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Combining longitudinal studies showed prevalence of disease differed throughout older adulthood

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Abstract

Objectives: Disease prevalence rates are often generalized across the older adult age range. By pooling self-reported health data from five Australian longitudinal studies of aging, we were able to present disease prevalence rates by 5-year age bands and sex. We also investigated the influence of education on prevalence at each age range and compared our observed prevalence rates with those from the 2001 National Health Survey (NHS) to see if existing data could be used to augment national estimates.

Study Design and Setting: We used data on 12,718 adults between 60 and 105 years of age from the Dynamic Analyses to Optimise Ageing (DYNOPTA) project.

Results: Hypertension and arthritis were the most prevalent diseases, with approximately 30% of males and 45% of females having either condition. Nearly all diseases were most prevalent amongst older adults in their 70s and lower for individuals in their 60s, and 80s and older. The effect of education varied by disease and older age group. Prevalence rates from DYNOPTA were generally similar to those reported by the NHS.

Conclusion: Disease prevalence is not consistent across older adulthood. Combining longitudinal studies provided a sufficient sample to estimate precise age divisions and can be used to supplement national estimates for specific populations.

Keywords: Disease prevalence; Older adults; DYNOPTA project; Education; Harmonized studies; Longitudinal

1. Introduction

It is well known that the likelihood of being diagnosed with one or more medical conditions increases with older age [1,2]. With the expected exponential rise in the population of individuals aged 60 and older [3], it is imperative to have accurate prevalence rates of disease to help anticipate health care needs and costs [4]. However, because of the difficulty of obtaining data from individuals in the latter half of the older age range, prevalence statistics are often based on limited samples that prevent fine-grained divisions by age (e.g., 60−79 years [5], 75 years and older [6]). Reliance on such samples perpetuates the assumption that prevalence rates are stable over large age bands (e.g., 20 years) and mask any peaks in disease presentation. For example, the National Health Survey (NHS) conducted by the Australian Bureau of Statistics [7] only provided estimates of disease prevalence for individuals of 55−64 years, 65−74 years, and 75 years of age and older. However, the rate of dementia, for example, has been shown to approximately double every 5 years between the ages of 70 and 84 years [8]. Therefore, there are likely to be differences in disease prevalence across older adulthood because of either age-associated increases in incidence or survivor effects.

Clearly, a large sample size is critical in providing sufficient numbers for estimating disease prevalence across more differentiated age spans. This is also needed to allow the investigation of other factors that may be related to the occurrence of disease. For example, both higher education and occupation-based socioeconomic status (SES) were related to lower disease prevalence levels among Swedish older adults [9]. A fine-graded representation of disease prevalence among older adults can also investigate whether such education effects remain at all stages of older adulthood, an issue that has never before been evaluated.

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What is new?

- By pooling self-reported health data from five Australian longitudinal studies of aging, we were able to present prevalence rates for chronic diseases by 5-year age bands and sex.
- Nearly all diseases were most prevalent amongst older adults in their 70s and significantly lower for individuals in their 60s, and 80s and older.
- The influence of education on disease prevalence varied by condition and was often only significant for individuals at particular ages.
- The 10-year prevalence rates were generally consistent with those provided by the National Health Survey.
- Combining existing longitudinal studies provided a sufficient sample to estimate precise age divisions and can be used to supplement national estimates for specific populations.

Finally, although information from other countries can inform a nation's health care planning, the hierarchy of the most prevalent diseases differs from county to country [10]. Furthermore, economic and cultural dynamics are unique to each country influencing policies on health care prevention and in turn disease prevalence. Consequently, the need to use nation-specific data for future planning is critical. Given that national-based health surveys have to report on the health of the entire population, and hence cover the entire lifespan, it is understandable that such surveys from a range of countries tend to use wider age ranges for disease estimates [7,11,12]. However, other research studies designed for specific goals may study a certain age range or population in greater detail than can be achieved by such large national studies. Although individual studies focused on specific disease outcomes typically have smaller samples than large-scale national studies, by pooling data from these individual studies, it may be possible to create another dataset that is comparable in size with the national dataset but specifically focuses on a particular population. Therefore, data from these pooled sources may be able to be used to fill in the gaps in information missed by the national surveys. Small differences in prevalence rates when multiplied up to the population level can add up to large differences in demand for health care and associated costs. Hence, it is vital to evaluate the accuracy and precision of estimates of disease prevalence rates from as many high quality data sources as possible.

The present study used data from the Dynamic Analyses to Optimise Ageing (DYNOPTA) project, a harmonization of data from nine Australian longitudinal studies of aging [13]. Our purpose was threefold: (1) Pooling the data from five of these independently designed studies resulted in self-reported health data from more than 12,000 adults aged between 60 and 105 years, and provided a sufficient sample to present prevalence rates for select chronic diseases by 5-year age bands and sex; (2) This large harmonized dataset also permitted the investigation of the role of education on disease prevalence at certain stages of older adulthood; and (3) comparison of our observed prevalence rates with those estimated by a NHS from the same time period [7,14]. If the prevalence rates are consistent with those obtained from the national health data, it suggests that this dataset, and other datasets like it, may be appropriately used to augment national estimates, particularly for those of advanced age.

2. Materials and methods

2.1. Participants and design

The present investigation used data from five of the nine Australian longitudinal studies of aging involved in the DYNOPTA project. Each of the five studies was closed after baseline recruitment. Because each longitudinal study involved in DYNOPTA was designed with unique objectives, each followed a different assessment interval. Studies also differed in the type and frequency of medical conditions assessed on each occasion of measurement and whether medical conditions were assessed in each testing interval. Consequently, there was no common year when the assessment of medical conditions overlapped across all nine studies (see Fig. 1). However, the time period between 2000 and 2002 permitted the inclusion of data from one measurement occasion for five studies contributing to DYNOPTA: Wave 6 of the Australian Longitudinal Study of Ageing, Wave 3 of the Australian Longitudinal Study of Women's Health (ALSWH) 1921-26 Cohort, Wave 4 of the Canberra Longitudinal Study of Ageing, Wave 7 of the Melbourne Longitudinal Studies on Healthy Ageing, and Wave 1 of the Personality And Total Health Through Life Study (see Ref. [13] for more information on DYNOPTA and the original studies contributing data for harmonization and pooling). This time period also matched the time frame that the 2001 Australian NHS was conducted.

This DYNOPTA sample provided self-report data on medical conditions from 12,718 Australian adults aged from 60 to 105 years (mean = 75.39, standard deviation = 6.86). All participants were randomly selected either from the electoral roll or the public Australian health insurance system. Three of the studies included participants living in either the community or residential care, and two of the studies included community-dwelling participants only. However, only 2.3% of the total sample was living in residential care. Nearly, 85% of the sample was female (because of the inclusion of the ALSWH), but the