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Deaths caused by non-communicable diseases among Australian adolescents in the 2001–2019 period

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Background

Adolescence is characterised by profound physical, mental and social transformations that affect health across the life course.[1] Reducing non-communicable diseases (NCDs) is a key component of the Sustainable Development Goals,[2] with adolescence widely recognised as the critical period when risk factors for NCDs start to emerge. However, adolescence is less well appreciated as a period of risk of death from NCDs. Despite NCDs being acknowledged as a growing challenge among Australian adults,[3] the lack of published recent evidence and cause trends in NCD mortality among Australian adolescents hampers prevention efforts in this important life stage. Reducing the NCD burden is also central to closing the life expectancy gap faced by Aboriginal and/or Torres Strait Islander peoples,[4] which similarly requires characterising the fatal burden in Aboriginal and Torres Strait Islander adolescents. We aimed to characterise and describe the incidence of deaths caused by NCDs among adolescents in Australia from 2001 to 2019.

Methods

In this study, we documented trends in the rate and causes of NCD-related deaths among adolescents aged 10–24 years from 2001 to 2019 in Australia. We acquired data from the Australian Institute of Health and Welfare, and applied a standard coding framework[5] to classify underlying causes of death into three major cause groups: non-communicable diseases (NCDs), communicable diseases and injuries.

We further stratified non-communicable causes of death into nine groups: chronic respiratory conditions, neoplasms, neurological disorders, cardiovascular diseases, diabetes and kidney diseases, digestive diseases, musculoskeletal disorders, substance use disorders and other NCDs (including mental disorders, but excluding self-harm). These classifications all used mutually exclusive and collectively exhaustive categories (see Supplementary Material S1 and Supplementary Table S1 for more details). We quantified mortality rates per 100,000 persons for deaths due to NCDs by age group (10–14; 15–19; 20–24 years), sex and Aboriginal and/or Torres Strait Islander status, and used smooth lines with locally weighted linear regression to visually represent the association between death rates and year.

Ethics

This study was approved by the University of Melbourne's Human Research Ethics Committee (2022-23144-25471-3).

Results

In 2019, the rate of death among 10–24-year-olds was 6.6 per 100,000 persons, which had reduced from 9.6 per 100,000 in 2001. Fig. 1 shows the rate of death caused by NCDs

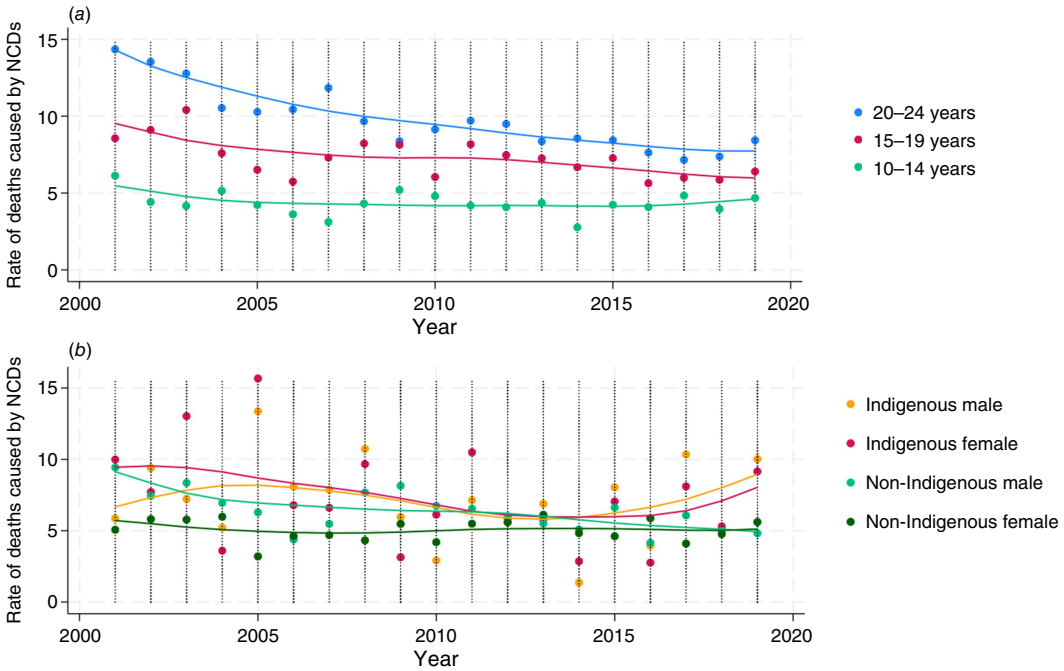

Fig. 1. Rate of deaths (per 100,000 persons) caused by non-communicable diseases (NCDs) among adolescents aged 10–24 years for the period from 2001 to 2019 in Australia, by age group (*a*), and by Aboriginal and/or Torres Strait Islander (Indigenous/non-Indigenous) status and sex (*b*). Note: data are shown as dot points and smoothed lines representing a locally weighted linear regression of year on death rate, for the assessed period.

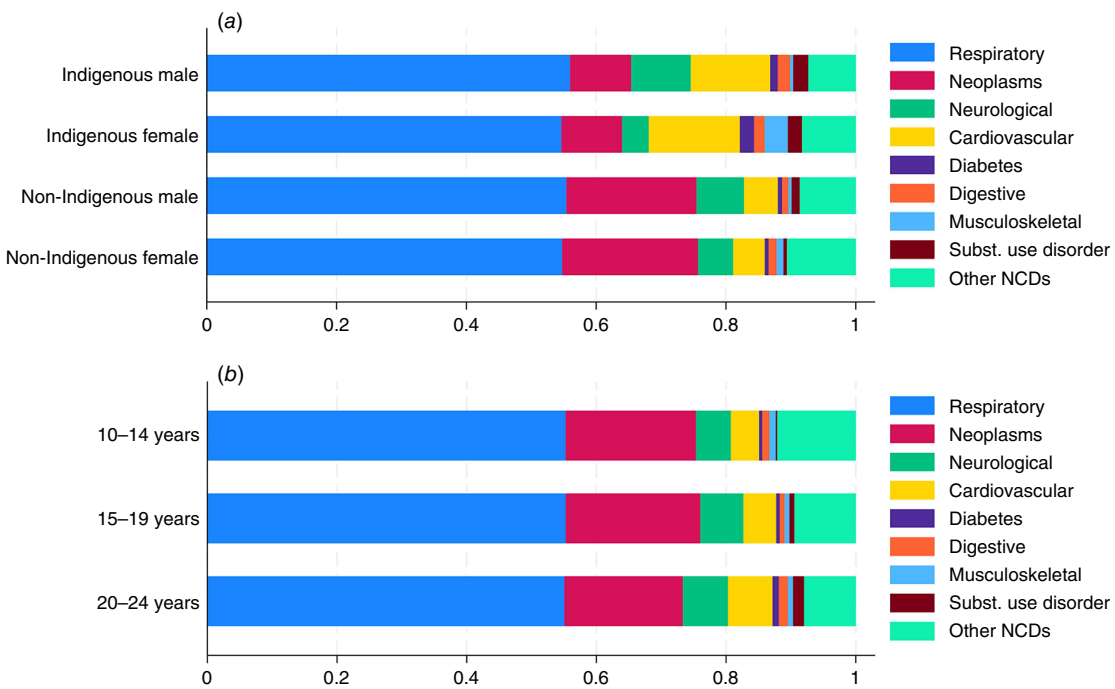

Fig. 2. Percentage of deaths caused by non-communicable disease (NCD) groups among adolescents aged 10–24 years for the period 2001–2019 in Australia, by Aboriginal and/or Torres Strait Islander (Indigenous/non-Indigenous) status and sex (*a*) and age group (*b*). Note: categories in the figure legend refer to, in order: chronic respiratory conditions, neoplasms, neurological disorders, cardiovascular diseases, diabetes and kidney diseases, digestive diseases, musculoskeletal disorders, substance use disorders, and other NCDs.

by age group (*a*) and by Aboriginal and/or Torres Strait Islander status and sex (*b*). The dot points represent the data, whereas the smoothed lines represent a linear regression of year on death rate for the period between 2001 and 2019. The NCD death rate fell from 2001 to 2019 for 15–19 and 20–24 year-olds, but was relatively stable in 10–14 year-olds across the study period. NCD death rates were higher among Indigenous than non-Indigenous adolescents in most years, with recent spikes for Aboriginal and/or Torres Strait Islander males and females after bottoming in 2014.

Fig. 2 shows the percentage of NCD deaths from each cause group by sex and Aboriginal and/or Torres Strait Islander status (*a*) and age group (*b*) for the 2001–2019 period. Chronic respiratory conditions represented the largest relative mortality burden for all groups, followed by cardiovascular disease and neoplasms for Indigenous and non-Indigenous adolescents, respectively. Fig. 3 shows the rate of deaths caused by each of the nine assessed NCD groups of conditions, by age group, in the 2001–2019 period. We observed slightly declining or stable death rates for most NCD condition groups across the three age groups during the assessed period, with exceptions for digestive diseases, and diabetes and chronic kidney diseases, which increased, and substance use disorders with a considerable decrease, all in the 20–24 years group. We note that we used a distinct *y*-axis scale for each graph in Fig. 3 because of high variability in death rates across NCD groups. Underlying data used for creating the graphs are available in the Supplementary Material.

Discussion and conclusions

In summary, we provide evidence that over almost 20 years, 10–14-year-olds have not experienced the same reduction in NCD deaths as older adolescents. An upward trajectory in the rate of NCD deaths for Aboriginal and/or Torres Strait Islander males and females from 2015 to 2019 also raises concerns that the mortality gap between Indigenous and non-Indigenous adolescents could be widening, although this could also be explained by the observed high year-to-year variance, potentially due to decreased quality of reporting of mortality statistics for Aboriginal and/or Torres Strait Islander peoples.

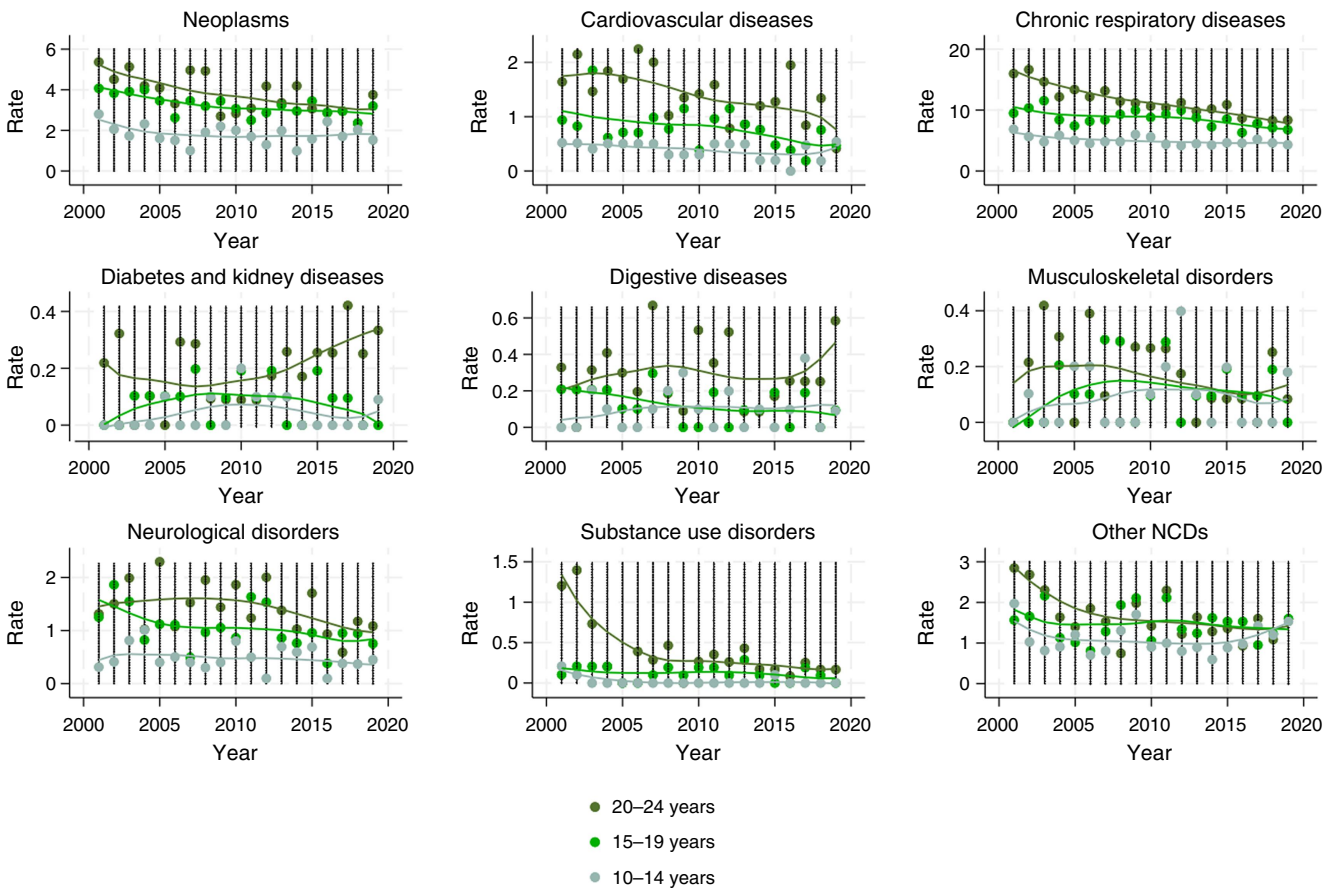

Fig. 3. Rate of deaths (per 100,000 persons) caused by each of the nine assessed non-communicable disease (NCD) groups among adolescents aged 10–24 years for the period from 2001 to 2019 in Australia, by age group. Note: data are shown as dot points and smoothed lines representing a locally weighted linear regression of year on death rate, for the assessed period. Due to high variance in the death rates for each condition group, a different scale is used for the *y*-axis for each group.

Our study has limitations. As we categorised self-harm within injuries rather than NCDs, as typically done within the Global Burden of Disease coding framework that we used,[5] and only primary causes of death were used, both the absolute and relative mortality burdens caused by NCDs could be underestimated. In addition, we only used information on the underlying causes of death. Given that the burden of NCDs among adolescents is manifold and not only represented in primary causes of death, more evidence is needed on the mortality burden due to NCDs using triangulation of different methods to account for multiple and overlapping causes of death.

This is the most up-to-date analysis of NCD causes of death among Australian adolescents. Although there has been growing interest in communicable diseases as causes of death among adolescents, including for marginalised populations,[5] the scarcity of evidence on NCDs as causes of death remains a significant impediment to progress in adolescent health. Our findings highlight the importance of further understanding and characterising recent trends in NCD-related deaths among Australian adolescents, including related intergenerational health inequities.[6] Such evidence might help fulfil the promise of early and effective prevention and treatment strategies that improve health and respond to such inequities.

Supplementary material

Supplementary material can be accessed from the article page online.

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Data availability. Data is available upon request. Please contact the corresponding author for more details.

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Author contributions. LCF, SAK and SMS conceptualised the study. LCF led the data curation, statistical analysis, funding acquisition, investigation, methodology, project administration, supervision, and writing of the original draft. TMRR conducted statistical analysis and contributed to the writing of the first draft. PA and AB supported the methodology. SAK funded the acquisition of the data. SAK and SMS supported the methodology and supervision. All authors reviewed and edited the manuscript, and approved the final version.

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