    - Individual and public actions that can enable positive behaviour and behavioural change and productive supportive environments conducive to healthy ageing; and
    - Physical, mental and social activity, diet and nutrition, including oral health, during the life course.
- Identify areas of action which would have the greatest impact on the projected growth of healthcare costs attributed to government and non government organisations, including self management programs for older people with chronic diseases.

The principal task of the working group will be to identify areas where science, engineering and technology can contribute to healthy older age.

Appendix C: Working Group Membership and Acknowledgements

- Professor Nick Saunders, Chairman of the National Health and Medical Research Council (Chair)
- Professor Tony Broe, Head, Geriatric Medicine, Prince of Wales Hospital
- Professor Wendy Brown, Professor, Physical Activity and Health, School of Human Movement Studies, University of Queensland.
- Professor Leon Earle, Director, Productive Ageing Centre, University of the Sunshine Coast
- Professor Bob Gregory, Head, Economics Program, Research School of Economics and Political Sciences, ANU
- Professor Richard Head, Director, CSIRO P-Health Flagship Program
- Professor Hal Kendig, Dean, Faculty of Health Sciences, University of Sydney
- Professor Stephen Leeder, Director, Australian Institute of Health Policy, University of Sydney
- Professor Allan McLean, Director, National Ageing Research Institute
- Professor Kerin O'Dea, Director, Menzies School of Health Research
- Mr Ian Yates, Joint Chief Executive, Council on the Ageing (COTA)

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