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Forecasts for numbers of people living with dementia in five European countries to 2050 and estimates for impact of smoking cessation: a Markov modelling study

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Background: Accurate forecasts for dementia burden are vital in public health planning. Increase in numbers of people living with dementia over time due to population ageing is offset by the decline in age-specific dementia incidence. We developed a Markov model that integrates calendar-trends in dementia incidence with those for mortality and cardiovascular disease to improve forecasts for dementia prevalence in England and Wales, France, Sweden, Spain and Poland and estimate the impact of smoking cessation programs.

Methods: A Monte-Carlo Markov Chain model labelled IMPACT-BAM was developed to forecast future prevalence of dementia, cardiovascular disease (CVD), and disability, and in addition to numbers of deaths and life-expectancy. Data from the English Longitudinal Study of Ageing and Survey for Health, Ageing and Retirement in Europe were used to obtain age- and sex-specific baseline prevalence estimates, transition probabilities, and calendar trends for the five countries. Population numbers by age and sex and mortality rates were obtained from official statistics. Trends in age- and sex-specific mortality rates over the past two decades for each country were projected to the future by fitting P-splines smoothed curves. Meta-analyses of published literature provided relative risks of CVD, dementia, disability, and mortality among smokers by age and sex. These estimates were used to modify transition probabilities proportionate to the change in population attributable risk fractions if smoking is eliminated by 2020.

Results: Estimated numbers of people living with dementia in 2020 and 2050 if current trends continue, and estimated numbers by 2050 if smoking is eliminated (age standardized prevalence %) were 700,000 (3.2), 961,000 (2.2), and 1,119,000 (2.1) respectively in England Wales; 998,000 (3.8), 2,128,000 (4.3) and 2,400,000 (4.2) in France; 147,000 (4.0), 223,000 (4.1) and 239,000 (4.2) in Sweden; 1,090,000 (5.8), 2,913,000 (6.5) and 2,913,000 (6.4) in Spain; and 623,000 (3.9), 1,254,000 (3.5) and 1,442,000 (3.5) in Poland. In England and Wales life-expectancy at age 50 is estimated to be 32.7 years increasing to 37.7 years by 2050 if current trends continue and to 38.6 if smoking is eliminated. Corresponding numbers were 31.5, 38.7, and 40.7 respectively for France; 30.5, 35.3, and 36.1 for Sweden; 31.4, 41.7, and 44.0 for Spain; and 29.3, 37.8, and 39.9 for Poland.

Conclusions: There is expected to be considerable growth in numbers of people living with dementia in the next three decades in five countries from North, West, South and East Europe. The main driver for the increase in numbers of people living with dementia is population ageing as the age-specific prevalence of dementia remains stable or declines over time. Smoking cessation may have a considerable impact on healthy years of life gained without an increase in numbers of people living with dementia at population level.