SPONSOR'S ROLE

Joy Binion is an employee of CMS, the Sponsor. Beyond that, Sponsor's role was limited to the review of the manuscript for clarity and accuracy and the provision of administrative data.

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The importance of sex and age disaggregated data

INTRODUCTION

Older adults, often described as those aged 65 years and above, have been seen as a largely homogenous category.[1] The burden of disease and needs of older adults varies greatly within this large age category,[2] highlighting the importance of finer age disaggregation. Various global policies and groups have stated the need for both age and sex disaggregated data to make older people more visible and to inform actions to improve their well-being.[3] Despite these policies, a gap remains in considering the intersection of sex and age in health data collection and reporting. The lack of disaggregated sex and age data in health research makes it challenging to understand the unique needs of older women,[4] impeding the development of equitable care for older adults.

This study aimed to explore the importance of sex- and age-disaggregated data in health research. Publicly available data on the disease burden in Canada were used to help understand patterns associated with sex and how they relate to age. The burden of disease was estimated using disability-adjusted life years (DALYs), with one DALY representing the loss of the equivalent of 1 year of full health.[5] We examined the number of DALYs per 100,000 population.

METHODS

Data describing the top 10 causes of DALYs in Canada in 2019, disaggregated by age and sex, were obtained from the World Health Organization (WHO).[6] The year 2019 was the most recent year for which data were available. The WHO provided data disaggregated by five-year age groupings.

We focused on two age groups, 65–69 and 85 years and older, to highlight the differences that may exist between younger older adults and older adults that are more advanced in age.

RESULTS

The top 10 causes of DALYs varied depending on the age group (Figure 1A,B). For older adults aged 65–69, the top

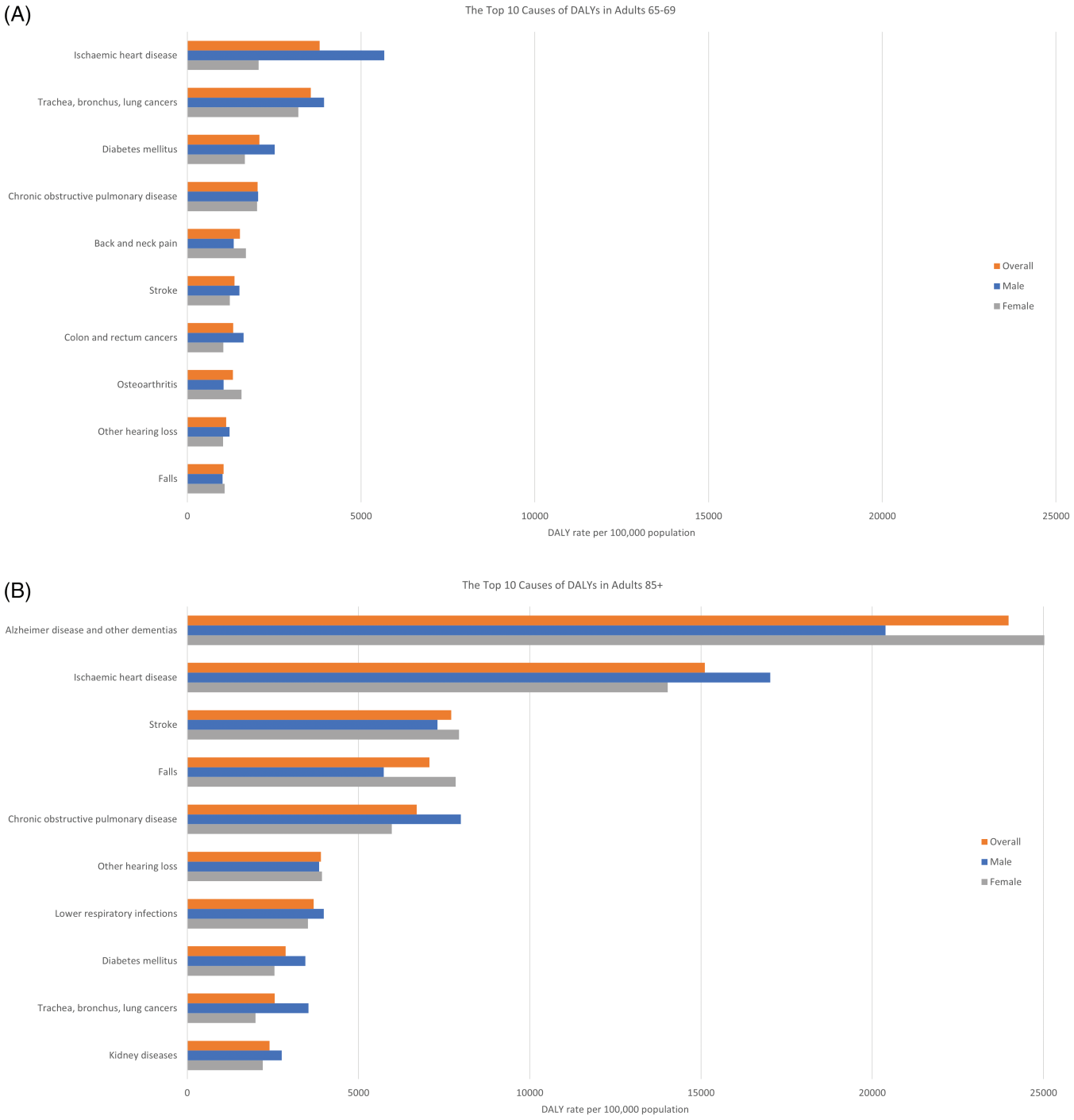

FIGURE 1 (A) The top 10 causes of disability-adjusted life years (DALYs) in adults ages 65–69. (B) The top 10 causes of DALYs in adults ages 85 years and over. This figure describes the top 10 causes of DALYs in Canada in 2019. The data were obtained from the World Health Organization. The data include overall number and disaggregated by sex on two age groupings: ages 65–69 and 85 years and older.

three causes of DALYs were ischemic heart disease, trachea, bronchus and lung cancers, and diabetes mellitus. For older adults aged 85 and over, the top three causes of DALYs were Alzheimer disease and other dementias, ischemic heart disease, and stroke. The magnitude of DALYs also varied by age group, with the highest DALYs seen in the 85 and over age group. The number one disease caused 3808 DALYs in the 65–69-year age group (Figure 1A) and 23,978 DALYs in the 85 and older age category (Figure 1B).

The DALYs clearly differed between sexes for certain conditions. In the 85 years and over age category, men had 1550 (78%) more DALYs because of trachea, bronchus and lung cancers compared with women. For certain diseases, the differences between women and men varied across age

TABLE 1 The relative difference in disability adjusted life years between men and women 65–69 years of age and those 85 years of age and over.

Condition	65–69 years of age			85 years of age and over		
	DALYs[a] in women	DALYs[a] in men	Relative difference between men and women[b]	DALYs[a] in women	DALYs[a] in men	Relative difference between men and women[b]
Ischemic heart disease	2047	5665	177%	14,031	17,019	21%
Trachea, bronchus, lung cancers	3192	3930	23%	1991	3541	78%
Diabetes mellitus	1652	2513	52%	2547	3447	35%
Chronic obstructive pulmonary disease	2004	2039	2%	5972	7988	34%
Stroke	1225	1501	23%	7933	7305	−8%
Other hearing loss	1024	1211	18%	3933	3850	−2%
Falls	1073	1010	6%	7834	5735	−27%

[a]Disability-adjusted life years (DALYs) are shown per 100'000 population

[b]Relative difference between men and women was calculated by using the formula: (DAYLs in men – DALYs in women) * 100% / DALYs in women.

groups (Table 1). In terms of ischemic heart disease, men and women began to converge in the number of DALYs: men had 177% greater DALYs compared with women in the 65–69 year age category, but only 21% greater in the 85 years and over age category.

DISCUSSION

This study demonstrates the importance of collecting and analyzing sex and age disaggregated data. As shown in Figure 1A, B, as individuals age there is a shift in the disease burden. The diseases that most impact older adults in the 65–69 years age category are not the same as in the 85-years and over age category. For example, Alzheimer's disease and other dementias is not one of the top 10 causes of DALYs in the 65–69 year age grouping, but becomes the number one cause in the 85-year and over age category. Data disaggregation by five-year age groupings allows for these differences among older adults to be made visible, which can help support decision-making and planning. In addition, the DALYs caused by a particular disease differ between men and women, further suggesting that older adults are not a homogenous group and that sex-specific patterns of morbidity, mortality, and health risks exist. The percent difference in DALYs between men and women changed between age groups for certain diseases, highlighting the interplay between sex and age.

It is clear that important differences are lost if a study aggregates all older adults into a large 65-years and over age category. We recommend that all researchers collect and analyze health data in a manner that allows for sex and age disaggregation. We support health data disaggregation by five-year age groupings for older ages, which has also been recommended by other researchers.[2] Developing best practices for collecting and analyzing health data should be a priority to ensure people remain visible as they age and to support evidence-based policy.

AUTHOR CONTRIBUTIONS

Natalie Palumbo, Shereen Khattab, Andrea Lawson and Paula A Rochon were involved in the conception and design of the study. Natalie Palumbo and Shereen Khattab analyzed the data and drafted the manuscript. All authors reviewed, edited, and approved the final manuscript. The authors also thank Wei Wu for providing statistical analysis support for this project.

CONFLICT OF INTEREST STATEMENT

The authors declare that there is no conflict of interest.

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COMMENTS

Comment on: Effectiveness and safety of anti-tau drugs for Alzheimer's disease

To the Editor

In a meta-analysis of the effectiveness and safety of anti-tau drugs for Alzheimer's disease (AD) by Zheng et al.,[1] the conclusion that "anti-tau drugs are unlikely to have an important impact on slowing cognitive or functional decline in AD patients" is premature. Although we commend the authors for highlighting emerging tau therapies, we believe that the conclusion was not appropriate, in part, given the varying study designs and different targets and mechanisms of action of the treatments included in the meta-analysis.

Most therapies included in the meta-analysis by Zheng et al., did not target tau. A review identified 143 agents being investigated in 172 trials of treatments for AD and classified their mechanism of action (MOA) according to the Common Alzheimer's Disease Research Ontology (CADRO) developed by the National Institute on Aging and the Alzheimer's Association International Alzheimer's and Related Dementias Research Portfolio (IADRP).[2,3] Thirteen of the 143 agents in development had tau as their primary target.[2] The meta-analysis by Zheng et al., included 34 trial reports investigating 20 agents for the treatment of AD.[1] Applying the CADRO classification to the included agents, only eight agents (16 trials) had an anti-tau MOA, whereas 12 agents (19 trials) had other targets, including amyloid, inflammation, oxidative stress, and synaptic plasticity (Table 1). Furthermore, each anti-tau agent included in the meta-analysis has a MOA that targets a different aspect of the tau pathological process. As the authors state, "It is conceivable that different types of anti-tau drugs might have different effectiveness and safety profiles." In addition, the meta-analysis combined people with mild cognitive impairment and those with mild and moderate dementia. It would have been more appropriate to separate the meta-analysis based on the targets, MOA, and AD severity.

Zheng and colleagues[1] state that anti-tau drugs were more commonly associated with serious adverse events. However, the only anti-tau therapy in Phase 3 development, hydromethylthionine mesylate (HMTM), has been reported to demonstrate very low rates of serious adverse events with none judged as related to the drug and no amyloid-related imaging abnormalities across multiple trials.[4] In addition to favorable safety profiles, several tau-based treatments in development, including HMTM, have an oral route of administration; therefore, they may offer an effective, convenient, accessible, and cost-effective treatment option.

Although there are currently no approved anti-tau therapies for AD, substantial preclinical, Phase 1, 2, and

See the reply by Zheng et al.