Systematic Reviews and Meta-Analyses of the Incidence and Prevalence of Dementia and Its Commoner Neurodegenerative Causes

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The National Population Health Study of Neurological Conditions (NPHSNC) was an ambitious program of research funded by the Government of Canada designed to improve our understanding of neurological conditions and their impact on Canadians.[1,2] It consisted of three national surveys and 13 pan-Canadian research projects targeting 15 priority neurological conditions, including Alzheimer's disease (AD) and related dementias. One of the projects consisted of carefully performed systematic reviews (and, where possible, meta-analyses) of incidence and prevalence studies of these priority conditions.[3]

In this supplement, we report on the results of this work on dementia overall and for the more common underlying neurodegenerative causes (i.e., dementia due to AD, dementia with Lewy bodies [DLB], frontotemporal dementia [FTD]). Table 1 provides a summary of the key findings that are elaborated on in the papers in this supplement. Table 2 provides definitions of the epidemiological estimates for prevalence and incidence reported in these papers.

Accurate information on the epidemiology of dementia is important for planning services to deal with the needs of those suffering from the condition as well as those of their family and caregivers. In projecting future demand, we must determine if incidence and/or prevalence is changing or remaining much as before in the population we serve. Otherwise, there is a risk of either under- or overestimating the resources required if our projections are based on dated information or figures imported from other nations. Finding evidence of true variation over time or across regions suggests that future rates are potentially changeable. Interventions directed at modifiable risk factors in future cohorts could lead to significant delays in onset if not outright prevention of age-related dementia. The need for accurate and timely information underscores the necessity of continuing to do epidemiological studies of these conditions.

As noted in the individual papers, there are a number of methodological issues with the incidence and prevalence studies done to date that detract from our ability to obtain accurate estimates that, among other things, can be used to look for variability across time and regions. While some of these methodological challenges are unique to the specific conditions reviewed, a number are common to all dementias and other neurological conditions.[3] Future studies must use validated diagnostic criteria and approaches to case ascertainment. One particular challenge will be determining how to implement new diagnostic criteria in a manner that ensures that we have data comparable to those from studies using older ones. Unless driven by a particular study design requirement, investigators should target similarly aged populations of the two sexes, collect standardized data and report results in a consistent manner. Use of the recently published standards of reporting of neurological disorders (STROND) checklist, a guideline for incidence and prevalence studies of these conditions, should enhance the quality of future publications.[4]

Notwithstanding these limitations, this supplement summarizes our current understanding of the epidemiology of AD and related disorders. Our work was guided by recommended methodology.[5] Literature searches identified a total of 16,066 citations, with 707 papers selected for full-text reviews conducted by 11 reviewers using a standardized approach. Abstracted data were analyzed, with the findings discussed internally as to what they indicated before conclusions were reached. On behalf of our study team, we are delighted to present the results.

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Table 1: Summary of select key findings from the dementia systematic reviews

Dementia	Individuals 60+ residing in the community
	• Pooled point prevalence 48.62 ($CI_{95\%}$: 41.98–56.32) per 1000 persons • Pooled annual period prevalence 69.07 ($CI_{95\%}$: 52.36–91.11) per 1000 persons • Pooled incidence rate 17.18 ($CI_{95\%}$: 13.90–21.23) per 1000 person-years • Pooled annual incidence proportion 52.85 ($CI_{95\%}$: 33.08–84.42) per 1000 persons • Increasing age associated with higher estimates • Annual period prevalence higher in North America and higher in institutional settings
Dementia due to Alzheimer's disease	Individuals 60+ residing in the community
	• Pooled point prevalence 40.19 ($CI_{95\%}$: 29.06–55.59) per 1000 persons • Pooled annual period prevalence 30.40 ($CI_{95\%}$: 15.64–59.12) per 1000 persons • Pooled incidence rate 15.83 ($CI_{95\%}$: 12.94–19.37) per 1000 person-years • Pooled annual incidence proportion 34.14 ($CI_{95\%}$: 16.44–70.92) per 1000 persons • Estimates vary significantly with age, diagnostic criteria and location
Dementia with Lewy bodies	Individuals of all ages residing in the community or institutions
	• Point and period prevalence estimates range from 0.02 to 63.55 per 1000 persons • Incidence rates range from 0.50 to 1.60 per 1000 person-years • Increasing prevalence with increasing age • Accounts for about 5% of dementia cases
Frontotemporal dementia	Individuals of all ages residing in the community or institutions
	• Period prevalence estimates range from 0.16 to 31.04 per 1000 persons • Incidence rates ranged from 0.00 to 0.33 per 1000 person-years • Accounts for about 3% of dementia cases in studies including subjects 65+ and about 10% among studies restricted to those less than 65

Table 2: Epidemiological terms defined

Term	Definition[6]
Point prevalence	Proportion of individuals diagnosed with a condition (e.g., dementia) at a specified point in time (e.g., May 1, 2016).
Period prevalence	Proportion of individuals diagnosed with a condition (e.g., dementia) during a specified period of time (e.g., between May 1 and August 30, 2016).
Incidence proportion	Number of instances a condition (e.g., dementia) is diagnosed during a specified period of time (note: time duration must be specified for the value to be meaningful) expressed as the proportion of the population at risk for the condition (e.g., 33 per 1000 persons during the period of observation).
Incidence rate	Number of new cases diagnosed with a condition (e.g., dementia) over a defined period of time (e.g., a year) in a specified population who are at risk of experiencing the event (e.g., 33 per 1000 person-years).

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