



TREND ANALYSIS OF LUNG CANCER MORTALITY IN IRAN, 1995-2004

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ABSTRACT: Background: Cancer remains a major cause of morbidity and mortality worldwide. Cancer is the third most common cause of death in Iran. Lung cancer is important cause of mortality due to cancer. With regards to cancer mortality, data are important to monitor the effects of screening program, earlier diagnosis, demographic data and other prognostic factors. The aim of this study was to evaluate the mortality rates and trends from lung cancer in Iranian population during a period of almost a decade, i.e. from 1995 to 2004.

Methods: National death Statistic Reported by the Ministry of Health and Medical Education (MOH&ME) from 1995 to 2004, stratified by age group, sex, and cause of death are included in this study. Burden of lung cancer was expressed as the annual mortality rates/100,000, general and/or per gender, and age group.

Results: The general mortality rate of lung cancer slightly increased during the years under study from 0.44 to 2.54 and lung cancer mortality was higher for older age and male.

Conclusion: Our study indicated remarkable increasing trends in lung cancer mortality. For lung cancer, since the rate of lung cancer screening is very low in Iran, it is recommended that in Iran screening be started as a public program in order to control the mortality and burden of lung cancer in the future.

Keywords: Lung cancer; Mortality; Trend analysis; Iran.

INTRODUCTION

Cancer is a major cause of morbidity and mortality, worldwide. According to the World Health Organization (WHO), the global burden of cancer is increasing, in the next 20 years (1).

Lung cancer is the most common fatal malignant disease worldwide; with an estimated 160,390 related deaths in the United States in 2007 (2) and more than 80% of patients will die during first five years of diagnosis (3).

High incidence and poor prognosis causes this cancer to be a fatal cancer. It is predicted to be the 7th cause of death and responsible for 3% of mortalities by 2030 (4). In Asian countries, the incidence and mortality rates of lung cancer in women are generally lower than western countries (5, 6) and this cancer was the most common cause of death from among cancer death in men (7).

Cancer is also the third most common cause of death in Iran (8). Lung cancer is the fifth leading tumor in Iran. Its incidence is low, but it has been increasing steadily in both men and women during the recent years (9, 10).

With regards to cancer mortality, data are important, together with other epidemiologic indicators such as incidence and survival, to monitor the effects of screening program, early diagnosis, other prognostic factors and also the risk in the population (11).

The aim of this study was to determine trends in lung cancer mortality in the Iranian general population during a period of almost a decade, i.e. from 1995 to 2004.

METHODS

National death Statistic Reported by the Ministry of Health and Medical Education (MOH&ME) from 1995 to 2000 (registered death statistics for Iranian population at the Information Technology & Statistic Management Center, MOH&ME) and from 2001 to 2004 (published by MOH&ME) (12-14) stratified by age group, sex, and cause of death (coded according to the 10th revision of the International Classification of Diseases [ICD-10]) are included in this analysis. Lung cancer [ICD-10; C34] was expressed as the annual mortality rates/100,000, overall, by sex and by age group (0-5, 5-14, 15-49 and ≥ 50 years of age). The populations of Iran in 1995-2003 were estimated by age group and sex using the census from 1996 conducted by Statistics Centre of Iran and its estimation according to population growth rate for years before and after national census (15).

RESULTS

All death records due to Lung cancer from 1995 to 2004 are included in the analysis. The general mortality rate of Lung cancer dramatically increased during these years from 1.10 to 8.11 (Table 1 and Figure 1). Moreover Lung cancer mortality was higher for male in comparison to female (Table 1 and Figure 2). In men population, the rate of Lung cancer mortality increased from 1.53 (in 1995) to 11.40 (in 2004), but in women the rate increases from 0.64 to 4.59 in same years (Table 1). Also the mortality increased as age increased (Table 1).

Table 1: Lung Cancer mortality rate and trend by sex and age group

	<5 Years		5-14 Years		15-49 Years		≥ 50 Years		All ages		Total
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female	
1995	0.21	0.00	0.00	0.01	0.30	0.17	10.76	4.46	1.53	0.64	1.10
1996	0.21	0.16	0.05	0.01	0.55	0.34	15.37	7.73	2.26	1.15	1.72
1997	0.20	0.20	0.07	0.10	0.59	0.41	19.37	8.41	2.79	1.30	2.07
1998	0.32	0.20	0.08	0.01	0.36	0.53	20.74	11.98	3.02	1.79	2.42
1999	0.51	0.27	0.03	0.06	0.94	0.62	28.62	10.70	4.16	1.69	2.96
2000	0.55	0.32	0.08	0.06	1.15	0.74	32.44	15.05	4.61	2.19	3.43
2001	0.21	0.07	0.09	0.12	1.09	0.81	31.74	14.10	5.06	2.46	3.79
2002	0.00	0.00	0.1	0.00	1.6	1.00	51.8	21.2	7.49	3.33	5.47
2003	0.00	0.18	0.03	0.29	2.43	1.44	78.70	35.35	11.5	5.46	8.60
2004	0.39	0.14	0.14	0.10	2.58	1.41	28.72	29.73	11.4	4.59	8.11

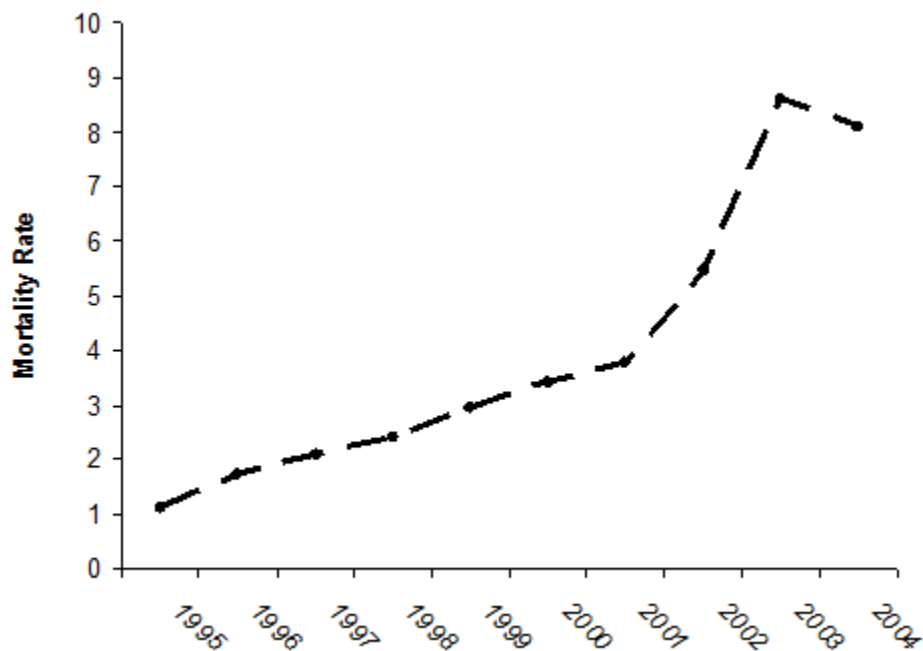


Figure1: Trend of Lung Cancer mortality during the period 1995-2004

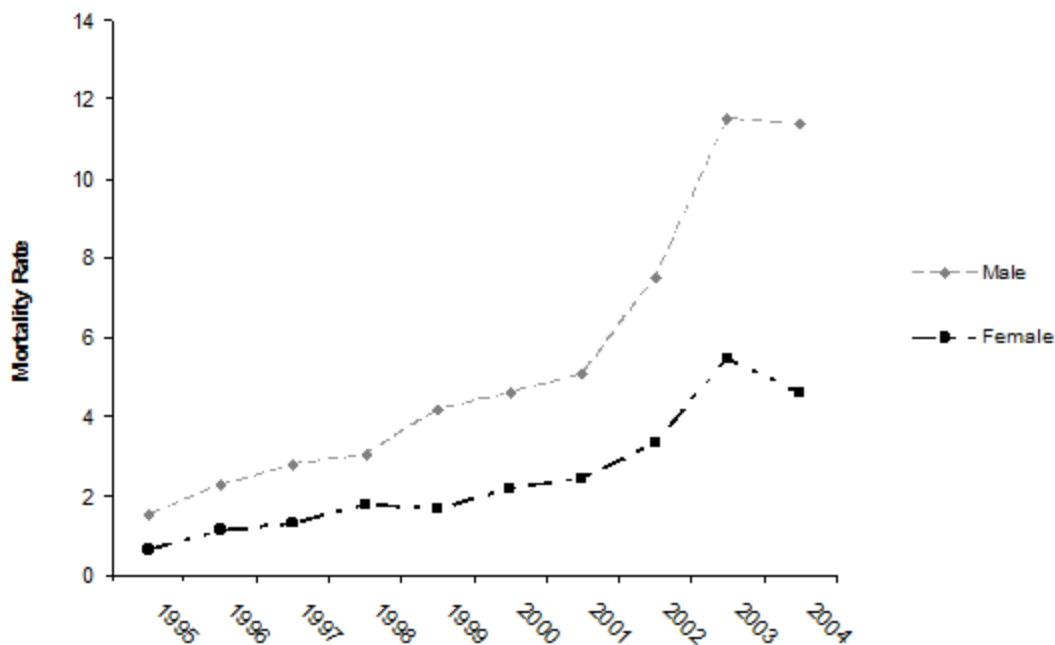


Figure2: Trends of Lung Cancer mortality during the period 1995-2004 by sex

DISCUSSION

This study provides comprehensive projections for mortality rates due to Lung cancer based on the national registry data, indicating remarkable increasing trends in Lung cancer mortality in the period under study. Our findings are in contrast to western countries. In United States, age-adjusted lung cancer mortality rates have declined among males and increased among females since 1995, which could be due to historical differences in cigarette consumption between genders (16,17). Also in Canada, a decline in mortality rates has been observed among men since the 1980 which reflects the effect of smoking controls among men (18). In the United Kingdom, age-specific lung cancer mortality rates among men have been in decline since the 1980s, but there was a rising rate for women for the same time which is related to past smoking behavior in the United Kingdom (19).

Our results indicated a higher mortality in men, compared to women, which could be due to more smoking among men (20, 21). This is in contrast to development countries which mortality of Lung cancer declining in men and rising in women (22, 23). This model is observed in some development countries such as Brazil and South Africa too (24, 25).

Lung cancer was reported more in men due to more exposure to risk factors (26), and high proportion of cigarette smokers among lung cancer patients was observed (27). Iranian study indicated a higher prevalence of lung cancer in males, older age and smokers with low and moderate socioeconomic classes (28). The access of screening for Lung cancer is very negligible in Iran. Screening can reduce mortality from lung cancer. Lung cancer death rates were reduced by 20 % when Low-dose computed tomographic (CT) screening is used in a high-risk group (29, 30). So it is recommended that in Iran screening be started at least in high risk group in order to control the mortality and burden of Lung cancer in future.

This study revealed an increasing trend of Lung cancer burden in Iranian population and the results will help to understand the direction of the lung cancer mortality in Iran. A limitation of this study is underestimating of mortality for cancers in Iran due to poor registry (12). Also we didn't access to crude data for all ages in order to give age-standardized mortality rates for international comparison. But the results may be useful to health practitioners and policy makers in monitoring and projecting future rates.

REFERENCES

1. International Agency for Research on Cancer: Global Cancer Report Lyon; 2003.
2. Jemal A, Siegel R, Ward E, Murray T, Xu J, Thun MJ. Cancer statistics, 2007. *CA Cancer J Clin* 2007; 57 (1): 43-66.
3. Zahir ST, Mirtalebi M. Survival of patients with lung cancer, yazd, Iran. *Asian Pac J Cancer Prev*. 2012;13(9):4387-91.
4. Injuries violence and disabilities biennial report 2004-2005. Switzerland: WHO; 2006. World Health Organization.
5. Kwong SL, Chen MS, Snipes KP, Bal DG, Wright WE. Asian subgroups and cancer incidence and mortality rates in California. *Cancer* 2005; 104(12), 2975-2981.
6. Lam WK. Lung cancer in Asian women-the environment and genes. *Respirology* 2005; 10 (4):408-17.
7. Bray F, Sankila R, Ferlay J, Parkin DM. Estimates of cancer incidence and mortality in Europe in 1995. *Eur J Cancer* 2002; 38(1): 99-166.
8. Mosavi-Jarrahi A, Mohagheghi MA. Epidemiology of esophageal cancer in the high-risk population of Iran. *Asian Pac J Cancer Prev*. 2006; 7, 375-80.

9. Babaei M, Mousavi S, Malek M, Tosi G, Masoumeh Z, Danaei N, Gafar G. Cancer occurrence in Semnan Province, Iran: results of a population-based cancer registry. *AsianPac J Cancer Prev* 2005; 6 (2): 159- 64.
10. Sadjadi A, Nouraie M, Mohagheghi MA, Mousavi-Jarrahi A, Malekezadeh R, Parkin DM Cancer occurrence in Iran in 2002, an international perspective. *Asian Pac J Cancer Pre* 2005; 6(3): 359-363.
11. Burnet NG, Jefferies SJ, Benson RJ, Hunt DP, Treasure FP. Years of life lost (YLL) from cancer is an important measure of population burden – and should be considered when allocating research funds *British Journal of Cancer*. 2005; 92, 241 – 245.
12. Naghavi M. Death report from 23 provinces in Iran. 1st edition. 2004; Tehran: Ministry of Health.
13. Naghavi M. Death report from 18 provinces in Iran. 1st edition. 2002; Tehran: Ministry of Health.
14. Naghavi M. Death report from 18 provinces in Iran. 1st edition. 2003; Tehran: Ministry of Health.
15. National Statistics Center, Online Publications at: <http://amar.sci.org.ir/PlanList.aspx>.
16. Jemal A, Siegel R, Ward E, Hao Y, Xu J, Thun MJ. Cancer statistics, 2009. *CA Cancer J Clin* 2009; 59:225-49.
17. Jemal A, Thun MJ, Ries LA, Howe HL, Weir HK, Center MM, et al. Annual report to the nation on the status of cancer, 1975-2005: featuring trends in lung cancer, tobacco use, and tobacco control. *J Natl Cancer Inst* 2008; 100:1672-94.
18. Canadian Cancer Society's Steering Committee on Cancer Statistics. Canadian cancer statistics 2011. Toronto: Canadian Cancer Society; 2011.
19. Cancer Research UK. Lung cancer – UK mortality statistics. <http://info.cancerresearchuk.org/cancerstats/types/lung/mortality/> (accessed on 18/Jul/2011).
20. Amos A: Women and smoking. *Br Med Bull* 1996 52:74-89.
21. Mackay J, Amos A: Women and tobacco. *Respirology* 2003, 8(2):123-130.
22. Brennan P, Bray I: Recent trends and future directions for lung cancer mortality in Europe. *Br J Cancer* 2002, 87(1):43-48.
23. UK lung cancer mortality statistics. [<http://www.cancerresearchuk.org>].
24. Bello B, Fadahun O, Kielkowski D, Nelson G. Trends in lung cancer mortality in South Africa: 1995-2006. *BMC Public Health*. 2011 Apr 4;11:209.
25. Souza MC, Vasconcelos AG, Cruz OG. Trends in lung cancer mortality in Brazil from the 1980s into the early 21st century: age-period-cohort analysis. *Cad Saude Publica*. 2012 Jan;28(1):21-30.
26. Belani CP, Marts S, Schiller J, Socinski MA. Women and lung cancer: epidemiology, tumor biology, and emerging trends in clinical research. *Lung Cancer*. 2007;55(1):15–23.
27. Bosetti C, Gallus S, Peto R, Negri E, Talamini R, Tavani A, et al. Tobacco smoking, smoking cessation, and cumulative risk of upper aerodigestive tract cancers. *Am J Epidemiol*. 2008;167(4):468–73.

28. Tarrahi MJ, Mehrabani D, Khademolhosseini F, Amini M, Masoumi SJ, Julaei H, Farahmand M. Lung cancer occurrence in Southern Iran. *J Res Med Sci.* 2009 Mar;14(2):139-40.
29. Heuvers ME, Wisnivesky J, Stricker BH, Aerts JG. Generalizability of results from the National Lung Screening Trial. *Eur J Epidemiol.* 2012 Sep;27(9):669-72.
30. National Lung Screening Trial Research Team, Aberle DR, Adams AM, Berg CD, Black WC, Clapp JD, Fagerstrom RM, Gareen IF, Gatsonis C, Marcus PM, Sicks JD. Reduced lung-cancer mortality with low-dose computed tomographic screening. *N Engl J Med.* 2011 Aug 4;365(5):395-409.