

## Evaluation of Causes of Death in East of Iran during 2004-2010

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### ABSTRACT

**Background:** Analysis of the leading causes of death in a community and comparing it with other communities is crucial for planning public health policy. The aim of this study was to determine mortality statistics in South Khorasan Province of Iran by using causes of death data which are classified based on the 10<sup>th</sup> revision of the International Classification of Diseases (ICD10).

**Methods:** In this cross-sectional study, data related to 20281 deaths for the period of 2004 to 2010 which were under the coverage of Birjand University of Medical Sciences were used. These data were collected by the office of statistical system of mortality (Death Registry) and the causes of deaths were classified based on ICD10. The obtained data was analyzed statistically with Pearson's Chi-square ( $\chi^2$ ) test, t test and ANOVA in order to find out the pattern of mortality trend in South Khorasan Province.

**Results:** Cardiovascular diseases (CVD) were the leading cause of death (29.8%) with the mean age of 72.6±15.5 in all registered deaths. Moreover, ischemic heart disease (44.87%) and cerebrovascular disease (25.67%) were the most common causes in CVD group, respectively. The second leading cause was unintentional injuries (12.9%) which are mostly due to road traffic accidents. The mean age in this group was 36.8±24. Cancers ranked the 3<sup>rd</sup> place during the period of study with the mean age of 64.86±18.26. The most frequent cancers are related to stomach (15.3%) followed by liver and biliary system (11.4%), lungs and bronchus (9.5%).

**Conclusion:** Three leading causes of death were cardiovascular diseases, unintentional injuries and cancers which may be prevented by changing life style, diet and reducing risk factors like smoking, obesity and stress.

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► *Implication for health policy/practice/research/medical education: Causes of Death in East of Iran*

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### 1. Introduction:

Medically, death is the permanent and irreversible cessation of vital functions (1). Certainly, prevention of death is the first cornerstone of medicine (2).

The study of deaths and related indicators can be the basis for planning and orientation, especially health policymaking for the control and prevention of disease in the population, for example, information on the causes of death, provides a view on diseases and factors leading to reduced life expectancy (3).

Accurate depiction of the face of death and disease in order to identify and deal with its risk factors is the main strategy to extend the lifetime and improve human health (1).

Demography is the statistical study of populations. Major debate on demography include four critical events that have been influenced by many issues over the years; and decrease or increase in these events, in turn, can be involved in planning the population of the country and lead to changing of death patterns in the country's population (4).

According to the reports of World Health Organization (WHO), pattern of deaths has changed in the world and in Iran; and causes of death in the world have moved from infectious diseases like AIDS and malaria to chronic illnesses like heart disease and cancer (5). Based on WHO report in 2008, the four leading causes of death in the world by 2030 will include heart failure, stroke, chronic obstructive pulmonary disease and lower respiratory tract infections. Increase in heart disease and cancer due to population aging and older people is an indication of lower deaths due to infectious diseases (5).

Based on predictions, cancer deaths from 7.4 million people in 2004 will rise to 11.8 million people in 2030, while deaths from cardiovascular disease, from 17.1 million people will rise to 23.4 million people.

Deaths by traffic accidents from 3.1 million people in 2004 will increase to 4.2 million people in 2030. In 2030, deaths by cancer, cardiovascular diseases, and traffic accidents altogether will form 56% of the 67 million predicted deaths (6).

In Iran, Ministry of Health and Medical Education in partnership with civil registration, conducting a program to register deaths by cause of death and decedents' identification characteristics, took an important step in determining the pattern of deaths in the country and monitored its process (4). Every year, several centers around the world publish the death toll of the region under control by cause, etc. They compare it with the results of similar studies in previous years to evaluate the success of their programs (2).

The purpose of this study was to evaluate the causes of deaths in South Khorasan Province from 2004-2010 according to the death registry data.

### 2. Materials and Methods:

This study was conducted on all the decedents of the population covered by Birjand University of Medical Sciences from 2004-2010, based on a comprehensive system of deaths registration. In this system, all the death cases (in all the cities in south Khorasan) from the health centers, hospitals, forensics and cemeteries were collected by a special form of deaths sent to health center in Birjand (committee of death cases registration). Recorded death cases were reviewed by the committee and returned to be fixed. Finally, the data on the forms were corrected and confirmed; and entered into the SPSS software, after deleting duplicates reported from two sources, and were analyzed using t-test at  $\alpha \leq 0.05$ . The coding of causes of death was conducted based on the tenth edition of the International Classification of Diseases (ICD 10) (7).

### 3. Results:

The present study was conducted on 20281 deaths recorded in the comprehensive system of deaths of the population covered by Birjand University of Medical Sciences, including all cities and main villages in

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**Table 1:** Frequency distribution of death cases by causes of death ICD10.

Main cause of death	Frequency	Percentage	Age(Mean±SD)
Cardiovascular diseases	5627	29.8	72.6±15.6
Unintentional injuries	2616	12.9	36.9±34.1
	2380	11.7	79.9±12.8
Symptoms, signs, and abnormal clinical and laboratory findings, not elsewhere classified			
Diseases	2170	10.7	0.0060
Perinatal Period			
Cancers and benign tumors	1968	10.4	46.9±18.3
Respiratory system diseases	1506	8	67.3±23.6
Gastrointestinal diseases	439	2.3	60.4±26.1
Infectious and parasitic diseases	370	2	51.7±32.8
Congenital and chromosomal malformations	348	1.7	1.6±8.2
Genitourinary system diseases	343	1.7	67.4±22.9
Violence by others	263	1.3	33.5±12.6
Endocrine, nutrition and metabolic diseases	217	1.1	63.3±26.1
Mental illness and behavioral disorders	195	1	56.6±28.6
Nervous system diseases	195	1	54.1±31.3
Suicide	120	0.6	32.5±15.3
Hematopoietic and immune system diseases	59	0.3	36.9±34.1
Musculoskeletal diseases	41	0.2	63.7±20.8
Skin and subcutaneous diseases	25	0.1	67.1±25.8
Complications of pregnancy and childbirth	15	0.1	32.3±6.9
Total	18897	93.2	59.3±28.8
Unknown	1384	6.8	-

South Khorasan Province. Out of these, 11828 cases (58.4%) were male and 8653 cases (42.6%) female. 8454 cases (41.7%) were rural and 11827 (58.3%) were living in urban areas. In terms of seasons, 5362 cases (26.5%) occurred in spring, 4796 cases

(23.7%) in summer, and 4711 (23.3%) in fall and 5412 cases (26.7%) in winter; thus, winter and fall had the highest and the lowest frequencies, respectively.

The average (SD) age of decedents was estimated to be 58.9±28.9 years; the average

was  $57.4 \pm 28.9$  and  $61.6 \pm 28.3$  years in males and females, respectively ( $P < 0.001$ ).

The average age was  $56 \pm 29.7$  and  $61 \pm 28$  years in urban and rural decedents, respectively ( $P < 0.001$ ). Table 1 shows the frequency distribution of death cases by causes of death by the ICD10 and the average death age in each main death group. Cardiovascular diseases, with 29.8% death cases were determined as the most common cause of death. Comparison of different age groups showed that in the age group of 20 to 44, unintentional injuries with 1095 deaths (54.3%) were the most important cause of death; in the age group of 45 to 65 years, 950 deaths (36.8%) and in the age group of 65 and older, 4389 deaths (42.1%) were due to cardiovascular diseases which were the main causes of death in both age groups.

In the case of gender, both in men and women, the leading cause of death was cardiovascular diseases, the share of this group of diseases in men and women were 26.8% (2910 out of 10866 total deaths in men) and 33.8% (2717 out of 1031 total deaths in women), respectively.

From 5627 recorded deaths caused by cardiovascular diseases, heart attack with 44.78% (2525 cases) and stroke with 25.6% (1445 cases) were the leading causes of death in this group.

In the main group of death due to unintentional accidents and injuries, out of 2616 deaths, 1774 cases (67.8%) were by transport accidents. The average age of decedents in unintentional accidents and injuries was estimated to be  $36.8 \pm 24$  years.

In the case of cancers, from 1968 cases of deaths from cancers, gastric cancer with 302 cases (15.3%), liver and bile duct cancer with 224 cases (11.4%) and lung and bronchial cancer with 187 cases (9.5%) were the most common causes of death in this group.

#### 4. Discussion:

Out of 20281 of the total deaths investigated, the three leading causes of death are cardiovascular diseases, unintentional injuries and cancers. In a national study conducted by Forouzanfar *et al* (2010), it was revealed that life expectancy at birth

was 71.6 years in men and 77.8 years in women in Iran (1). Moreover, they found that 350 thousand deaths occurred in both sexes and all age groups in 2010 in Iran and in both males and females and all age groups, ischemic heart disease was the main cause of death, claiming about 90 thousand lives. Meanwhile, the main causes of death among Iranian population with age of 15 - 49 year olds in both sexes included: injuries (23.6%) and ischemic heart disease (12.7%) (1). In 2005, cardiovascular diseases, cancers, accidents, alzheimer and HIV (AIDS) were reported as the five leading causes of death in the United States (8).

In 2008, from 49.5 million total deaths in the world, cardiovascular diseases, stroke and pneumonia (the flu) were the three leading causes of death with 33.7%, in the same year, the three leading causes of death in Iran were coronary artery disease, road accidents and strokes with 37.1% (8). In Thailand, 2005, stroke (10.7%), ischemic heart diseases (7.8%), HIV (AIDS) (7.5%) (9); in Mexico, 2004, ischemic heart diseases (13%), diabetes mellitus (9.7%) and cerebrovascular diseases (6%) (10); in a study in Beijing, China, 2007, malignant cancers (28%), heart diseases (25%) and cerebrovascular diseases (19%) (11), were the three main causes of death. It can be said that road accidents, unlike the developed countries, is one of the serious problems in Iran and also in South Khorasan Province which results from non-standard roads, technical problems of vehicles, disregarding of traffic laws and unauthorized speed of drivers on the road.

Cardiovascular diseases, with 29.8% of total deaths, were determined as the main cause of death (51.7% male and 48.2% female). In 2007, 33.6% of the total deaths in the United States were caused by cardiovascular diseases (12). In Australia, 2008, 34% of deaths (47% male and 53% female) (13), in Kerman province (south of Iran) 2004-2005, 32% of deaths (54.6% male, 45.4% female) (14) and in Birjand, 2002, 28.8% of deaths (55.7% male and 44.3% female), (15) were caused by cardiovascular diseases. This is probably due to the prevalence of high cholesterol, high blood pressure, and

smoking. In general, wrong way of life of the people of this province; and since the predisposing factors of cardiovascular diseases, including those listed and also mental pressures, diabetes and alcohol consumption are higher in men, death by these diseases is higher in men. The average age of decedents by this disease category is estimated to be  $72.6 \pm 15.5$  years. In this study, like other studies (14, 16) more than 78% of deaths occurred in people above 65 years.

Second leading cause of death is unintentional injuries with 12.9%; in 2007, road accidents in the world with 2.4% of the total deaths is in the tenth rank (5); it is in the sixth and fifth rank in Beijing China, 2007 (12) and Mexico, 2004 (11), respectively. The average age of the decedents by unintentional injuries is estimated to be  $36.8 \pm 24$  years; in Australia, 2008, the average age of the total damage is reported to be 52.3 years. Also, 42.7 and 38 years have been reported for suicide and accidents, respectively (13). The top cause of death in the age group of 20 to 44.99 years was the unintentional injuries with 54.3% of all deaths. Death by unintentional injuries occurs mainly in men which is also true in our study (17.5% of deaths in men, 9.2% in women).

In the present study, cancers and tumors are the third most common causes of death (10.4%) with average age of  $64.86 \pm 18.26$  years and include 11% of deaths in men and 9.9% in women.

The most prevalent cancers included gastric cancer (15.34%), liver and biliary tract cancer (11.38%) and lung and bronchus cancer (9.5%). In a study in 2004-2005, in Iran, gastric cancer, lung and bronchus cancer, leukemia, liver and bile duct and esophagus cancer (16) were more common. Nevertheless, surveys conducted in Canada, 2011 showed that lung, colorectal, breast, prostate and pancreatic cancers are the most common cancer related death (17). Moreover, it was shown that about 2 in 5 Canadians will develop cancer in their lifetime, and about 1 in 4 Canadians will die due to cancers. In 2014, it is estimated that 191300 Canadians will develop cancer, and

76600 will die due to cancers. More than half of new cancer cases (52%) will be lung, breast, colorectal and prostate cancer in Canada. Moreover, these studies also showed that lung cancer is the leading cause of cancer death, causing more deaths among Canadians than the other three major cancer types combined (18). In Australia, 2008, lung and bronchus, prostate, breast, colon and pancreatic cancers were the most prevalent cancers causing death (13). The reason for this difference is partly related to differences in lifestyle, smoking, diet, genetic factors, etc.

It seems that based on death rates, common causes of death during a 7-year period in Birjand was in its natural course, and although there were programs to control and reduce the common causes of death, including circulatory system diseases, cancer and accidents, their impact on the common causes of death has not been shown yet. Therefore, there is a great need for health planning and effective measures to prevent and control risk factors of cardiovascular diseases, especially in terms of changing people's lifestyles in order to modify cases such as diet rich in cholesterol, physical inactivity and smoking to reduce the death rate caused by heart attack and increase life expectancy in the province.

In order to control and reduce traffic accidents, the major cause of death can be reduced and controlled by informing the relevant organizations about the importance of this issue and planning and suggesting inter-sectoral cooperation.

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