

## Meta-Analysis of Prevalence of Smoking in 15-64-year-old Population of West of Iran

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### ABSTRACT

**Background:** Cigarette Smoking is a recognized cause of systemic disorders such as bronchogenic, carcinoma, and cardiovascular diseases and hence prompt and effective interventions are required for its elimination. Thus, This Meta-analysis was carried out for an adult population of west of Iran in order to estimate of prevalence smoking in this area.

**Methods:** We examined related to documentation by searching in published and non-electronic databases. Data were extracted based on variables such as the year of the study, sex, age group, and the prevalence of smoking. Based on the results of heterogeneity, we used fixed or random effects model to assessment the overall prevalence of cigarette smoking. All analyses were accomplished via STATA 11 software.

**Results:** Totally, 25,990 subjects (13005 males) were investigated. Meta-analysis in men and women indicated prevalence of 22.9 (20.6-25.2) and 0.6 (0.3-0.9) respectively.

**Conclusions:** It was found that more than one-fifth of men from 15 year to 64-year-old of west of Iran smoked cigarette. Providing an education on harmful effects of smoking to the adult population would be a valuable means for reducing destructive consequences of smoking.

**Keywords:** Cigarette, meta-analysis, prevalence, West of Iran

### INTRODUCTION

Cigarette is one of the most significant risk factors and influencing factors increasing the total burden of diseases. It can cause serious malignancies in mouth, throat, lung, larynx, esophagus, bladder, pancreas, liver, and cervix. Besides, cigarette smoking is the most common cause of avoidable deaths in the world.<sup>[1-5]</sup> In a study by Dol *et al.*, smokers survived 10 years less than non-smokers.<sup>[6]</sup> Scientific evidence has revealed that smoking is harmful not only for smokers but also for their neighbors.<sup>[7]</sup>

It is estimated that during 1990 decade, annually 3 million deaths have happened due to the cigarette smoking that 2 million of which were in developed countries but in 2020 and early 2030 decades this indicator will increase to 10 million with 7 million

deaths in developing countries. This indicated that now on one cigarette related death happens every 10 s, which will reach one death per 3 s in the next 30-40 years.<sup>[8]</sup>

Results of a more recent study showed that 14% of Iranians are tobacco users, which this prevalence in male was 6 fold female. In this report, the lowest prevalence of smoking were in the provinces of Ilam (7.6%), Yazd (8.6%) and Golestan (9.1%) and the highest provinces of smoking were in the provinces of Sistan-Baloochistan (20.3%) and Booshehr (21.2%).<sup>[9]</sup> As well, another report of World Health Organization (WHO) suggested that the burden of smoking in developing countries such as Iran is in increasing trend.<sup>[10]</sup>

Given the above mentioned statistics and high amounts of problems attributable to smoking, in order to reduce the rate of cigarette smoking and its adverse outcomes, it is necessary to estimate the situation of smoking in the community using valid data. Since the national surveillance of non-communicable disease risk factors has been conducted in all provinces of Iran in recent years, collection and pooling of the results via meta-analysis provides an important opportunity to policy makers to support evidence based decision making. Present paper aims to measure the prevalence of cigarette smoking in 15-64-year-old adults by meta-analysis of the results of the first step of 5-years national non-communicable disease risk factors surveillance project in province placed at the west of Iran (Kordestan, kermanshah, lorestan and Hamadan).

## METHODS

### Study design, setting and study population

The present meta-analysis was performed on 5 year documents of Iranian non-communicable disease risk factors surveillance system (first step) with regard to prevalence of smoking among the adult population of west of Iran. To access the results of the first step of non-communicable disease risk factors surveillance system in different provinces we relied on published reports of the relevant studies in 2007-2009. Documents of the surveillance system in 2004 and 2006, which was not in paper or electronically available, were collected in coordination with the center for disease control of Islamic republic of Iran's Ministry of

Health (data of 2007, 2008, and 2009 years had been published in the data book by Ministry of Health and Medical education and data between 2004 and 2006 years collected from the relevant departments in Iranian Ministry of Health and Medical Education. Meanwhile, this project was not carried out in 2005 year. Furthermore, fact sheets and report of provincial of non-communicable disease risk factors surveillance system is available in site: <http://www.ncdinfobase.ir>).

### Description of the studies imported into present research

These studies were carried out with using related to protocols of WHO. The first step of these studies was ended after five national projects. Data for these studies were collected by questionnaire. In each cluster, eligible subjects of the first household were questioned by the interviewers and then other households were approached until required sample sizes in each age and sex groups were completed.<sup>[11]</sup>

Samples selections in these studies were applied using information of the post office of Islamic Republic of Iran with a systematic approach and multi stage cluster sampling method. Sample size selection was equal in different sex and age groups (15-24, 25-34, 35-44, 45-54, 55-64, years).<sup>[11]</sup>

### Data collection

Data were collected according to year of study, overall sample size, and sample size disaggregated by gender and age groups and finally, the prevalence of cigarette smoking in male and female. Data were entered in a Microsoft Excel spreadsheet. The results of 5 years of the national non-communicable disease risk factors surveillance system (first step) in west of Iran acted as the inclusion eligible, as a result.

### Quality assessment

As all selected articles were conducted and published based on the WHO guidelines with a similar methodology in wholly provinces of Iran, no quality assessment was performed.

### Inclusion and exclusion eligible

Merely results of 5 years of the national non-communicable disease risk factors surveillance system (first step) in west of Iran were included in the study. Other studies whose results did not hold those eligible excluded from the present study.

### Statistical analysis

Data analysis was carried out using the STATA v. 11. We calculated Standard error for prevalence of smoking in each study according to the binary distribution formula. Cochran test (Q) of heterogeneity was carried out among the studies. Based on the results of the heterogeneity test, fixed effect model (where  $P > 0.05$ ) or random effects model (where  $P < 0.05$ ) was used to estimate the pooled prevalence of cigarette smoking in total population and within age-gender groups. Additionally, to reduce the effect of random variation, Bayesian techniques were applied to estimate the pooled prevalence of smoking. Finally, using the meta regression command, the effect of variables susceptible to make heterogeneity among the studies was investigated. 95% confidence interval of the prevalence was estimated and demonstrated in forest plot. (Size of the square indicates the weight or sample size and the horizontal line indicate the 95% confidence interval for the prevalence of smoking in each study and pooled prevalence) [Figures 1 and 2].

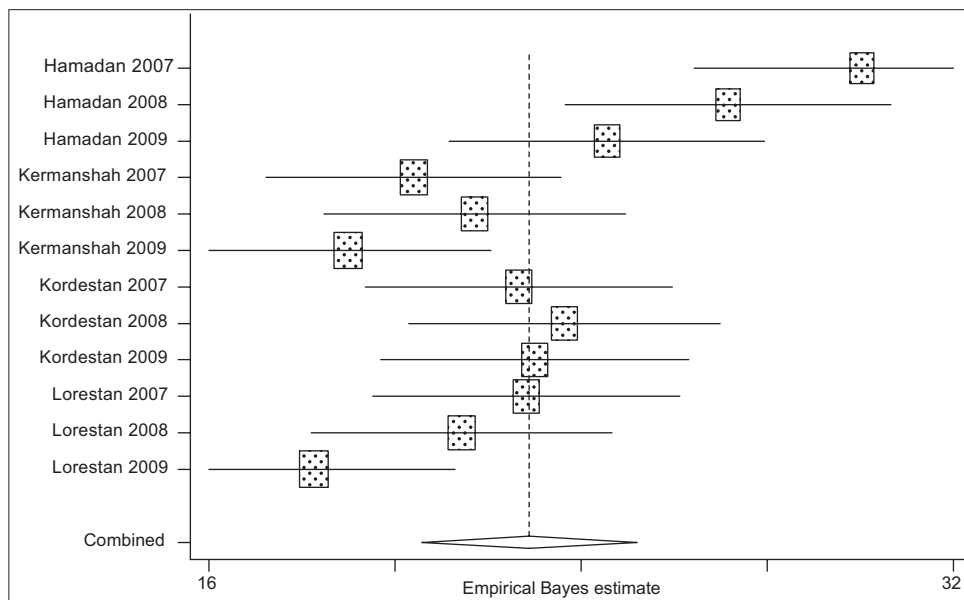
### RESULTS

According to the national census of 2006, total population of west of Iran was 6769340 (Kordestan: 1440158, Kermanshah: 1938060, Lorestan: 1716527, Hamadan: 1674595) which covered

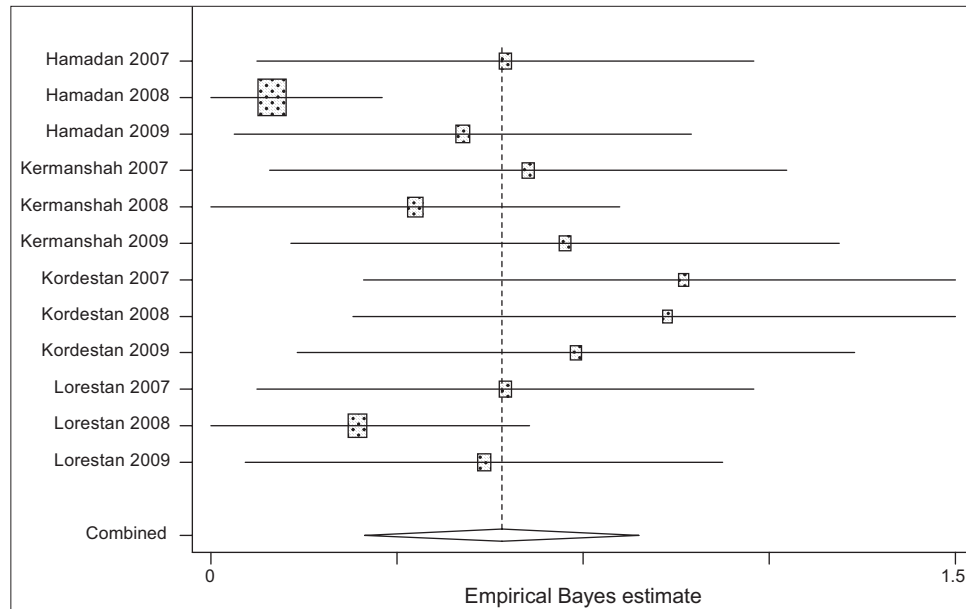
about 9.7% of the total population of Iran. Of this population, 25990 persons (13005 males) who were Iranian in 5 age groups (15-24, 25-34, 35-44, 45-54, and 55-64 years) were investigated [Table 1]. Sample size in 2004 was 9990 and in the next 4 years annually 4000 subjects were participated in the study.

According to the results of the survey of the steps project (non-communicable disease risk-factors surveillance system), the prevalence of the cigarette smoking in men dispersed from 17.2% (Lorestan, 2009) to 32.4% (Hamadan, 2007). Pooled prevalence of smoking in men in this meta-analysis was estimated about 22.9 (20.6-25.2). In This study, prevalence of smoking in men who were 15-24-year-old dispersed between 2% (Kermanshah, 2006 and 2009) and 10.2% (Kermanshah, 2004), in 25-34-year-old men between 17.2% (Lorestan, 2009) and 42.4% (Hamadan, 2008), 35-44-year-old men between 25.7% (Lorestan, 2009) and 55.1% (Hamadan, 2007), 45-54-year-old men between 26.3% (Kordestan, 2006) and 45.2% (Kermanshah, 2004) and 55-64-year-old men between 21.6% (Kordestan, 2007) and 41.9% (Kermanshah, 2004). Table 1 shows, the total estimates of smoking prevalence by gender.

The prevalence of cigarette smoking in women dispersed from 0.07% (Hamadan, 2008) to 2.3% (Kordestan, 2007). Pooled prevalence of smoking in women in this meta-analysis was



**Figure 1:** Difference the estimated prevalence of smoking among men in each of individual study and overall; This chart shows that range in prevalence of smoking among male is 18.25-30.03% (Based on analysis Bayes)



**Figure 2:** Difference the estimated prevalence of smoking among female in each of individual study and overall; This chart shows that range in prevalence of smoking among female is 0.12-0.95% (Based on analysis Bayes)

estimated about 0.6 (0.3-0.9). In these studies, prevalence of smoking dispersed about 0-0.6% in 15-24-year-old women, 0-3% in 25-34-year-old women, 0-4% in 35-44-year-old women, 0-7.1% in 45-54-year-old women, and 0-8.7% in 55-64-year-old women [Table 1].

## DISCUSSION

This study revealed that about one fifth of 15-64-year male residents in west of Iran were current cigarette smokers. In a study carried out in Isfahan (Central province of Iran), among 2626 19 years and older subjects, prevalence of self-reported cigarette smoking in men was 18.7%.<sup>[12]</sup> Results of two another studies in Capital of Iran revealed this prevalence 20.6% and 22% in men.<sup>[13,14]</sup> In Mashhad (north-east Iran) 17.2% of men (172 of 999 subjects) were current smoker.<sup>[15]</sup> Furthermore, a study in shiraz showed that About 26% of men were smoker.<sup>[16]</sup> These findings showed that the prevalence of cigarette smoking in men in all parts of Iran as well as the area of the current study was high; however, the prevalence of cigarette smoking in this study lower than those in other country. For example in USA: 43.7%, Brazil: 14.7% and Malaysia: 29.7%<sup>[17]</sup> of the subject were smoker which the observed dissimilarity could be due to cultural and social factors in different populations.

Maximum of male smokers were in 35-44 and 45-54 age groups respectively. Table 1 indicates that the prevalence of cigarette smoking among men aged 15-24 less than other age groups and this difference is significant. Furthermore, the prevalence of cigarette smoking increases from 15-24 to 45-54 age groups and then declines, which is in parallel with the results of most of another relevant studies.<sup>[14]</sup> This decline might be due to the more common cigarette related diseases and mortality and well sensitivity of its risks in the older age groups.

Based on Table 1, trend of the prevalence of smoking cigarette increased by age, and women aged from 55 years to 64 years smoked more than the other age groups. Furthermore, this table showed that Estimated pooled prevalence of cigarette smoking in female inhabitants of west of Iran was 0.6%. The rates in first two age groups (15-24 and 25-34 years) were significantly different from those in older age groups. Merely, some of the studies in different parts of Iran showed similar findings. In a study,<sup>[18]</sup> the prevalence of smoking a cigarette in women were 2.1%. This prevalence for 30-70-year-old women in Semnan was 0.5%<sup>[19]</sup> while in the study Mehrabi *et al.*<sup>[20]</sup> 5.9% of women aged 15-64 years were smoker.<sup>[20]</sup> It seems that different classifications of smoker in dissimilar studies is one of the core causes of the heterogeneity in results.

**Table 1:** Description of the studies according to year of publication, sex, age group and result of meta-analysis

Province (publication year)	15-24		25-34		35-44		45-54		55-64		Total	
	M	F	M	F	M	F	M	F	M	F	M	F
Kordestan 2004	5	0	32.4	0	48.2	1.2	37.3	1.2	29.7	1.3	-	-
Kordestan 2006	7.1	0	27.7	1	32.7	3	26.3	7.1	28.2	8.7	-	-
Kordestan 2007	7.2	0	30.7	3	35	4	32.1	5	21.6	3.2	22.6	2.3
Kordestan 2008	5.05	0	33.01	2	42	3.92	31	3.03	25.53	5.15	23.85	1.98
Kordestan 2009	9	0	27.27	1.02	34	1	37	3	25	2.02	23.03	0.97
Kermanshah 2004	10.2	0	29.2	0.4	44	1.6	45.2	1.7	41.9	2.3	-	-
Kermanshah 2006	2	0	25.7	0	37.4	2.9	31.3	3	29.4	3	-	-
Kermanshah 2007	3	0	23	0	35	1	36	1	25.5	6	19.8	0.7
Kermanshah 2008	3	0	29	0	31	1	42	0	25	2	21.41	0.32
Kermanshah 2009	2	0	19.8	0	33	1	30.3	3.96	34	3.03	18.11	0.9
Lorestan 2004	5.5	0.6	25.2	1.6	36.5	0.6	29.4	1.6	25.3	1.4	-	-
Lorestan 2006	5.1	0	28.7	1	36.4	0	42.6	0	25.7	1.9	-	-
Lorestan 2007	7	0	26.3	0	39.4	1	33.7	2	27.9	2	22.8	0.6
Lorestan 2008	6.06	0	21	0	37	0	36.63	0.98	28.28	1.02	21.06	0.2
Lorestan 2009	5.051	0	17.17	0	25.77	1.04	36.36	2	23.23	1.03	17.25	0.52
Hamadan 2004	8.7	0	24.2	1.3	37.8	1.6	38	1.6	25.3	2.5	-	-
Hamadan 2006	4	0	22.4	0	48	1.1	41	1	30	0	-	-
Hamadan 2007	9	0	37	0	55.1	1	57.3	2	30.6	2	32.4	0.6
Hamadan 2008	2.97	0	42.42	0	48.51	0	38	0	37.76	1	28.47	0.07
Hamadan 2009	7.84	0	27.27	0	43.88	0.98	40.4	1.03	27.45	2	25.03	0.45
Pooled estimate												
%	5.3	0.06	27.1	0.4	39	1.02	36.9	1.4	28.3	1.8	22.9	0.6
	(4.2-6.4)	(-0.2-0.4)	(24.7-29.5)	(0.06-0.8)	(36-42.1)	(0.6-1.4)	(34.02-39.9)	(0.9-1.9)	(26.03-30.7)	(1.2-2.3)	(20.6-25.2)	(0.3-0.9)
Q	32.6	1.3	36.5	11.4	49.1	12.2	47.2	19.5	33	19.8	52.9	27.5
(Heterogeneity) P												
Sample size	0.03	1	0.009	0.9	0.0001	0.9	0.0001	0.4	0.02	0.4	0.0001	0.004
	2594	2593	2601	2599	2607	2607	2610	2597	2593	2589	13005	12985



Furthermore, the prevalence of cigarette smoking in the other countries is different too. For instance, in Pakistan, 5% of women aged 25-44 years and 7.8% women aged 45-64 years,<sup>[21]</sup> In Egypt, 1.5% of 15-80-year old women,<sup>[22]</sup> in Kuwait 1.9% of adult women,<sup>[23]</sup> in Italy 22.5%<sup>[24]</sup> of adult women and in the USA 17.4%<sup>[25]</sup> of adult women were current smokers. Thus, it can be stated that the prevalence of smoking a cigarette in women of this area less than other part of Iran and lower than those in other countries.

## CONCLUSION

In present, meta-analysis indicated that the prevalence of cigarette smoking in men was significantly more than that of women in all age groups. This pattern was parallel to the results of all studies in Iran and other countries (China, Korea, European countries and USA).<sup>[26-29]</sup>

One of the highest reasons of discrepancies in the results of different studies was due to the various classifications of smoking. On the other hand, determination of prevalence of smoking in this study was based on self-reporting, which leads to a under reporting. The amount of this under reporting is different in populations based on cultural situation and level of acceptance of smoking and stigma. Because of lack of social acceptance of smoking in Iran, the probability of under reporting of prevalence of smoking in both genders (particularly in women) more than the other countries. For instance in a study, the prevalence of smoking based on the self-reporting was 18.7 and 1.3 in men and women respectively. However, laboratory tests showed these rates 21.2% and 6.7% respectively that it was 1.13 and 5.1 folds respectively higher than those predictable by self-reporting.<sup>[12]</sup> Considering this prevalent under reporting, Therefore, it can state that the actual prevalence of smoking in men and particularly in women living in west of Iran are more than the reported prevalence in present meta-analysis.

Although, power of steps projects (non-communicable disease risk factor surveillance system) in Iran was in a high level because of its methodology and extensive study sample size, but under-reporting (due to self-reporting) was one of the main limitations in

the estimation of prevalence of smoking a cigarette for citizens of west of Iran in this meta-analysis.

Increasing trends in the prevalence of cigarette smoking shows that the policies for controlling cigarette smoking in Iran, and particularly, in west provinces of Iran have not been professionally applied. Therefore, it is necessary to design and conduct strategies and activities with regard to control of smoking such as general and political supports, increasing social pressures toward smoking ban, regular training of the population to understand risks of smoking, and converting the control programs to a social demand.

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