Review Articles

The global prevalence of dementia: A systematic review and metaanalysis

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Abstract

Background: The evidence base on the prevalence of dementia is expanding rapidly, particularly in countries with low and middle incomes. A reappraisal of global prevalence and numbers is due, given the significant implications for social and public policy and planning.

Methods: In this study we provide a systematic review of the global literature on the prevalence of dementia (1980–2009) and metaanalysis to estimate the prevalence and numbers of those affected, aged $\geq$60 years in 21 Global Burden of Disease regions.

Results: Age-standardized prevalence for those aged $\geq$60 years varied in a narrow band, 5%–7% in most world regions, with a higher prevalence in Latin America (8.5%), and a distinctively lower prevalence in the four sub-Saharan African regions (2%–4%). It was estimated that 35.6 million people lived with dementia worldwide in 2010, with numbers expected to almost double every 20 years, to 65.7 million in 2030 and 115.4 million in 2050. In 2010, 58% of all people with dementia lived in countries with low or middle incomes, with this proportion anticipated to rise to 63% in 2030 and 71% in 2050.

Conclusion: The detailed estimates in this study constitute the best current basis for policymaking, planning, and allocation of health and welfare resources in dementia care. The age-specific prevalence of dementia varies little between world regions, and may converge further. Future projections of numbers of people with dementia may be modified substantially by preventive interventions (lowering incidence), improvements in treatment and care (prolonging survival), and disease-modifying interventions (preventing or slowing progression). All countries need to commission nationally representative surveys that are repeated regularly to monitor trends.
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1. Introduction

Dementia is a clinical syndrome caused by neurodegeneration (Alzheimer's disease, vascular dementia, Lewy body, and frontotemporal dementia being the most common underlying pathologies) and characterized by inexorably progressive deterioration in cognitive ability and capacity for independent living. It is a health- and social-care priority for many high-income countries. Governments in the UK, France, Norway, USA, and South Korea have recently developed specific plans or strategies. Population aging is having a profound impact on the emergence of the dementia epidemic, and is driving government responses. Although young-onset cases are increasingly recognized, dementia is typically a condition that affects older people, among whom it is a leading contributor to disability and dependence [1,2]. Particularly rapid increases in the numbers and proportion of older people are forecast for China, India, and Latin America [3]. By 2050, the number of people aged ≥60 years will have increased by 1.25 billion, accounting for 22% of the world's population, with 79% living in the world's less developed regions. As yet, awareness of dementia and health system preparedness is much more limited in these regions. It is therefore important to track the global prevalence of this burdensome condition, and its regional distribution in the context of the rapidly unfolding demographic and health transitions.

In 2005, Alzheimer's Disease International [ADI] commissioned a panel of experts, coordinated by our group from King's College London, to review all available epidemiologic data and reach a consensus estimate of prevalence in each of the 14 WHO regions [4]. The panel estimated 24.3 million people with dementia in 2001, with 60% living in low- and middle-income countries (LMIC). Each year, 4.6 million new cases of dementia were predicted, with numbers affected nearly doubling every 20 years to reach 81.1 million by 2040. These estimates were described as "provisional," given that prevalence data were lacking in many world regions, and patchy in others [4]. Coverage was good in Europe, North America, and in developed Asia–Pacific countries. Several studies were done in India and China, but estimates were too few or too variable to provide a consistent overview for these very large countries. There was a dearth of published epidemiologic studies in Latin America [5–7], Africa [8], Russia, the Middle East, and Indonesia, and a consequent reliance upon the consensus judgment of the international expert panel. The panel's consensus largely supported a tendency noted in the relatively few LMIC studies available at that time, for the age-specific prevalence of dementia to be lower in those regions than in the developed north [8–10].

Our group reappraised the global prevalence of dementia for the forthcoming revision of the report of the Global Burden of Disease (GBD, which provides information for the global health community on the relative burden contributed by different diseases to years lived with disability and premature mortality), with findings summarized in ADI's *World Alzheimer Report 2009* [11]. By this time, the global evidence base had expanded considerably with more studies from low- and middle-income countries (defined according to the World Bank classification), based on gross national income per capita, and other regions and groups previously underrepresented in the literature. These included prevalence studies conducted by the 10/66 Dementia Research Group in Brazil, Cuba, Dominican Republic, Peru, Mexico, Venezuela, India, and China [12,13], and further new prevalence studies from Brazil [14], Peru [15], Cuba [16], Venezuela [17], China [18], Korea [19], India [20], Thailand [21], Australia (indigenous people [22]), Guam [23], Poland [24], and Turkey [25]. Enhancements from the previous exercise included: a fully systematic review of the world literature on the prevalence of dementia; a critical appraisal of study quality; and an attempt, where possible, to generate regional estimates from quantitative metaanalyses. A reappraisal was timely, not only because of improvements in the evidence base, but also given the very high policy relevance of such data.

2. Methods

The differences in approach between the current study and the generation of the earlier ADI/*Lancet* estimates [4] are summarized in Table E1. We conducted a systematic review of the world literature on the prevalence of dementia with PubMed/Medline up to March 2009 using the search terms ("Dementia"[Mesh] AND (("Prevalence"[Mesh]) OR "Epidemiology"[Mesh])). We sought and included population-based studies of the prevalence of dementia among people aged ≥60 years of age (according to the Diagnostic and *Statistical Manual of Mental Disorders, fourth edition* [DSM-IV] or the *International Classification of Diseases, tenth edition* [ICD-10] criteria, or similar clinical criteria), for which the fieldwork started on or after January 1, 1980. The exclusion criteria were related to sampling, case ascertainment procedures, and outcome definitions:

(A) *Sampling design:*
   1. Studies of prevalence from the follow-up phase (rather than the inception phase) of a population cohort.
   2. Studies sampling from an out-of-date population register (prepared >3 years prior to the survey).
   3. Studies of nursing home or residential care populations, primary care attendees, or other unrepresentative service-user populations.
B. *Ascertainment/outcome definition:*
   1. Studies in which the ascertainment of dementia depended upon help-seeking and/or receipt of dementia care services.
   2. Studies in which "dementia" was diagnosed purely on the basis of cognitive impairment, such as according to a cutpoint on the MMSE.