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Tobacco Use and COPD in Australian Adults: Disease Burden, Risk Factors, and Public Health Interventions

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Abstract. Tobacco use is the single largest preventable risk factor for Chronic Obstructive Pulmonary Disease (COPD) in Australia. Despite decades of public health campaigns, COPD imposes a massive burden on the Australian health system in terms of deaths, hospitalisations and Disability-Adjusted Life Years (DALYs). Through a systematic literature review of the epidemiology of tobacco exposure and COPD in Australian adults, this paper examines the epidemiological association between tobacco exposure and COPD burden measures, trends in smoking prevalence at the population level and the success of current and proposed COPD public health interventions. Despite the steep drop in smoking rates over the last 30 years, the absolute number of people with smoking-attributable COPD remains high, particularly among Indigenous populations, older adults, and those of socioeconomically disadvantaged backgrounds, the paper concludes. The study considers a combination of legislative change, targeted health education, and greater accessibility of pulmonary rehabilitation (PR) services to be crucial in reducing COPD-related morbidity and mortality, as well as the associated healthcare burden, in Australia.

Keywords: COPD, tobacco use, disease burden, public health interventions, Australia

1. Introduction

Chronic Obstructive Pulmonary Disease (COPD) can be defined as a progressive disease with significant impairment in respiratory function, chronic inflammation and airflow limitation, which is largely irreversible [1]. COPD is one of the most significant causes of disease burden in Australia and consistently ranks among the top five contributors to YHL (total years of healthy life lost) in the country [2]. Tobacco smoking is the leading modifiable risk factor for COPD, accounting for about 70–80% of all cases of COPD [3]. In 2019, tobacco use contributed to more than 13% of all deaths among Australians aged 45 years and over, representing approximately 24,000 deaths annually [4]. When considering the costs of tobacco-related illness in Australia due to direct healthcare costs, lost productivity and informal care costs, the total expense of the disease is over AUD 137 billion annually [5]. Previous studies have well established the pathophysiological changes caused by tobacco smoke in the airways [6]. Long-term exposure to tobacco has been shown to cause oxidative stress, in addition to a protease-antiprotease imbalance and irreversible structural changes in the lung parenchyma [7].

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This paper, using a systematic literature review approach, examines the burden of tobacco-attributable COPD in Australian adults, based on peer-reviewed epidemiological studies, national health survey data and global burden of disease reports. The results of this review add to the body of evidence intended to inform targeted public health policy in Australia, specifically regarding the contribution of risk factors to morbidity, the demographic disparities in COPD burden, and the effectiveness of current interventions. This study reviews the most recent evidence to identify gaps in knowledge and understanding of COPD prevention and management, and provides evidence-based recommendations for future research and health policy.

2. Literature review

The Global Burden of Disease (GBD) 2019 study has provided the most comprehensive global analysis of tobacco-attributable disease burden to date. The study revealed that tobacco accounted for about 200 million DALYs in 2019, of which COPD was the single largest contributor [4]. In Australia in particular, the GBD data showed that theDALY burden for COPD attributable to tobacco use was considerably larger than that for cardiovascular disease, and lung cancer, within the same attributable burden framework [4]. The results confirm the importance of COPD as a public health priority in tobacco control policy.

Since the first report, the Australian Institute of Health and Welfare (AIHW) has recorded COPD as one of the leading causes of disease burden in Australia. The prevalence of COPD in Australia is 2.5% of the total population as reported in the 2022 National Health Survey, which showed a high age-specific burden, with an increasing prevalence with age, reaching 7.0% for people aged 65 years and over (see Figure 1). The survey also found the comorbidity burden of COPD is widespread: nearly all individuals with COPD (86.6%) report at least one other chronic condition, adding a compounded burden of ill-health for this population [8].

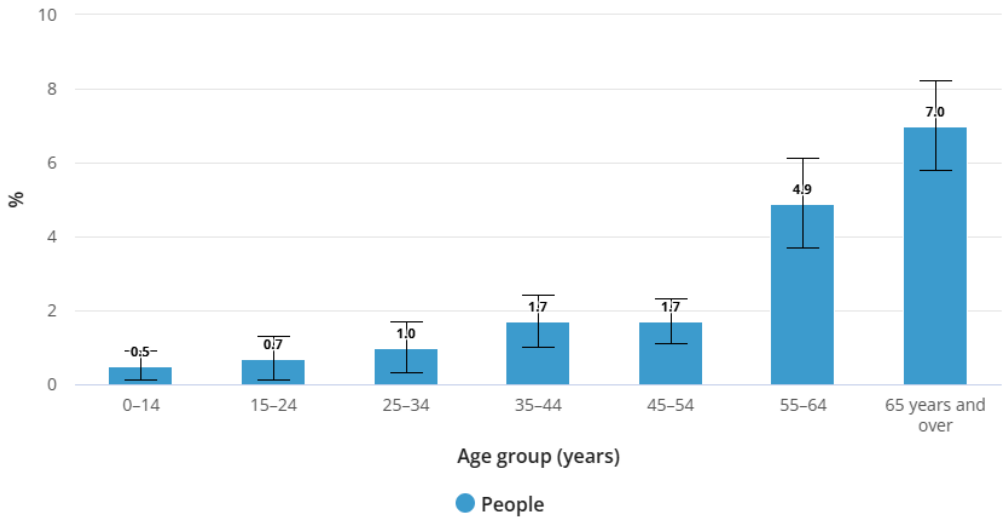

Figure 1. COPD prevalence by age group in Australia, 2022 (%) [8]

According to the results of the 2022–23 National Drug Strategy Household Survey (NDSHS), the daily smoking rate among Australians (aged 14 and over) fell from 19.4% in 2001 to 8.3% in 2022–23, representing a reduction of more than half over two decades [9]. A similar reduction is observed

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in age-standardised rates of daily smoking among adults (aged 18 years and over), based on ABS National Health Survey data, which fell from 22.4% in 2001 to 10.6% in 2022 [8]. These decreases are generally credited to the comprehensive tobacco control measures in place in Australia such as the introduction of plain packaging (2012) – the first to be introduced in the world, progressive excise tax increases and ongoing national quit campaigns [5].

Despite gains at the population level, inequalities continue to be of major concern. In 2018–19, the proportion of Aboriginal and Torres Strait Islander people who smoked every day was around 35%, which is almost four times higher than for non-Indigenous people, and reached 58% in very remote communities [10]. Compared to the overall population, hospitalisation rates of COPD and pneumonia hospitalizations among First Nations populations were significantly higher in 2021-2023, accounting for 18% and 21% of their total hospitalisations, respectively [11]. In addition, socioeconomic disadvantage increases the risk: In 2022–23, Australians in the most socioeconomically disadvantaged group were more than three times as likely to smoke daily (13.4%) as those in the least disadvantaged group (4.1%) [9].

The international BOLD study defined prevalence rates of COPD in various countries using spirometry, and found that self-reported smoking history was the most powerful independent predictor of COPD diagnosis [6]. In Australian cohorts, former smokers still have a significantly higher risk than never-smokers, with the risk persisting for more than 20 years after quitting [7]. In the Australian arm of the BOLD study, researchers reported that less than a third of Australians with spirometrically confirmed COPD had previously been diagnosed by a clinical physician, highlighting the large proportion of the population with a diagnosis gap in primary care [12]. Importantly, occupational dust and fume exposure is estimated to contribute 15-20% of the burden of COPD in Australia, which is a non-tobacco pathway that policy should address [12].

The COPD-X Plan, created by Lung Foundation Australia and the Thoracic Society of Australia and New Zealand is the key clinical guideline to inform the treatment of COPD in Australia [13]. The latest edition (2023) highlights the need for early spirometric diagnosis, tailored drug management, smoking cessation and provision of structured pulmonary rehabilitation for all patients with moderate to severe disease [13]. Despite this guidance, the national audit of COPD management in Australian general practice revealed that less than 40% of people had a record of smoking cessation counselling, suggesting a significant gap between guideline recommendations and practice [14].

3. Case study: tobacco-attributable COPD burden in Australia

To demonstrate the scale of the public health problem, this section examines the epidemiological characteristics of tobacco-attributable COPD among Australian adults. The 2022 National Health Survey (NHS) by ABS estimated that about 496,000 Australian adults (aged 45 and older) were living with COPD (4.8%) [8]. The prevalence of COPD rose steadily with age: it was 1.7% among those aged 45–54 years and 7.0% among those aged 75 years and over (Figure 2), with the highest prevalence (8.3%) observed in men aged 75 years and over [8].

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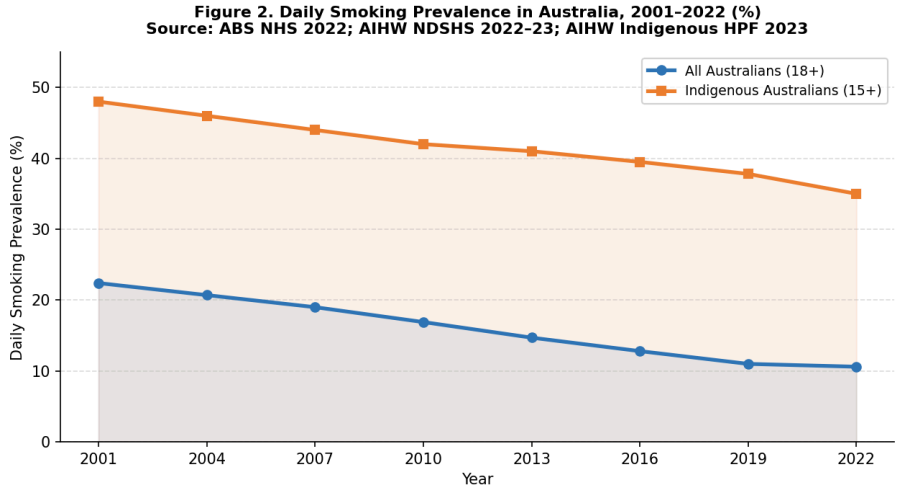

Figure 2. Daily smoking prevalence in Australia, 2001–2022 (%) [8-10]

Although the rate of new cases of COPD has decreased, the number of Australians with the condition has increased, largely becausethe population is ageing and survival after acute exacerbation has improved [2]. Respiratory conditions were among the principal diagnoses for 521,000 hospitalisations in Australia in 2023-24, accounting for 4.1% of all hospitalisations, and $5.8 billion in health expenditure [15]. Figure 2 shows the number of COPD-specific hospitalisations increasing from around 56,200 in 2011 to more than 66,000 in 2020-21 [2].

Figure 3 shows the different trends in smoking rates over two decades between Indigenous and non-Indigenous Australians. Both groups have experienced a decline, but the difference between themremains significant, highlighting the structural inequality that underlies the disparity in COPD outcomes [10]. This epidemiological imbalance further underscores the importance of tobacco control measures that focus on equity, beyond the level of the population [5].

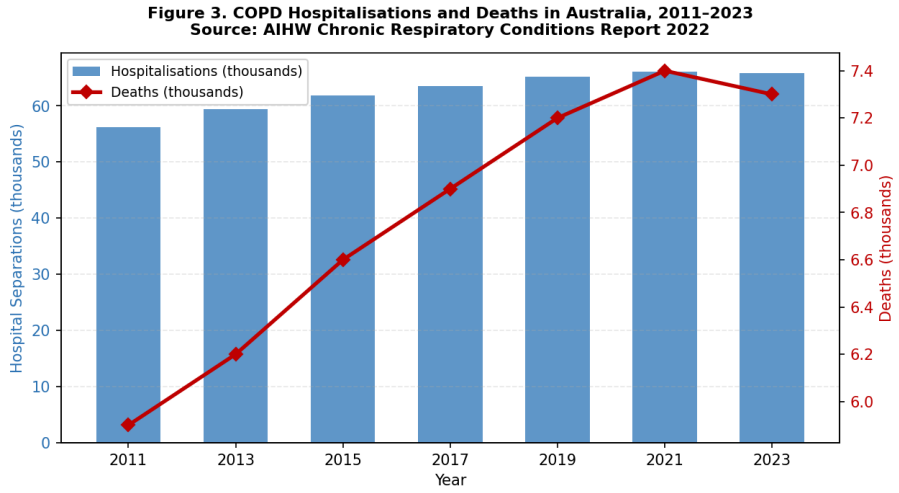

Figure 3. COPD hospitalisations and deaths in Australia, 2011–2023 [2, 15]

4. Discussion

The findings from this paper's review of the evidence indicate that tobacco smoking remains the leading cause of COPD in Australia, and that the burden of the disease is increasing

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disproportionately in older people, Indigenous people and socioeconomically disadvantaged people. Although legislative policies like plain packaging, excise tax hikes and advertising bans have helped lower population-level smoking prevalence over the past few decades, the legacy of the fact that many people have already smoked continues to cause significant burden from established COPD [5].

COPD is a significant systems-level challenge due to its ongoing underdiagnosis of COPD. While spirometry is the gold standard for COPD diagnosis, access is not equal across primary care settings, especially in rural and remote areas, where both COPD prevalence and smoking rates are higher [16]. Calls have been made to better integrate spirometry into regular health care visits, leveraging the potential benefits of Medicare reimbursement, to fill the diagnostic gap – an approach suggested to be cost-effective [17].

Behavioural changes and pharmacotherapy such as varenicline and nicotine replacement therapy (NRT) in conjunction with behavioural support are the most clinically effective interventions for slowing COPD progression [14]. Evidence from randomised controlled trials shows that current smokers with mild to moderate COPD might experience an approximately 50% reduction in FEV1 decline when they quit smoking [7]. However, there is variation in access to subsidised cessation programs in Australia, and uptake among high-risk groups is significantly lower for Indigenous Australians [10].

While smoking rates have declined, the absolute number of COPD hospitalisations and deaths has increased over the past decade (2011-2023) as shown in Figure 3. This apparent paradox is due to the long-time lag between tobacco smoking and the onset of COPD, and to the ageing of cohorts of long-term heavy smokers. Predictions that COPD would become the third leading cause of death worldwide by 2030 are coming true, and policy and intervention measures are becoming increasingly critical [18].

5. Conclusion

This study aimed to examine the burden of tobacco-attributable COPD among Australian adults and public health interventions, and it revealed that despite decades of effective tobacco control policy, COPD continues to be a major tobacco-attributable cause of disease burden in Australia. The analysis found that the disease burden is maintained by population ageing and continued smoking among vulnerable populations, and this suggests that tobacco remains a pressing public health issue.

This study is original in bringing together epidemiological burden information, demographic trend analysis, and intervention evidence within the unique Australian policy context. The results of the present study complement previous reviews: they include comparative analysis based on real national data from surveys and emphasize the gap in access to diagnostic spirometry and cessation support among sociodemographic groups.

The findings of this study are relevant to the practice of public health in Australia, including primary care policy development, health workforce planning, and tobacco control legislation. The limitations of this study include the use of observational and self-reported survey data,which may underestimate smoking prevalence and COPD burden, as well as the lack of longitudinal cohort data to strengthen causal inference in the present analysis.A potential restriction is that it only deals with population level data, potentially masking sub-national or community level variation that is important. Future research could consider what the burden of COPD is on Aboriginal and Torres Strait Islander people and the effectiveness of culturally designed smoking cessation support in remote communities. Overall, this study provides new insights into the persistence of tobacco-

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attributable COPD burden in Australia and highlights the importance of equity-focused, multi-level public health intervention.

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