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Epidemiology of lung cancer: A-mini review

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Abstract

Lung cancer remains the leading cause of cancer-related deaths globally, with a distribution pattern dictated by economic development levels. This paper explores the diverse trends in lung cancer incidence and mortality across the world, with a specific focus on the United States, the United Kingdom, Europe, and the BRICS nations (Brazil, Russia, India, China, and South Africa). The rise and subsequent fall of lung cancer cases in developed nations like the U.S. and U.K. are linked to the prevalence of smoking, effective tobacco control programs, and the availability of healthcare services. However, developing countries continue to grapple with high smoking rates, environmental pollutants, and healthcare disparities, leading to a higher burden of death from lung cancer. The examination of racial and ethnic differences in the U.S. and regional differences in Europe further underscore the complex interplay of socio-cultural factors in lung cancer trends. In Asia, particularly in India and China, rising tobacco use has led to a surge in lung cancer cases. In South Africa, occupational hazards like asbestos exposure compound the issue. The need for robust tobacco control policies and accessible healthcare is crucial in mitigating the global lung cancer burden, particularly in low- and middle-income countries where the disease burden is highest.

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Introduction

Globally, lung cancer remains the predominant cause of cancer-related mortalities in both genders. The distribution of these deaths varies according to the economic development level of countries, with no notable difference in men, while industrialized nations see a higher rate of lung cancer-related deaths in women compared to developing countries. In these latter nations, breast cancer accounts for more deaths in women than lung cancer (1).

Epidemiology of lung cancer

Lung cancer prevalence and mortality are intrinsically linked to smoking behavior. A surge in smoking rates, initially in men and later in women, is succeeded by an increase in lung cancer incidence and death rates in subsequent decades. These rates then reduce once extensive anti-smoking programs are launched (1). This pattern has occurred earlier in developed countries as opposed to developing ones. In nations such as the United States and the United Kingdom, the incidence and mortality rates of lung cancer have been on a downward trend since the 1990s. However, in developing nations, including the BRICS countries, despite lower cancer incidence, death rates remain high due to continued high smoking rates in both genders. This discrepancy is attributed to factors such as unequal access to healthcare, environmental pollution, and socio-cultural barriers (1,2).

In the United States, the peak of lung cancer incidence in men was observed in the 1980s, and a similar pattern followed in women two decades later. A significant finding was that in the 1960s, non-smoking men were over four times more likely to die from lung cancer than women. However, over the next 40 years, this risk rose in women and nearly matched that in men. Currently, lung cancer deaths in men are decreasing at an annual rate of 2.9%, which is roughly twice the decline rate observed in women. Racial and ethnic disparities also exist, with non-Hispanic whites and blacks demonstrating the highest incidence and mortality rates. In particular, black men show the highest death rate, roughly twice that of Asian Americans, who have the lowest rate of cancer-specific deaths. Such racial and ethnic disparities are largely due to variations in smoking rates, lower surgery rates among minority populations, and a higher probability of late-stage diagnosis (2,3).

The United Kingdom exhibits trends similar to the United States in smoking and lung cancer incidence. Male smoking prevalence peaked between the 1940s and 1950s, followed by a surge in lung cancer incidence in the 1970s (3). Despite falling rates in both genders, lung cancer remains the second most common cancer in the United Kingdom. Mainland Europe shows significant geographical variations in lung cancer incidence. The highest rates are observed in Central and Eastern Europe, but male incidence has been decreasing continent-wide since the early 1990s. Exceptions to this pattern are Norway, Finland, Spain, and France, where lung cancer rates have stabilized. The increasing incidence of lung cancer in women has decelerated in the United States and the United Kingdom, but continues to escalate in Central and Eastern Europe. These regional disparities reflect the tobacco epidemic's early stages in nations such as Belarus, Hungary, Poland, and the Russian Federation. Additionally, socio-economic and educational inequalities, as well as late-stage disease diagnosis, contribute to the variations in lung cancer incidence and mortality in Europe (4,5).

The remaining regions of Asia, including India and China, are witnessing a swift rise in lung cancer rates due to escalating tobacco use, especially among men. In India, lung cancer has become the most prevalent cancer in men and the fourth most common in women. In recent decades, India has seen a significant shift in cancer patterns, with lung cancer, once a rare disease, now being a major cause of death (6). This shift is largely due to an expanding tobacco epidemic, with nearly half of Indian men and a fifth of women either smoking or consuming tobacco orally. It's noteworthy that the incidence of lung cancer in India tends to be at a younger age compared to Western countries, possibly due to earlier initiation and more intense smoking habits (6,7).

In China, lung cancer has been the leading cause of cancer deaths for many years, impacting both men and women. The incidence and mortality rates have been on a consistent upward trend, primarily due to the high prevalence of smoking among Chinese men, although the rates among women have remained relatively low. Indoor air pollution from the domestic use of solid fuels, such as coal and biomass, is another significant risk factor for lung cancer in China, especially among non-smoking women. Additionally, the high prevalence of chronic obstructive pulmonary disease (COPD), primarily due to high smoking rates and indoor air pollution, further contributes to the high rates of lung cancer in China (8,9).

Finally, in South Africa, lung cancer presents a significant health challenge, especially among men.

Similar to other BRICS countries, the rise in lung cancer incidence and mortality rates can be largely linked to high smoking rates (9,10). Additionally, exposure to occupational hazards, such as asbestos, especially in the mining industry, poses another substantial risk factor for lung cancer in South Africa. Despite the increasing burden of lung cancer, access to diagnostic and treatment services remains restricted, particularly among disadvantaged populations, leading to high mortality rates (11,12).

Conclusions

Lung cancer is a global health concern that continues to be the leading cause of cancer-related deaths in both men and women. The patterns and trends of lung cancer incidence and mortality vary globally, largely mirroring the differences in smoking habits and tobacco control measures across different countries and regions. To alleviate the global burden of lung cancer, it is essential to bolster tobacco control policies and improve access to early diagnosis and effective treatments, particularly in low- and middle-income countries where the disease burden is most severe.

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