Economic Modelling and Evaluation of Prevention Strategies for Dementia

LAURIE BROWN, GEETHA RANMUTHUGALA and BINOD NEPAL

AAG 41st National Conference ‘Ageing Landscapes’

18 – 21 November, Fremantle WA
Outline

● Aim
● Background
● Methods
● Results
  ● Population ageing
  ● Smoking
  ● Obesity
  ● Physical Inactivity
● Conclusion
Aim

To model the potential impact on dementia prevalence of modifying three lifestyle risk factors - smoking, obesity and physical inactivity - in Australian men and women aged 45 years and over the next 45 years.
Background

- Number of Australians with dementia is expected to more than double by 2030 as is the cost of providing care.

- Population ageing is often considered the most important factor determining the occurrence of dementia in the future.

- Projections of dementia cases are therefore often based solely on the projected age composition of the population.
  - from under 200,000 persons in the year 2000, to over 300,000 by the early 2020s, and rising to approximately 500,000 in the 2030s.
Background cont.

- Emerging evidence for the role of modifiable risk factors in dementia - reduce the disease burden by reducing risk, delaying onset and/or by early intervention to modify disease progression.

- As more intervention options become available, policy makers will need decision-support tools that allow them to evaluate and compare the likely health and economic outcomes of these strategies to identify the most cost effective approaches at a population level.

→ Development of a computer model that simulates the health and economic impacts of dementia prevention strategies.
Methods

● ‘Dementia Model’ generates a time-series of cross sectional prevalence snap-shots of dementia in Australia based on population growth and trends in risk factors

● Group model based on 5-year age groups of men and women separately

● Age-sex groups broken down into high risk (exposed) and low risk (unexposed) categories e.g. past or current smoker vs never smoked
Methods cont.

- Age-sex specific dementia prevalence rates were obtained from the most recent international literature.
- Age-sex risk category prevalence rates were calculated by applying relative risk estimates (from the literature) and risk factor distribution (ABS NHS 04-05).
- The new prevalence rates by risk categories were then applied to the projected population (from ABS Series B).
Methods

● Three risk factors were investigated (only the impact of one factor is examined at a time - joint effect of these lifestyle factors was not modelled)
  ● Never vs ever smoked
  ● Obese (BMI ≥ 30) vs not-obese (BMI < 30)
  ● Sedentary vs active

● A number of scenarios run to compare the impact of differing levels of change in the risk factors.

● The results of lifestyle change scenarios were compared with ‘ageing only’ (base case) scenario to examine the impact of modifying lifestyle factors.
Results
Age-specific prevalence rates of selected risk factors

[Graph showing age-specific prevalence rates for selected risk factors, categorized by sex (Male and Female). The graph includes lines for 'Ever smoked', 'BMI>=30', and 'Sedentary' for different age groups: 45-49, 50-54, 55-59, 60-64, 65-69, 70-74, 75-79, 80-84, and 85+. The prevalence rates are depicted as percentages.]
Ageing of Australia's Population (next 45 years)
Prevalence of Dementia

![Graph showing the prevalence of dementia by age group and gender.](image)
Relative Risk of Dementia

- Ever smoked vs never smoked 1.140
- Obese vs non-obese 2.296
- Sedentary vs active 1.693
Projected numbers of people living with dementia considering ageing only

Number of persons with dementia

- Male
- Female

2006 2011 2016 2021 2026 2031 2036 2041 2046 2051
Impact of reducing smoking

Per cent difference compared to 'ageing only' scenario

- Ageing only
- Smoking drops 2.5% every 5 years
- Smoking drops 5% every 5 years
- Smoking drops 10% every 5 years
Impact of obesity

- Obesity rises 2.5% every 5 years
- Obesity drops 5% every 5 years
- Obesity drops 10% every 5 years

Per cent difference compared to 'ageing only' scenario

2006  2011  2016  2021  2026  2031  2036  2041  2046  2051

Ageing only

Obesity rises 2.5% every 5 years

Obesity drops 5% every 5 years

Obesity drops 10% every 5 years
Impact of promoting physical activity

-20.0%  -15.0%  -10.0%  -5.0%  0.0%  5.0%  10.0%

2006  2011  2016  2021  2026  2031  2036  2041  2046  2051

Per cent difference compared to ‘ageing only’ scenario

-20.0% -15.0% -10.0% -5.0%  0.0%  5.0%  10.0%

Ageing only

Physical inactivity rises 2.5% every 5 years

Physical inactivity drops 5% every 5 years

Physical inactivity drops 10% every 5 years
Conclusion

- Despite the significant health and cost burden associated with dementia, there is a major gap in our knowledge about future impacts and the role prevention strategies might play in reducing these.

- Taking into account the role of modifiable risk factors, the Dementia Model provides a new and innovative means of informing health policy.