

## **Epidemiological features of lung cancer in Slovenia**

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*Lung cancer is the most frequent cancer in the world with wide geographical variations in risk. In Europe its incidence trends in men are decreasing in the most affected countries such as Scotland and Finland, increasing moderately in Eastern Europe, and increasing steeply in Southern Europe. The incidence trends in women are increasing everywhere. Many risk factors have been identified, and the overwhelming role of tobacco smoking has been repeatedly demonstrated. According to the data of the Cancer Registry of Slovenia in the time period 1961–1990, the incidence of lung cancer in Slovenia was increasing. In the 80's the increase was moderate in men and steep in women. The cumulative rates in men were in the middle of those established for selected European states and regions while the rates in women were at the bottom. The results of the birth cohort analysis indicated a stabilisation of the rates in men and further increase of the rates in women. About 25 % of cases in both sexes were diagnosed in a localised stage. In men the percentage of the localised stage was increasing by age which was explained by a decreasing percentage of the more aggressive small cell carcinoma. More squamous cell carcinomas were registered in men, and more adenocarcinomas in women. The observed survival of lung cancer patients was around 7 % for men and 6 % for women, and has not changed since 1970. In 1989, 42 % of adult men and 24 % of adult women in Slovenia were smokers. In the period 1975–1994, the percentage of smokers was decreasing in men, and increasing in women. These results are a challenge for more efficient antismoking campaigns, especially among women.*

**Key words:** lung neoplasm-epidemiology; Slovenia

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### **Introduction**

Lung cancer is now the most frequent cancer in the world. Pisani, Parkin and Ferlay estimated that in the year 1985 the world burden had been: 896 000 new lung cancer cases (677 000 in men and 219 000 in women) and 785 000

deaths due to lung cancer (600 000 in men, and 185 000 in women).<sup>1</sup>

There are wide geographical variations in the risk. In Europe alone the crude incidence rates are varying from 180–45/100 000 in men, and from 55–5/100 000 in women.<sup>2</sup> In men the time-trends in incidence are different. They are decreasing in most affected countries such as Scotland, England and Finland, increasing moderately in Eastern Europe, and increasing steeply in Southern Europe. In women the trends are increasing everywhere.<sup>3</sup>

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Study of the epidemiology of lung cancer has been one of the most rewarding aspects of medical research in the past 40 years. It has been shown how a disease that has become the most common type of cancer throughout the world can be made to become relatively rare.<sup>4</sup> Many risk factors have been identified: tobacco smoking, atmospheric pollution, occupational hazards, ionising radiation, some familial, genetic and other host factors as well as the protective role of diet rich in fruit and vegetable. The overwhelming role of tobacco smoking in the causation of lung cancer has been repeatedly demonstrated.<sup>4,5</sup>

The aim of our study was to analyse lung cancer incidence in Slovenia in depth and to compare the obtained results with the available data on Slovenian smoking habits.

### Material and methods

Lung cancer incidence and survival data were drawn from the data base of the Cancer Registry of Slovenia. This Registry was established in 1950 at the Institute of Oncology as a population-based cancer registry. Data from the period 1961–1990 were analysed.

Data on smoking habits have been gathered regularly within the framework of Slovenian public opinion survey on a random sample of 2093 adult men and women since 1975.<sup>6</sup> These data were kindly supplied by the Faculty of Social Sciences.

Standard methods in descriptive epidemiology were used.<sup>7</sup> Crude incidence rate has been defined as the rate of total annual number of new cases per 100 000 population in the relevant year. Cumulative incidence rate is a special age-standardised rate. It is the sum over each year of age of the age-specific incidence rates taken from birth to age 74. It can be interpreted either as a directly age standardised rate with the same population size in each age-group, or as an approximation to the cumulative risk.

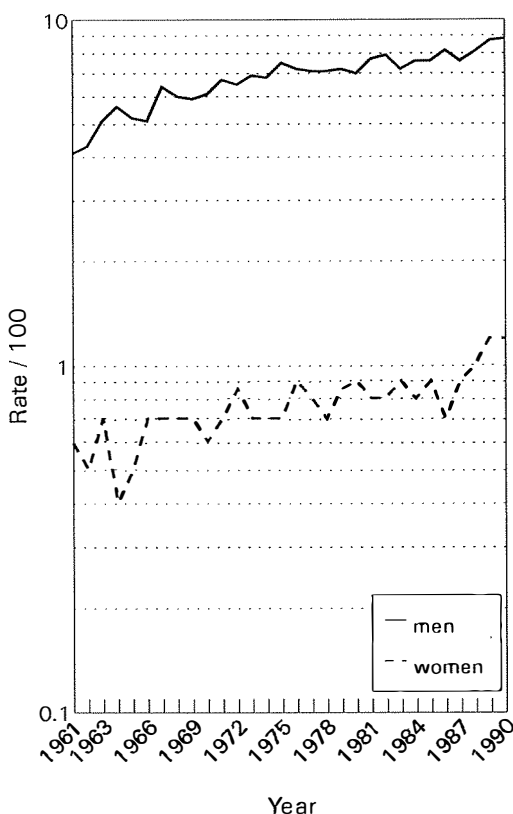
Staging was based on the international cancer registries regulation. According to this regulation, all investigation methods including surgery

are considered in stage determination of solid tumours. In the case that patient was not treated previously, the autopsy report is considered as well. The lung cancer cases were coded as localised when tumour was confined to the same site of the lung and no nodes or distant metastasis were present.

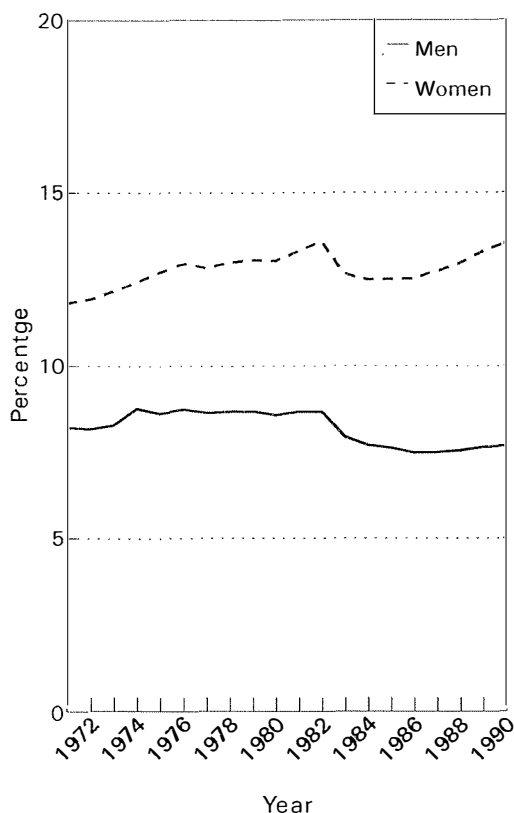
### Results

#### *Lung cancer incidence and survival*

In Slovenia the incidence of lung cancer was increasing in both sexes (Figure 1). In men the increase was steep in the sixties and seventies, and moderate in the eighties, while in women the increase was steeper in the eighties than before.



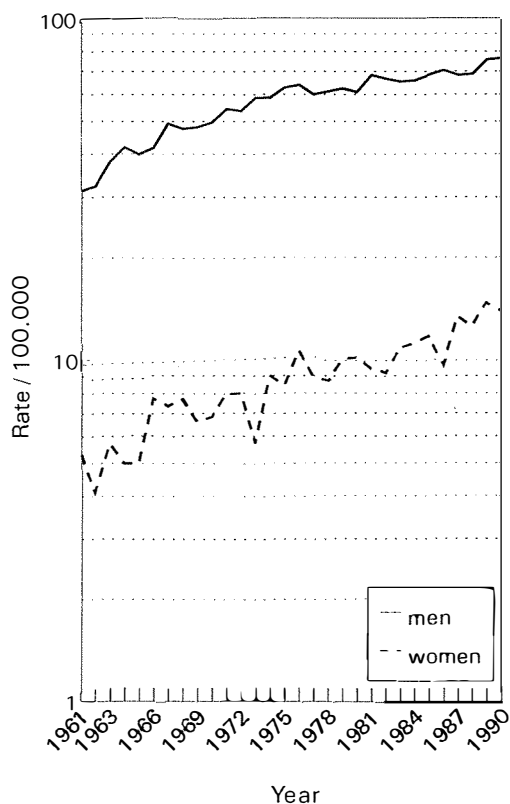
**Figure 1.** Crude annual lung cancer incidence rates by sex, Slovenia 1961–90.



**Figure 2.** Percentage of elderly population by sex, Slovenia 1971–90.

In this long time period the population tree of Slovenia changed.<sup>8</sup> The percentage of the elderly population was growing till 1982 to be temporarily stabilised in the eighties (Figure 2). We have to take this changing age distribution into account and look at the age standardized cumulative rates, at the risk of getting lung cancer till the age of 75 years (Figure 3). In men a steeper increase in the risk to get lung cancer in the sixties and at the beginning of seventies, and in women a steady increase in the eighties was confirmed.

These cumulative rates in men place Slovenia in the middle of the rank order of selected European states and regions (Figure 4). In Slovenia the risk of getting lung cancer in a man till the age of 75 years was almost 8/100, in comparison to the Netherlands and Lower Silesia in Poland where it was about 11/100,



**Figure 3.** Cumulative annual lung cancer incidence rates by sex, Slovenia 1961–90.

and with Norway and Sweden where the rates were the lowest 3–4/100. With the cumulative rates in women (0.9/100), Slovenia was placed at the bottom, very close to different regions of Germany (Figure 5).

In Slovenia itself, the cumulative rates varied. In men high rates were found in industrial and mining settlements, while in women they were found in the capital region of Slovenia.<sup>9</sup> In the commune of Idrija stable high rates were found in both sexes.

To predict properly further trends of lung cancer in Slovenia a detailed analysis on trends in the incidence of specific age-groups by time periods (Figure 6a, b) and by birth cohorts was needed (Figure 7a, b). In men the peak of the rates plotted by time periods shifted to the left and a stabilisation in the eighties was observed.

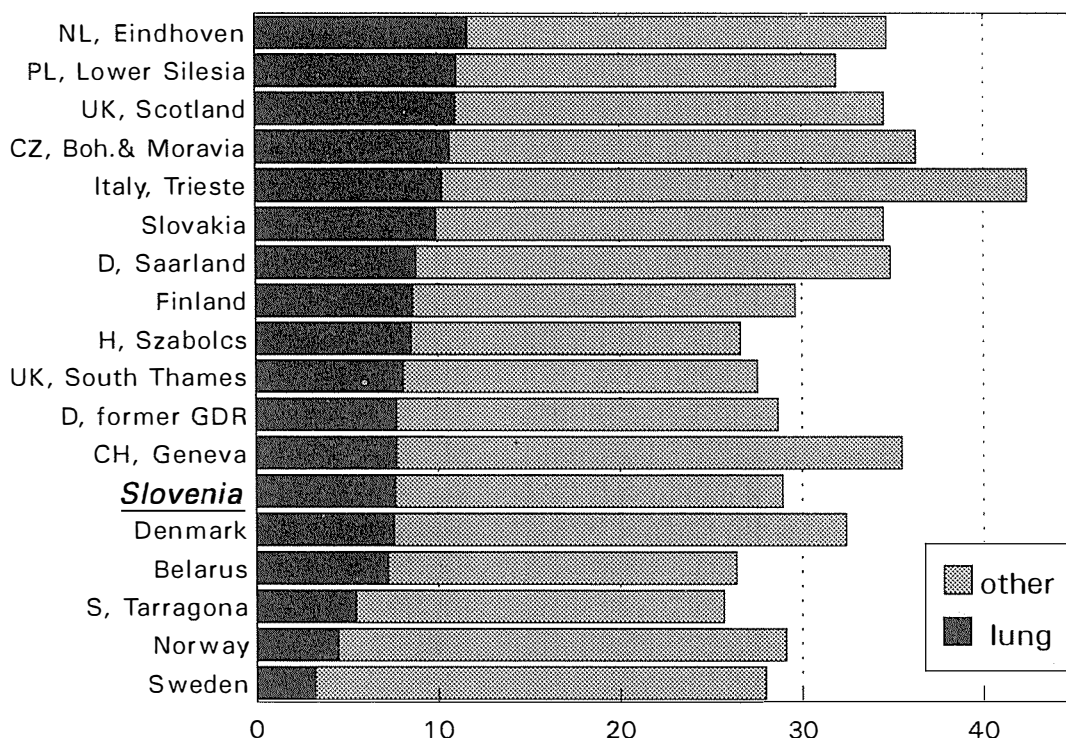


Figure 4. Cumulative average annual lung cancer incidence rates in men, Europe 1983–87.

In women the peak remained in the oldest age groups and the curve was higher in each subsequent time period. We tried to explain such a different behaviour by sex with a birth cohort analysis. In the birth cohort analysis (Figure 7) we presented the same data in a different way. The rates were plotted by birth cohorts, by the year of birth of newly diagnosed lung cancer patients. There was a clear cohort effect in both sexes. An encouraging one in men with lower rates in younger generations, born around 1931 and later, and a warning one in women, with higher rates in younger generations in all age groups.

In the period 1981–90 in Slovenia about 25 % of patients of both sexes were diagnosed in the localised stage (Figures 8 and 9). The stage distribution differed by age however. In men only, a growing percentage of the localised stage in the elderly was obvious. To explain this observation, we analysed the histologic

types of lung cancer in Slovenia by age in men and women (Figure 10a, b). The distribution differed by sex. More adenocarcinomas were registered in women, and more squamous cell carcinomas in men, while approximately the same percentage of carcinomas were nonspecified or microscopically non verified. The percentage of small cell carcinoma decreased by age in both sexes.

Population survival of lung cancer patients in Slovenia did not change in the period 1970–1989. The observed five year survival rate of patients aged 0–74 years was around 7 % for men and around 6 % for women.

#### *Smoking habits*

In 1989, 42 % of adult men and 24 % of adult women in Slovenia were smokers. With these data Slovenia was placed in the middle of the EC countries. In men the highest percentage

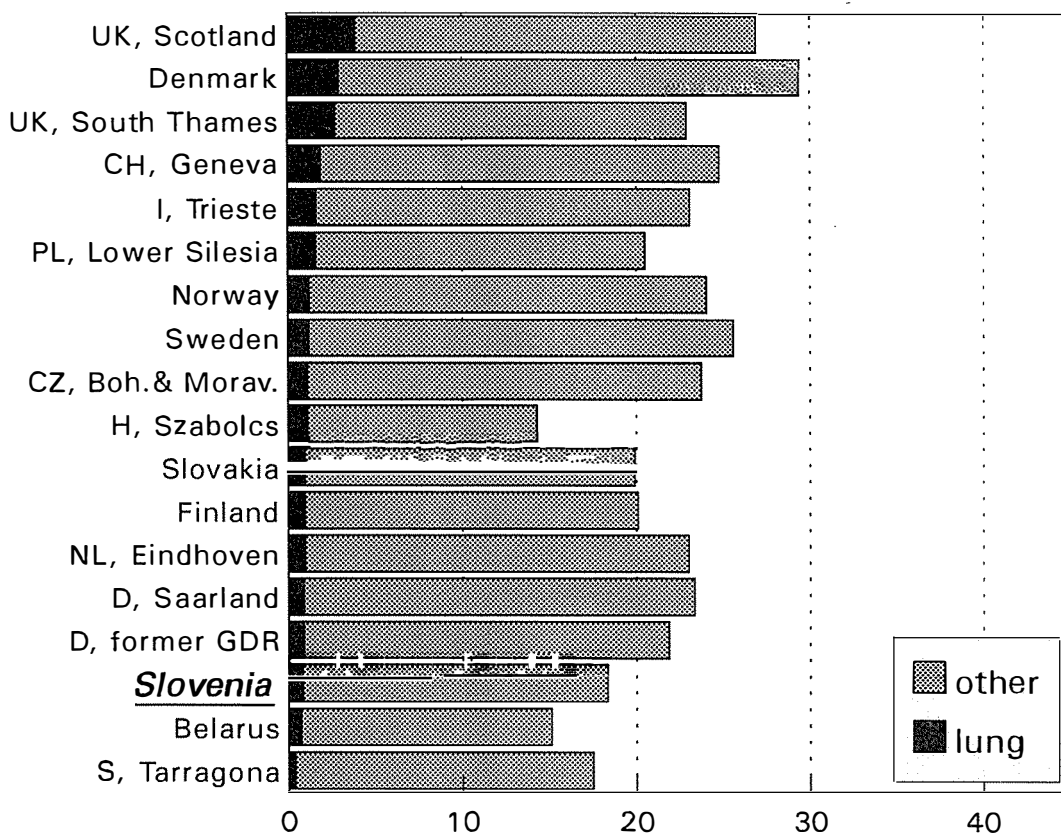


Figure 5. Cumulative average annual lung cancer incidence rates in women, Europe 1983-87.

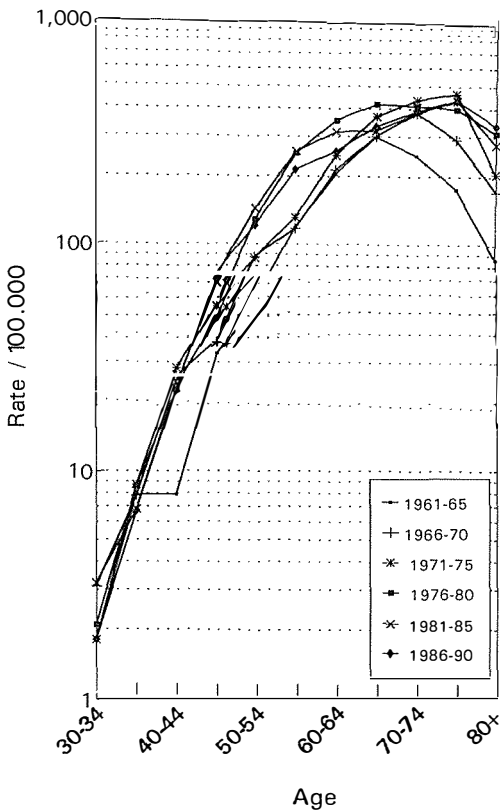
of smokers was seen in the age group 31-40 years while in women it was in the age group 26-30 years. The percentage of ex-smokers was higher in men in all age groups after the age of 25. Smoking habits differed by education. The highest percentages were seen in men with elementary and professional education, and they were highest in women with professional and middle education. In the time-period 1975-1994, the percentage of smokers among men was decreasing whereas among women it was increasing (Figure 11). The decrease in men was observed in all age groups after the age of 26, while the increase in women was observed till the age of 61.

Smoking habits differed by communes of Slovenia. In 1989, more smokers were found in industrial and mining settlements.<sup>9</sup> Unfortunately, an analysis by sex was not performed.

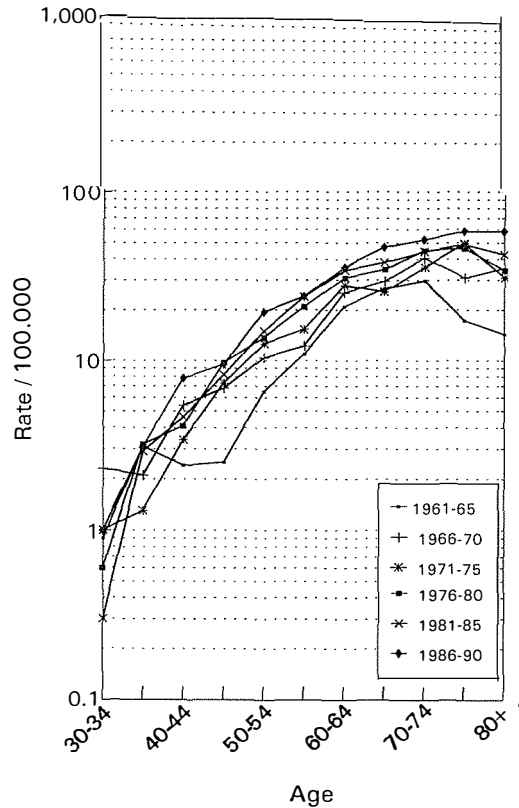
### Discussion and conclusion

In the time period 1961-1990 the incidence of lung cancer in Slovenia was increasing. In the eighties the increase was moderate in men and steep in women. The cumulative rates in men were in the middle of those established for selected European states and regions, while the rates in women were at the bottom. The results of the birth cohort analysis indicate a stabilisation of the rates in men and further increase of the rates in women in the near future.

About 25% of cases in both sexes were diagnosed in the localised stage. In men, the stage distribution differed by age, however. The localised stage was increasing with age. With age also the percentage of more aggressive small cell carcinoma was decreasing. A similar observation was reported by Teeter and coworkers in 1990.<sup>10</sup>



**Figure 6a.** Age-specific lung cancer incidence rates in men by time periods, Slovenia 1961-90.

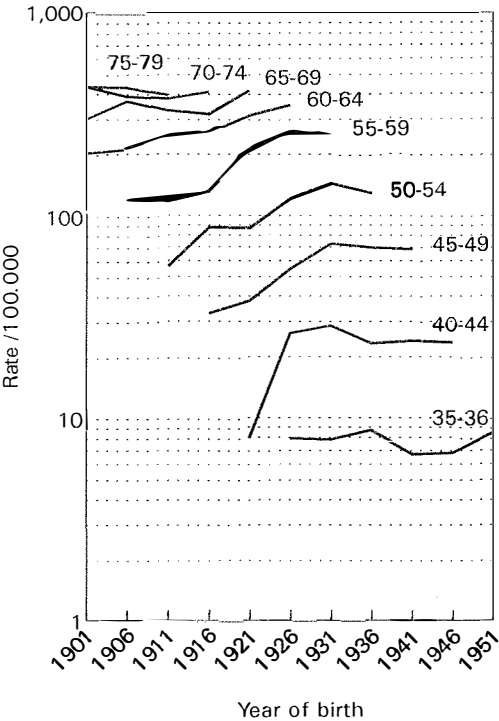


**Figure 6b.** Age-specific lung cancer incidence rates in women by time periods, Slovenia 1961-90.

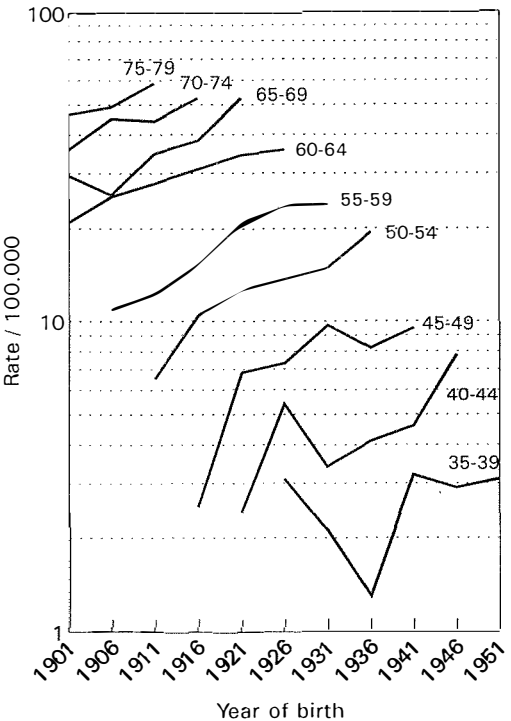
More squamous cell carcinomas were registered in men, and more adenocarcinomas in women. Such results were expected according to other reports in the literature.<sup>11</sup>

The observed survival of lung cancer patients was around 7% for men and 6% for women, and has not changed since 1970. This statement is a challenge not only for clinicians in their search for additional pieces to the unresolved puzzle of a more efficient treatment, but first

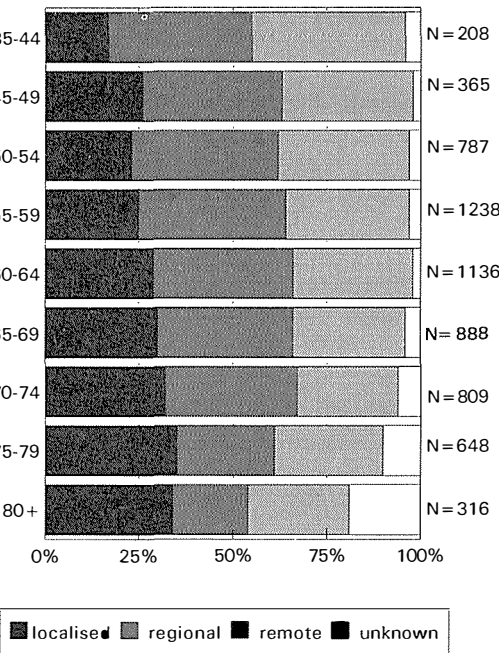
of all for health educators and general practitioners in their attempt to develop more efficient antismoking campaigns, especially among women. According to the described smoking habits in 1989 in Slovenia, (42% of adult men and 24% of adult women were smokers), and the fact that by eliminating tobacco smoking, the worldwide potential to reduce the incidence of lung cancer would reach 80-90% for men and 60-80% for women,<sup>12</sup> a lot of work still waits to be done in the future.



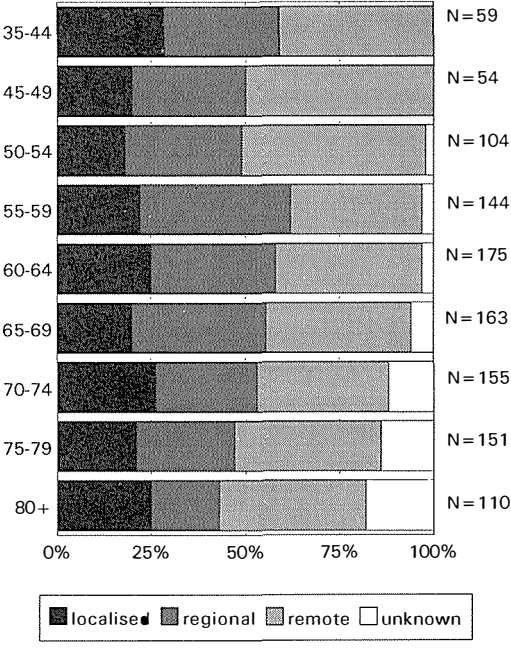
**Figure 7a.** Age-specific lung cancer incidence rates in men by birth cohorts, Slovenia 1961–90.



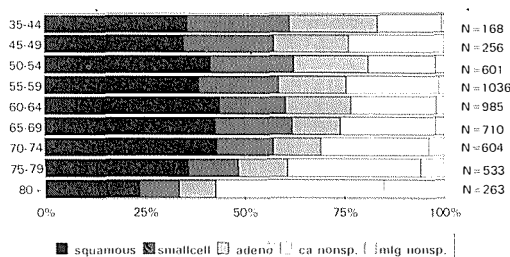
**Figure 7b.** Age-specific lung cancer incidence rates in women by birth cohorts, Slovenia 1961–90.



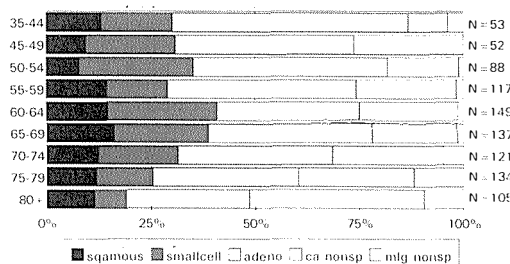
**Figure 8.** Stage distribution of lung cancer in men by age, Slovenia 1981–90.



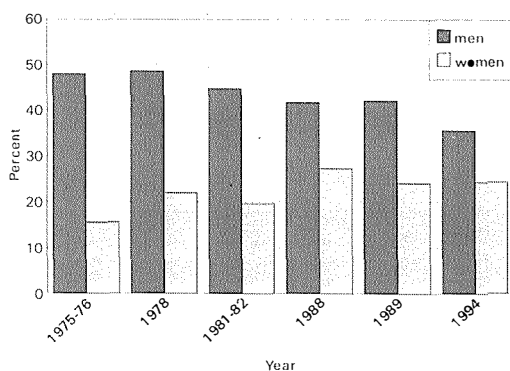
**Figure 9.** Stage distribution of lung cancer in women by age, Slovenia 1983–90.



**Figure 10a.** Histologic types of lung cancer in men by age Slovenia 1983–90.



**Figure 10b.** Histologic types of lung cancer in women by age, Slovenia 1983–90.



**Figure 11.** Percentages of smokers by sex, Slovenia 1975–94.

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