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# Trends in lung cancer incidence in Lebanon by gender and histological type over the period 2005–2008

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ABSTRACT

*Introduction:* Lung cancer incidence rates, overall and by histologic subtypes, vary substantially by gender and smoking. This study's aim was to review data regarding trends in the number of cases of different lung-cancer histologies and relate these to smoking habits by gender in Lebanon.
*Materials and methods:* Lung cancer data using ICD-O, 3rd edition, from the Lebanese National Cancer Registry from 2005 to 2008 were stratified by gender for histology type for patients aged over 18 years.
*Results:* Lung cancer cases among males were 2.5 times higher than those in females. The most common lung cancer histology type for males and females was adenocarcinoma for all observed years. The proportion of squamous cell carcinoma in incident cases was significantly higher in males than in females for the total period from 2005 to 2008, P = 0.032, but not in individual years. The ratio of adenocarcinoma to squamous cell carcinoma in incident cases between 2005 and 2008 was 2:45 for males and 3:15 for females.
*Conclusion:* Lung cancer histology in Lebanon is following a pattern similar to that found in most countries of North America and in Europe, where adenocarcinoma is the most prevalent subtype among both males and females.


## 1. Introduction

Lung cancer is the most common cause of cancer-related death among both sexes combined [1]. The incidence rates of this disease have increased dramatically in developing countries, particularly in the Arab world, where tobacco consumption among both sexes continues to rise. Currently, around half of lung cancer cases occur in developing countries, whereas in the 1980s, developing countries contributed to around 31% of cases [2]. In the United States and Europe, rates of smoking among males have decreased, thus resulting in decreased lung cancer incidence, while increased smoking among females since the 1970's has increased the incidence of female lung cancer in these countries [2,3].

Lebanon is a small middle-income country on the Eastern Mediterranean shore with a population of around 4 million Lebanese citizens, 1 million Syrian refugees, and half a million Palestinian refugees. It is at the third stage of its demographic transition characterized by a decline in both fertility and mortality rates [4]. According to the United Nation's World Population Prospects, the average life expectancy in Lebanon will rise from 71 to 78.7 years between 2009 and 2050, leading to an increase in the median population age from 28.8 to 41.7 years as well as the percentage of older population aged 60 years and above from 10.3% to 25.8%. Data from World Health Organization (WHO) Globocan 2012 have shown that in the Arab world, Lebanon has the highest lung cancer incidence in females and the third highest in males (Table 1). According to the National Cancer Registry (NCR) of Lebanon, lung cancer incidence from 2003 to 2008 remained relatively stable among males ranking second behind prostate cancer, but increased among females, for which it ranks third behind breast and colon cancer [5].

Trends in lung cancer incidence are largely the product of changing smoking prevalence and patterns of tobacco consumption. The most common forms of tobacco smoking in Lebanon are cigarettes or waterpipe smoking, which is gaining popularity, particularly among females [6]. A recent study has shown that waterpipe smoking generates ambient carcinogens and toxicants equivalent to 2–10 cigarettes in 1 h of use[7]. Adult smoking in Lebanon is estimated at 38.5% (males at 46% and females at 31%) [8]. Smoking prevalence among the youth is estimated to be among the highest worldwide (65.8% for boys and 54.1% for girls), with waterpipe smoking the major form of smoking (33.9%) followed by cigarette smoking (8.6%) [8].

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**Table 1**
Prevalence of adult smoking by gender from selected eastern Mediterranean and European countries and the United States, WHO, 2009 and Age-standardized rates to the world population ASR (W), rates stratified per gender per 100,000, Globocan (2012).

| | Smoking Males% | Smoking Females% | ASR (W) 100,000 (males) | ASR (W) 100,000 (females) | Data quality indicator | | |
|---|---|---|---|---|---|---|---|
| | | | | | Quality | Regional or national | Coverage |
| *Eastern Mediterranean* | | | | | | | |
| Egypt | 40 | <1 | 11.2 | 3.8 | High-quality* | Regional | Lower than 10% |
| Bahrain | 34 | 8 | 21.3 | 8.5 | High-quality* | National data or high quality regional | Greater than 50% |
| Iraq | 26 | 3 | 24.2 | 6.6 | Frequency data | | |
| Jordan | 47 | 6 | 27.0 | 4.1 | National data (rates). | | |
| Kuwait | 35 | 4 | 9.9 | 4.8 | High-quality* | National data or high quality regional | Greater than 50% |
| Lebanon | 46 | 31 | 30.2 | 11.0 | National data (rates). | | |
| Libya | 47 | <1 | 28.0 | 3.7 | High-quality* | Regional | Lower than 10% |
| Syria | 42 | N/A | 25.5 | 5.3 | No data, estimated from neighboring countries | | |
| Morocco | 33 | 2 | 25.5 | 2.8 | Regional data (rates) | | |
| Oman | 12 | <1 | 6.7 | 2.8 | High-quality* | National data or high quality regional | Greater than 50% |
| Saudi Arabia | 24 | 1 | 7.3 | 2.7 | National data (rates). | | |
| Tunisia | 58 | 5 | 31.1 | 1.7 | High-quality* | Regional | Lower than 10% |
| UAE | 19 | 2 | 11.2 | 5.2 | National data (rates). | | |
| Yemen | 35 | 11 | 6.4 | 1.7 | Regional data (rates). | | |
| *Southern Europe* | | | | | | | |
| Italy | 33 | 19 | 38.5 | 13.1 | High-quality* | Regional | Lower than 10% |
| France | 36 | 27 | 52.0 | 20.2 | High-quality* | Regional | Between 10% and 50% |
| Greece | 63 | 41 | 50.9 | 9.0 | No data | | |
| Spain | 36 | 27 | 52.5 | 11.3 | High-quality* | Regional | Between 10% and 50% |
| *Northern Europe* | | | | | | | |
| Norway | 28 | 26 | 34.8 | 26.1 | High-quality* | National data or high quality regional | Greater than 50% |
| Sweden | 24 | 24 | 19.4 | 19.1 | High-quality* | National data or high quality regional | Greater than 50% |
| United Kingdom | National data or high quality regional | Greater than 50% | 25 | 23 | 34.9 | 25.9 | High-quality* |
| Germany | 33 | 25 | 38.8 | 17.9 | High-quality* | Regional | Between 10% and 50% |
| *Eastern Europe* | | | | | | | |
| Turkey | 47 | 15 | 63.9 | 8.8 | High-quality* | Regional | Lower than 10% |
| Croatia | 36 | 30 | 58.2 | 15.4 | High-quality* | National data or high quality regional | Greater than 50% |
| Poland | 38 | 27 | 60.5 | 21.8 | High-quality* | Regional | Lower than 10% |
| Romania | 38 | 18 | 58.8 | 11.2 | Regional data (rates) | | |
| *North America* | | | | | | | |
| US | 33 | 25 | 44.2 | 33.7 | High-quality* | National data or high quality regional | Greater than 50% |

* Data included in Cancer incidence in Five Continents (CI5) volume IX and/or X.

In addition to smoking, urban air pollution measured by concentrations of particulate matter <10 μm in size (PM10) exceeds the levels set by WHO (20 $\mu g/m^3$) in most urban Lebanese cities [9].

Smoking rates among Lebanese females are the highest in the Mediterranean and Arab region and are rising at a higher pace than those observed in neighboring countries [10–12]. Currently, the incidence of lung cancer among females remains lower than that of males [5]; however, it is expected to increase in the future since incidence of lung cancer closely reflect patterns in smoking prevalence from 20 to 30 years earlier due to the long latency period between the time of smoking initiation until diagnosis [13,14].

Lung cancer incidence rates, overall and by histologic subtypes, vary substantially by gender and smoking [15–17]. Different proportions of histology types were reported among males and females, mainly confirming the close relationship between smoking and squamous cell carcinoma. Here, we present from the NCR in Lebanon the percentage of lung cancer cases for each of the common histology types by gender from 2005 to 2008. We also relate