

## Prevalence of major coronary heart disease risk factors in Iran

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### ABSTRACT

**Background and aims:** Coronary heart diseases (CHDs) contribute to mortality, morbidity, disability, productivity and quality of life. This study was aimed to determine the prevalence of major risk factors for CHD in the provinces of Iran.

**Methods:** This study reported pre-existing data and was of secondary, descriptive type. Prevalence of non-communicable disease (NCD) risk factors was defined for the provinces of Iran. A reliable report of NCD risk factors, the national surveillance program conducted in Iran, such as type II diabetes, hypertension and mean body mass index (BMI), smoking, hookah smoking, high cholesterol and obesity was used.

**Results:** The highest and lowest prevalence of hypertension was obtained in Bushehr (20.85%) and Yazd (12.86%) provinces, respectively. The highest mean BMI was reported from Mazandaran province (26) and the lowest from Sistan and Baluchestan province (22.50). Qom province had the highest prevalence of diabetes (27.65%). The highest prevalence of high cholesterol was obtained in Lorestan province (50.87 %) and the lowest in the Khuzestan province (22.71%). East Azarbaijan province had the highest prevalence of smoking (14.8%) and Kurdistan province the lowest (0.16%). Hookah smoking was most prevalent in Hormozgan province (7.62%). The highest prevalence of physical activities was reported from Sistan and Baluchestan province (47.84%) and the lowest from Kohgiluyeh and Boyer-Ahmad (22.2%).

**Conclusion:** Prevalence of CHD risk factors is the main priority for the Iranian health system. There is a need for intervention programs in the provinces which are at greater risk as well as for modification of people's lifestyle.

**Keywords:** Prevalence, Coronary heart disease, Risk factor, Epidemiology, Iran.

### INTRODUCTION

In the third period of epidemiological transition in the late twentieth century, coronary heart disease (CHD) and its risk factors, in many countries, including Iran, have become a major health problem.<sup>1, 2</sup> Non-communicable diseases NCDs are estimated to contribute to almost 60% of

mortalities worldwide and 43% of the global burden of disease in 1999. With current trends, by 2020 these diseases are predicted to account for 73% of deaths and 60% of the disease burden.<sup>3</sup> NCDs are already of major importance in developed countries and are rapidly turning into a major public health

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threat in the developing countries. Over a period of 30 years, the burden of NCDs for developing and newly industrialized countries is expected to rise by more than 60% by 2020, less than a rise of less than 10% in developed countries.<sup>4,5</sup> The underlying cause of this epidemic is the increase in lifestyle-related risk factors resulting from social and economic changes. Obesity and overweight, arterial hypertension, inadequate physical activity, hypercholesterolemia and addiction are the first leading five risk factors, causing 68% of risk factors burden and 11% of total burden of diseases, leading to 1.6 million disability adjusted life years.<sup>5-7</sup> From three major groups of diseases and injuries (pretransitional, NCDs, and accidents and injuries), NCDs cause the most disease burden in Iran, 45% for men and 33% for women.<sup>2,6,7</sup> On the basis of the results obtained in the fifth round of survey of NCD risk factor surveillance program in Iran in 2010, among both genders, only 4% in the age group of 15-44 years and 1% in the age group of 45-64 years had no CHD risk factors.<sup>3,8</sup> An increase in the median age of the population, demographic changes and aging, rapid development of urbanization and globalization, high prevalence of smoking, high prevalence of exposure to risk factors for CHD, improper diet, small communities and development of technologies followed by a decrease in physical activity and increase in mental tension and stress have resulted in a high incidence of this disease.<sup>4-7</sup> In addition, CHD is the most common cause of death in many communities around the world, including Iran. Not only CHD does have impacts on mortality, but also it affects the morbidity, disability and productivity.<sup>9-11</sup> In Iran, as with other countries, CHD causes incidence, mortality and burden of disability adjusted life years (DALY) on the community.<sup>12-17</sup> Several studies on CHD risk

factors have been conducted in Iran. The prevalence has been mentioned only sporadically in various reports.<sup>18-24</sup> So far, the prevalence has not been reported collectively for the Iranian provinces. Determining prevalence of CHD risk factors per province can help us to understand and evaluate the epidemiological transition theory and changing pattern of diseases in various communities in Iran, as well as explaining the epidemiology of CHD.<sup>17-19</sup> This study was aimed to determine the prevalence of major risk factors for CHD in the provinces of Iran.

## METHODS

This secondary, descriptive study reports pre-existing data. Prevalence of NCD risk factors was defined for the provinces of Iran.<sup>18</sup> To determine prevalence of risk factors for NCD in 2007 and 2009, we used reliable reports of NCD risk factors surveillance program conducted in Iran, such as type II diabetes, hypertension and mean body mass index (BMI), smoking, hookah smoking and high cholesterol. In the study of risk factors for NCDs in Iran, the minimum sample size was 2,500 individuals in the most sparsely populated province that is equivalent to the minimum sample size suggested by the World Health Organization (WHO) technical recommendations; however, the maximum sample size consisted of over 10020 individuals in Tehran. Sampling from the five age groups 15-24, 25-34, 35-44, 45-54 and 55-64 years, we selected equal numbers of men and women to participate in this research. Data collection in Iran was based on the stepwise approach recommended by WHO. Details of the method can be seen in other studies.<sup>18-24</sup>

## RESULTS

Prevalence of hypertension, diabetes, smoking and low physical activity in the 15

to 64 years old population in Iran in 2007 and 2009 was reported 17.38%, 9.69%, 11.39% and 35.21% and 16.09%, 5.56%, 10.82% and 38.97%, respectively. The prevalence was different in the provinces. The highest prevalence of hypertension (20.85%) was reported for Bushehr province followed by East Azarbaijan (20.47%). The lowest prevalence of hypertension was reported for Yazd and Golestan provinces (12.86% and 12.94%, respectively).

The highest mean BMI was obtained in Mazandaran (26), Gilan (25.9) and Khuzestan (25.7) provinces. The lowest mean BMI were obtained 22.5 and 22.8 for Sistan and Baluchestan and Hormozgan provinces, respectively.

The highest prevalence of diabetes was reported from Qom (27.65%) and

Khuzestan (15.57%), while the lowest was reported for Ardabil (4.49%). The highest prevalence of high cholesterol was obtained in Lorestan province (50.87%) and the lowest in Khuzestan province (22.71%). East Azarbaijan had the highest prevalence of smoking (14.8%) and Kurdistan had the lowest (0.16%). Hookah smoking was most prevalent in Hormozgan province (7.62%) followed by Fars (4.6%), but it was least prevalent in Ilam (0.5%) and Kurdistan (0.78%). The highest prevalence of physical activity was obtained in Sistan and Baluchestan (47.84%) province while the lowest prevalence was reported for Kohgiluyeh and Boyer-Ahmad (22.2%). The prevalence of hypertension, diabetes and other risk factors for Iran provinces in 2009 is shown in Table 1.

**Table 1:** Prevalence of cardiovascular risk factors in Iran – 2009

Province	HT <sup>1</sup>	DM <sup>2</sup>	Cho <sup>3</sup>	OO <sup>4</sup>	Smoking	hookah	PA <sup>5</sup>
1 Alborz	16.35	11.12	28.84	48.49	12.82	3.12	35.42
2 Ardabil	17.07	4.49	39.6	48.8	13.2	1.5	38.7
3 West Azarbaijan	17.38	5.49	25.8	48.8	14.5	1.17	38.3
4 East Azarbaijan	20.47	12.82	27.4	47.4	14.8	1.8	36.1
5 Bushehr	20.85	8.65	35.03	40.4	6.3	12.5	46.1
6 Chaharmahal and Bakhtiari	17.18	5.74	32.6	37.79	13.3	1.08	30.04
7 Ilam	14.9	5.16	25.02	39.5	6.6	0.5	26.9
8 Esfahan	15.2	8.33	37.8	44.2	12.3	1.6	38.4
9 Fars	16.91	9.63	40.06	39.76	10.32	4.6	41.52
10 Ghazvin	16.11	10.79	34.27	46.48	11.42	1.16	39.05
11 Gilan	16.79	9.61	35.77	48.56	12.36	1.92	32.4
12 Golestan	12.94	9.61	35.77	46.58	6.98	1.1	38.8
13 Hamadan	15.25	4.09	23.64	41.21	14.03	1.23	33.07
14 Hormozgan	16.6	12.04	37.32	34.8	8.31	7.62	46.28
15 Kerman	14.73	8.96	23.8	34.48	11.21	1.73	40.21
16 Kermnanshah	16.68	7.61	22.73	48.8	10.46	1.25	31.54
17 South Khorasan	15.46	13.57	31.01	30.43	6.7	1.5	29.16
18 Razavi Khorasan	18.67	5.12	31.7	39.61	8.34	4.46	29.48
19 North Khorasan	19.5	10.53	42.8	39.52	7.42	0.87	35.5
20 Khuzestan	17.59	15.57	22.71	46.68	9.39	1.64	40.36
21 Kohgiluyeh and Boyer-Ahmad	14.4	6.78	28.37	43.4	8.74	2.74	22.2
22 Kurdistan	16.63	7.6	29.31	47.09	0.16	0.78	32.99
23 Lorestan	14.81	8.44	50.87	41.75	10.89	2.24	23.68
24 Markazi	14.32	6.95	37.54	42.79	12.57	0.92	29.78
25 Mazandaran	15.47	10.53	42.8	54.35	10.58	1.35	23.26
26 Qom	17.51	27.65	49.87	49.58	10.06	2.47	41.67
27 Semnan	16.03	9.94	49.7	49.99	9.97	9.74	39.97
28 Sistan and Baluchestan	13.36	10.63	33.63	29.91	8.27	10.08	47.84
29 Tehran	16.35	11.12	28.84	48.49	12.82	3.12	35.42
30 Yazd	12.86	11.3	29.58	46.99	7.92	1.44	47.65
31 Zanjan	17.1	5.84	49.4	55.13	11.77	0.63	29.99

1. Hypertension; 2. Type II diabetes; 3. High Cholesterol; 4. Overweight or obese: BMI  $\geq$  25 kg/m<sup>2</sup>; 5. Physical Activity.

## DISCUSSION

In this study, prevalence of CHD risk factors has been reported for the Iranian provinces. The findings of this study indicated that the CHD risk factors in Iran are less prevalent than in some of neighboring countries. In a similar study conducted in Egypt NCD risk factors were examined, and prevalence of smoking for men, women and the whole population was reported as 46%, 0.4% and 24.4%, respectively. Prevalence of smoking was higher in Egypt than in Iran.

In addition, the prevalence of diabetes and hypertension was 10.5% and 39.7% respectively in Egypt. These figures are also higher than those of Iran.<sup>23</sup> In Kuwait, prevalence of type II diabetes, hypertension, smoking and high cholesterol were obtained 11.2%, 10.8%, 23.6% and 38.65% respectively.<sup>21,23</sup> These figures are higher than those of a study conducted in Iran. Prevalence of type II diabetes, hypertension, smoking and high cholesterol in Qatar, according to the national NCD risk factors surveillance program, was reported 16.7%, 32.9%, 16.4% and 32% respectively.<sup>23</sup> According to a study conducted in a heart center in Tehran, Iran, 45% of the patients with myocardial infarction had a history of hypertension, 35% diabetes and 67.6% smoking.<sup>24</sup> These figures reported for the most important factors for myocardial infarction were higher than those reported in this study. As an explanation for these differences, the prevalence of risk factors in the referenced study could be affected by the number of subjects. The subjects in this study were in the age group of 15-64 years from all over the country. The referenced study examined the major risk factors leading to mortality. Another study conducted within a 10-year period examined the patients with acute myocardial infarction in a hospital in northern Iran. Within this period, 1236 patients were hospitalized. The

mean age of patients was  $60.6 \pm 11.2$ . Among these patients, 62% were men; 21.6% had history of hypertension, 15.9% diabetes, 36% dyslipidemia and 46.3% smoking. 18.7% were under 50 years, 40.9% 50 to 64 years and 40.4% were over 60 years. In that study, similar to the present study, the major determining risk factors for CHD were hypertension, diabetes and smoking.<sup>17</sup> Prevalence of CHD risk factors in Iran can then lead to the increase in mortality rate. Addressing intervention programs to reduce the incidence of risk factors for NCDs is a priority in health programs.

## CONCLUSION

Prevalence of CHD risk factors is the main priority for the Iranian health system. There is a need for intervention programs in the provinces which are at greater risk as well as for modification of people's lifestyle. The strength of this study was to report the prevalence rates of CHD risk factors based on the official provincial borders. Therefore, it can help us easily to compare and understand this disease epidemiologically in order to plan in health system. Also, it can be useful for politicians and decision makers to introduce and understand the problems of CHD.

## CONFLICT OF INTEREST

The authors declare that they have no conflict of interests.

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## REFERENCES

1. Larijani B, Fakhrzadeh H, Mohaghegh M, Pourebrahim R, Akhlaghi MR. Burden of coronary heart disease on the Iranian oil industry (1999-2000). *East Mediterr Health J.* 2003; 9(5-6): 904-10.
2. Kelishadi R, Hovsepian S, Qorbani M, Jamshidi F, Fallah Z, Djalalinia S, et al. National and sub-national prevalence, trend, and burden of cardiometabolic risk factors in Iranian children and adolescents, 1990 - 2013. *Arch Iran Med.* 2014; 17(1): 71-80.
3. Samavat T. [Programs for prevention and control of cardiovascular diseases. 1<sup>st</sup> ed. Tehran: Ministry of Health and Medical Education Health Deputy Publication; 2012: 34-8] Persian.
4. Ahmadi A, Hasanzadeh J, Rajaeifard A. To determine the relative factors on hypertension in Kohrang, Chaharmahal & Bakhtiari province, 2007. *Iran J Epidemiol.* 2008; 4(2): 19-25.
5. Ministry of Health & Medical Education (MoHM). Non-communicable disease risk factor infobase. Tehran: Health Center for Disease Management of Islamic Republic of Iran; 2007 and 2009.
6. Ahmadi A, Hasanzadeh J, Ghaem H, Khosravi S, Reisi R. The survey of family history of diabetes in patients with type 2 diabetes in Chaharmahal va Bakhteyari province, Iran, 2008. *J Shahrekord Univ Med Sci.* 2009; 11(2): 1-7.
7. Ahmadi A, Hasanzadeh J, Rajaeifard A. Metabolic control and care assessment in patients with Type 2 diabetes in Chaharmahal & Bakhtiari province 2008. *Iran J Endocrinol Metab.* 2009; 11(1): 33-9.
8. Nasri H, Behradmanesh S, Ahmadi A, Baradaran A, Nasri P, Rafieian-Kopaei M. Association of serum lipids with level of blood pressure in type 2 diabetic patients. *J Ren Inj Prev.* 2014; 3(2): 43-6.
9. Harper K, Armelagos G. The changing disease-scape in the third epidemiological transition. *Int J Environ Res Public Health.* 2010; 7(2): 675-97.
10. Celermajer DS, Chow CK, Marijon E, Anstey NM, Woo KS. Cardiovascular disease in the developing world: prevalences, patterns, and the potential of early disease detection. *J Am Coll Cardiol.* 2012; 60(14): 1207-16.
11. Degano IR, Elosua R, Marrugat J. Epidemiology of acute coronary syndromes in Spain: estimation of the number of cases and trends from 2005 to 2049. *Rev Esp Cardiol (Engl Ed).* 2013; 66(6): 472-81.
12. Talaei M, Sarrafzadegan N, Sadeghi M, Oveisgharan S, Marshall T, Thomas GN, et al. Incidence of cardiovascular diseases in an Iranian population: the Isfahan Cohort Study. *Arch Iran Med.* 2013; 16(3): 138-44.
13. Ghadimi H, Bishehsari F, Allameh F, Bozorgi AH, Sodagari N, Karami N, et al. Clinical characteristics, hospital morbidity and mortality, and up to 1-year follow-up events of acute myocardial infarction patients: the first report from Iran. *Coron Artery Dis.* 2006; 17(7): 585-91.
14. Khosravi A, Taylor R, Naghavi M, Lopez AD. Mortality in the Islamic Republic of Iran, 1964-2004. *Bull World Health Organ.* 2007; 85(8): 607-14.
15. Aghasadeghi K, Zarei-Nezhad M, Keshavarzi A, Mehrabani D. The prevalence of coronary risk factors in Iranian lor migrating tribe. *Arch Iran Med.* 2008; 11(3): 322-5.

16. Sarrafzadegan N, Oveisgharan S, Toghianifar N, Hosseini S, Rabiei K. Acute myocardial infarction in Isfahan, Iran: hospitalization and 28th day case-fatality rate. *ARYA Atheroscler J*. 2009; 5(3).
17. Hajian-Tilak K, Jalali F. Changing patterns of cardiovascular risk factors in hospitalized patients with acute myocardial infarction in Babol, Iran. *Kuwait Med J*. 2007; 39(3): 243-7.
18. Ahmadi A, Shojae M. Estimation of life expectancy changes in Chaharmahal va Bakhtiyary Province, Iran, during 2005-2009. *J Shahrekord Univ Med Sci*. 2011; 13 (4): 74-80.
19. Sadeghi-Bazargani H, Jafarzadeh H, Fallah M, Hekmat S, Bashiri J, Hosseingolizadeh G, et al. Risk factor investigation for cardiovascular health through WHO STEPS approach in Ardabil, Iran. *Vasc Health Risk Manag*. 2011; 7: 417-24.
20. Bonita R, Dwyer T, Jamrozic K, Winkelmann R. Surveillance of risk factors for non-communicable diseases: the WHO STEP wise approach. Geneva, Switzerland: World Health Organization, 2002.
21. World Health Organization. World health statistics. WHO: World Health Organization; 2013.
22. Esteghamati A, Etemad K, Koohpayehzadeh J, Abbasi M, Meysamie A, Noshad S, et al. Trends in the prevalence of diabetes and impaired fasting glucose in association with obesity in Iran: 2005-2011. *Diabetes Res Clin Pract*. 2014; 103(2): 319-27.
23. World Health Organization. [Cited 2014]. Available from: [http://www.who.int/topics/noncommunicable\\_diseases/factsheets/en](http://www.who.int/topics/noncommunicable_diseases/factsheets/en).
24. Donyavi T, Naieni KH, Nedjat S, Vahdaninia M, Najafi M, Montazeri A. Socioeconomic status and mortality after acute myocardial infarction: a study from Iran. *Int J Equity Health*. 2011; 10: 9.

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