

## Lung cancer in the commonwealth A closer look at the data

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Each year more than 3,000 people in the commonwealth die from lung cancer. Most cases are diagnosed too late – at an advanced stage of cancer development – when the tumor has spread and is difficult or impossible to treat successfully. The prognosis for people with advanced-stage lung cancer is bleak, since only 2% of these patients live another five years or more. Fortunately, lung cancer is largely preventable since smoking is responsible for most cases. The difficulty Kentucky faces is that for many years the state has ranked No. 1 in the nation in smoking prevalence and, consequently, in lung cancer mortality.

### Kentucky vs. the United States

Over time the mortality rate from lung cancer for both men and women has been consistently higher in Kentucky than in the United States (Fig. 1). Moreover, the gap between these rates has been widening. In 1980 the lung cancer mortality rate in Kentucky was 85.2 for every 100,000 men, whereas the national rate was 71.8 for every 100,000 men, a difference of 19%. In 1990 that gap doubled to 38%. A similar pattern is observed for women: The difference between rates in

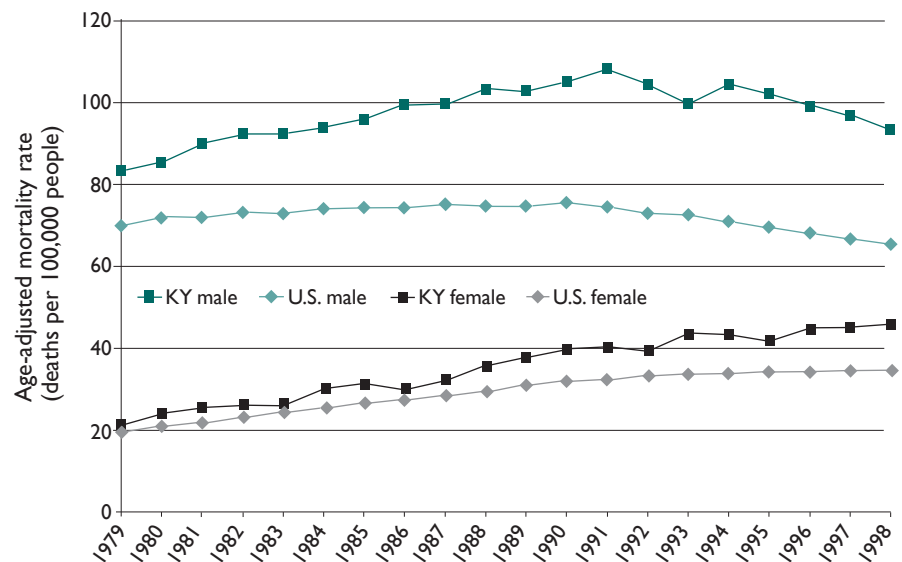


Fig. 1. U.S. and Kentucky lung cancer mortality rates by gender, 1979–98 (Source: National Center for Health Statistics).

Kentucky and the United States increased from 12% in 1980 to 20% in 1990.

What accounts for this widening gap for both men and women in Kentucky? Decreases in smoking rates, which have been taking place slowly but steadily over the last 20 years, have lowered lung cancer incidence and mortality rates but the decline in smoking has been smaller in Kentucky than in the rest of the country. From 1986 to 1997, smoking prevalence in the United States declined by 16%, from an overall average of 29.5% to 24.7%, while in Kentucky

it declined by only 11%, from 34.7% to 30.8%. Since the effect of smoking on lung cancer incidence rates occurs with a delayed reaction – what researchers call latency – rates at any given time reflect smoking patterns years ago. This lag is characteristic of most cancers because damage to the affected organ (in this case the lungs), and initiation and progression of malignant tumors often precede the symptoms and diagnosis of cancer by several years. This lag also partly explains why the risk of lung

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cancer for ex-smokers drops correspondingly by the number of years since smoking ceased.

The clear relationship between smoking and lung cancer also is observed across the nation: the higher the rate of smoking in a given state, the higher the rate of mortality from lung cancer (Fig. 2). Many studies have shown that in addition to this well-established relationship, the patterns of smoking also strongly affect the risk of developing lung cancer. The risk of lung cancer increases with both the frequency and duration of smoking, so that a person who smokes two packs a day has a substantially higher risk than someone who smokes one pack, and a person who has smoked for 10 years is at higher risk than one who has smoked for five.

### The gender gap narrows

Figure 1 also highlights a troubling pattern in lung cancer mortality between men and women. Both sexes had a steady increase up to the early 1990s. Thereafter, the rates started to decline for men while they continued upward for women,

stabilizing only in the last few years. This reflects differences in smoking patterns among men and women.

### Differences across the commonwealth

Although comparisons between states are useful, statewide rates assume that lung cancer affects all regions equally. Like most states, Kentucky has distinct geographic and lifestyle regions (e.g., western Kentucky differs substantially from eastern Kentucky, just as the state’s rural areas tend to differ from its urban ones), each of which has different lung cancer rates. Figure 3 shows lung cancer incidence rates across Kentucky’s 15 Area Development Districts for the period 1994–98. The highest rates are clustered in the Big Sandy, Kentucky River and Cumberland Valley Districts. These regional differences will be discussed in detail in a future issue.

### Looking deeper

Although cancer can strike at any age, like cardiovascular disease and stroke, it generally affects people in older age groups. Figure 4 shows lung cancer incidence rates

by age groups, from 35–39 years to 85 or older, for both Kentucky and SEER. (The SEER – Surveillance, Epidemiology and End Results – program is the most comprehensive source of nationwide cancer incidence data, covering 14% of the population in the United States. SEER rates are used as estimates for cancer rates in the nation.) With age we see a steady increase in the incidence rates of lung cancer, especially after age 50, with the peak occurring in the 70–74 age group for Kentucky and in the 75–79 age group for SEER.

Kentucky has the highest lung cancer incidence rate in the nation at 82 per 100,000 individuals for 1997–98. But this rate does not represent the extent of disease among individuals who are more susceptible, since the rate is the average for Kentucky’s entire population, including children, who rarely develop lung cancer. When assessing lung cancer burden, attention should focus not only on the incidence rate among all Kentuckians but also among specific age groups. The incidence rate among Kentuckians aged 60–80 (who constitute 65% of lung cancers), is more than 400 per 100,000, almost five times greater than the state’s overall rate.

The difference in incidence across age groups is similar for both Kentucky and SEER, but there are notable differences in the rates for each age group. Overall, lung cancer rates are 53% higher in Kentucky than in the nation. But for individuals between age 45 and 60, Kentucky’s rates are 70% higher than SEER’s. After age 80 the difference declines sharply, with Kentucky’s rates being about 20% higher than SEER’s. These high rates among individuals between 45 and 60 are alarming because of the potential impact of lung cancer on the quality of personal and family life, health care costs, and worker

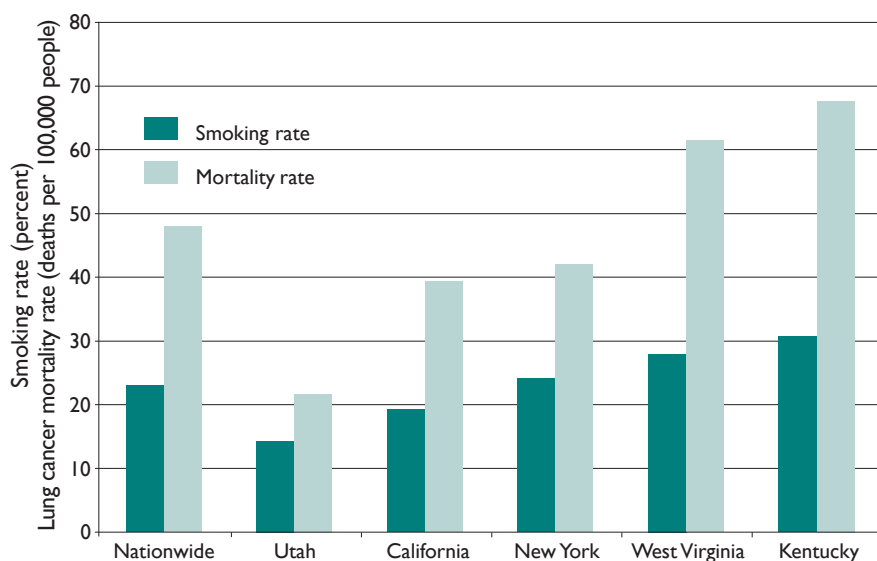


Fig. 2. Smoking and age-adjusted lung cancer mortality rates for the United States, Kentucky and selected states, 1998 (Source: Behavioral Risk Factor Surveillance System and National Center for Health Statistics).

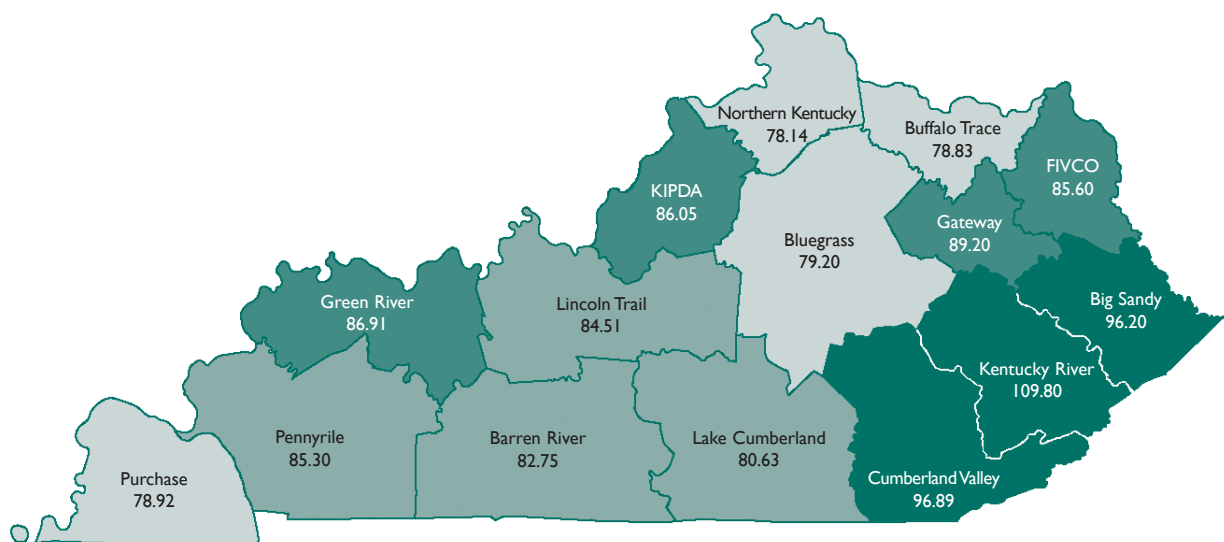


Fig. 3. Age-adjusted lung cancer incidence rates (cases per 100,000 people) by Area Development District in Kentucky, 1994–98 (Source: Kentucky Cancer Registry).

productivity and disability among this active and productive segment of the population. Furthermore, since many of these people are baby boomers, over the coming years the number of new cases is likely to increase substantially.

A similar analysis shows that men in Kentucky not only have lung cancer incidence rates roughly twice that of women — 113 per 100,000 men vs. 58.0 per 100,000 women in 1997–98 — but the size of this gap also varies depending on the age group. Across the 45–49, 50–54 and 55–59 age groups, the gap between men and women stays roughly constant, with incidence rates for men being about 50% higher. But after age 60, the gap grows steadily to more than 100% in older groups.

### Conclusions

National lung cancer mortality rates among men have steadily decreased over the last two decades, whereas in Kentucky these rates began to drop only in the last few years. In contrast, national lung cancer mortality rates among women have continued to increase, leveling off only in recent years, whereas in Kentucky these rates appear to still be on the rise.

Consequently, the gap in these rates between the United States and Kentucky has increased for both men and women. Smoking is the main cause of lung cancer, so a clear pattern emerges when comparing lung cancer incidence and smoking rates by state — the smaller decline in Kentucky over time is likely attributable to smaller declines in the state’s smoking rates.

Age-specific rates provide additional information to assess the burden of disease. For those aged

45–60, lung cancer incidence rates in Kentucky are disproportionately higher than for those in the rest of the country. Furthermore, this age group is a growing segment of the population, made up of members of society who are generally in their most productive years, often bearing high levels of responsibility both at work and at home. Because it is on the rise, the burden of lung cancer among women in this age group deserves special attention.

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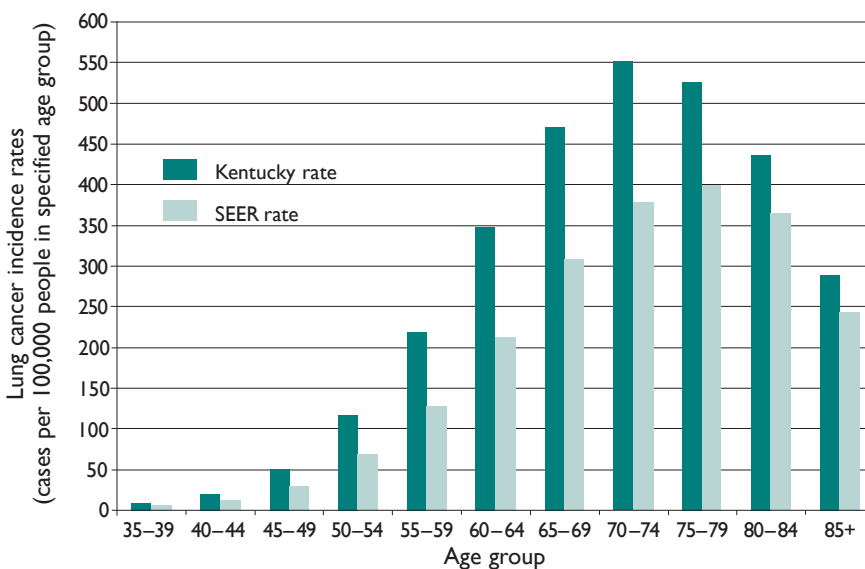


Fig. 4. Lung cancer incidence rates for Kentucky (1994–98) and SEER (1993–97) by age groups for all races, total population (Source: Kentucky Cancer Registry and SEER).

Reducing the heavy burden that lung cancer places on Kentuckians will be achieved only through efforts to reduce and prevent smoking, developing effective screening methods to detect the disease at an earlier stage, and discovering innovative treatments that will improve survival. The topics covered in this policy brief aid in describing the problem and in identifying specific groups, so that targeted interventions can be successfully implemented.

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## FROM THE GOVERNANCE BOARD

In response to Kentucky's high lung cancer mortality rates the General Assembly invested in a 20-year initiative on prevention and control research to address lung cancer in the commonwealth. To guide these research efforts the General Assembly established the Lung Cancer Research Project — a consortium enterprise between the University of Kentucky and the University of Louisville — which is overseen by a nine-member governance board.

The priorities of the Lung Cancer Research Project focus on four specific research areas:

- early detection and epidemiology of lung cancer
- pre-clinical and clinical studies to advance the effectiveness or understanding of lung cancer treatment
- characterization of genetic and familial relationships of lung cancer
- studies on the mechanisms of causation and spread of lung cancer

Less than four months from the first meeting in February 2001, the board made a request for

applications and established a committee of researchers to review prospective grants. The June 15, 2001 deadline was the first of two funding cycles this year and resulted in 53 grant applications, 34 from the University of Kentucky and 19 from the University of Louisville.

The distribution of the 53 applications across basic, pre-clinical, clinical and behavioral research at the University of Kentucky and the University of Louisville are shown below.

	UK	U of L
Basic science	4	5
Pre-clinical	16	12
Clinical	12	1
Behavioral	2	1

Clearly, much work remains to be done to address this disease. But through research efforts funded by the Lung Cancer Research Project we will make progress. Future issues of the *Lung Cancer Policy Brief* will identify the projects that were funded and provide updates on these research efforts.

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