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Death Portrait of Isfahan Province in Years 2007–2011

Masuod Ferdosi, Farzaneh Mohammadi Sefiddashti, Pejman Aghdak[1], Reza Moradi, Maryam Mofid, Farzaneh Rejalian, Ali Nemati

Health Management and Economics Research Center, Isfahan University of Medical Sciences, Isfahan, Iran, [1]Isfahan Provincial Health Center, Isfahan University of Medical Sciences, Isfahan, Iran

Correspondence to:
Mr. Ali Nemati, Health Management and Economics Research Center, Iran University of Medical Sciences, Tehran, Iran. E-mail: ali_nemati96@yahoo.com

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ABSTRACT

Background: The rapid rise in noncommunicable diseases (NCDs) is one of the main health challenges affecting the global development in the present era. This raising challenge is a major threat to countries' socioeconomic development as well as millions of people health.

Methods: It was a retrospective study with analysis of reported death in Isfahan Province during a 5-year period from 2007 to 2011. Required data were collected from statistics provided by Deputy of Health in Kashan and Isfahan Universities of Medical Sciences in 2012. Excel software was used for data analysis.

Results: During this period, the cardiovascular events, cancers and tumors, unintentional injuries, respiratory diseases, and prenatal mortality were the main reasons of mortality in Isfahan Province. The overall rate of cardiovascular events rose 5.10% in the 5-years of the study observation, and Khor – Biabanak was on the top of the list; while in cancer rating Khor – Biabanak, Golpayegan, and Khansar both stood at the outset (per 1,000 people). For injuries, the highest rate belonged to Golpayegan, Tiran-Kervan, and Chadegan. Meanwhile, for mental illnesses, the highest rate was observed in Khomeini Shahr. Moreover, the highest maternal and fetal mortality was reported in Fereydunshahr, Khor – Biabanak and Mobarakeh.

Conclusions: Given the sharp rise of NCD, programs by health care system should be directed toward lifestyle modification while a proper framework should be determined to deal with these kinds of disease. Furthermore, optimal allocation of resources based on needs can provide better facilities for different cities.

Keywords: Cancer, cardiovascular events, death, injuries, Isfahan, mental diseases, mortality

INTRODUCTION

Based on an article by the WHO, mortality of children under 5 years has decreased up to 5% while noncommunicable diseases (NCDs) mortality has increased from 59% in 2002 to 69% of deaths in 2003. Moreover, a significant increase in HIV mortality from 2.8 million to 6.5 million and a rapid change in smoking mortality from 5.4 million to 8.3 million were predicted during 2002–2003.[1] The WHO has provided a clear framework for all countries regarding the fact that chronic diseases have to be decreased by 2% each year between 2006 and 2015.

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Achieving this goal would prevent 36 million deaths worldwide each year.[2] Rapid rise of NCD is a major threat to countries' socioeconomic development as well as millions of people health. Given the present conditions, it is estimated that up to 2020 these diseases would be responsible for 73% of deaths and 60% of total burden of diseases. In addition, given the aging population of the world, a significant growth is expected in NCD mortality rate in next 25 years; in other words, it is predicted that 11.8 million deaths due to cancer and 23.4 million deaths due to cardiovascular events is supposed to occur in 2030. Therefore, three-quarters of overall world deaths would be associated with NCD in 2030.

In 2008 the world experienced 57 million deaths, which 36 million (63%) of them occurred because of chronic diseases. It is commonly supposed that chronic diseases initially affect older population; however, these diseases are the real cause of mortality in almost 16 million people under the age of 70 every year[3] and one-quarter of all deaths due to these diseases are reported in people under the age of 60.[4] Due to the rise of mortality associated with noncontagious diseases, particularly in developing countries, the WHO has declared NCD as a health priority in developing countries since the 1980s. At present, NCD is the main cause of disability and mortality across the world. According to the WHO, 60% of mortality and 43% of global burden of diseases is related to NCD.[5] According to the WHO report, chronic diseases lead to 70% of mortality in Iran.[6] Based on statistics recorded in mortality portrait of Iran's 29 provinces in year 1383, ten major causes of death in this country include cardiovascular events, unintentional injuries, cancers, respiratory diseases, prenatal mortality, gastrointestinal diseases, total public events, urinary tract and genital diseases, endocrine and metabolic disorders, and congenital malformations.[7] The present study aims to investigate mortality and its distribution across Isfahan Province. In fact, the research is a part of land-use planning study and strategic development of Isfahan Province in healthcare sector.

Cancer is the second mortality cause after cardiovascular events in developing countries and the third cause of mortality in less developed communities. It kills more people than tuberculosis, AIDS, and malaria, so that lack of interventions which prevent it, means death of over 85 million in next 10 years across the world.[8]

According to the WHO, heart attack and stroke are responsible for more than 50% of mortality and morbidities which annually kill more than 12 million people worldwide.[9]

In Iran most deliveries take place in hospitals and labor centers[10] and prenatal mortality mostly occur in these hospitals or labor centers.[11] One of the Millennium Development Goals was governments commitment to reduce the index of maternal mortality up to three quarters and children deaths up to two-thirds until 2015.[12]

Over 90% of accident mortality take place in low-income and middle-income countries.[13] Based on the global burden of diseases, in 1990 traffic accidents was the 6th cause of death in the world, but in 2002 it rose up to the third cause of life loss or disability.[14]

Increasing burden of chronic diseases is one of the challenges which all healthcare systems of 21st century is faced with. Increasing life expectancy, lifestyle modernization along with numerous risk factors which can cause chronic diseases, and promotion of interventions to preserve the lives of the people who were already prone to death; all would lead to a change in burden of diseases which health systems are faced with.[15]

In most recent WHO reports, the pattern of mortality has changed in Iran like all over the world; mortality causes have changed from infectious diseases such as meningitis and malaria to chronic diseases such as heart attacks and different type of cancers. According to WHO 2008 statistical report, in 2030 the four common causes of death across the world would be heart failure, strokes, chronic obstructive pulmonary diseases, and lower respiratory tract infection. The incidence of heart attacks and cancer in old ages represents a decrease in communicable diseases mortality. With development of public health system in countries, there was a significant decrease in mortality of children under 5 years, and this process has been along with the country's development objectives.[16]

According to 1996–2020 global burden of diseases research report, chronic diseases including cardiovascular events, cancer, and respiratory diseases would be the main factors of death worldwide.[17]

In global scale, it is predicted that annual cancer mortality would increase from 7.4 million in 2004 to 11.8 million in 2030 while cardiovascular mortality events would increase from 17.1 million to 23.4 million. Traffic accidents mortality would increase from 1.3 million people in 2004 to 2.4 million in 2030. Until 2030 cancer, cardiovascular disease, and traffic accidents would make up 56% of 67 million predicted deaths.[18]

METHODS

It was a retrospective study with analysis of reported death in Isfahan Province during a 5-year period from 2007 to 2011. This study was a part of Spatial Planning of Isfahan Province in Health Sector. Required data was collected from statistics provided by Deputy of Health in Kashan and Isfahan Universities of Medical Sciences in 2012. We categorized causes of deaths according to Diagnostic and

Statistical Manual of Mental Disorders (IV) codes. Percent of each category to total number of deaths was used as our basic indices. Rate (to 10,000 people) of death among the first ten cities for each important death cause was another one. Excel software was used for data analysis.

RESULTS

Division of regions in terms of mortality in different areas of the province

The following Tables 1-6 indicates the time process of mortality in terms of causes in Isfahan Province for the period 2007–2011.

In 2011 Isfahan with 39.9%, Khomeini Shahr with 8.44%, and Najafabad with 6.99% have had the highest percentage of cardiovascular events, and the highest rate for every has been related to Khor – Biabanak with 421.5 deaths (among 10,000 people) and Ardestan with 393.7 deaths. The lowest rate is related to Shahin Shahr and Meymeh, Falavarjan, and Isfahan with respectively 100.7, 127.4, and 145 people [Tables 4-6].

Cancer mortality, cardiovascular events, mental diseases and behavioral disorders, prenatal mortality, traffic accidents, and respiratory diseases have increased during 2007–2011. In 2011 cardiovascular events, cancers and tumors, unintentional injuries, respiratory diseases, and prenatal mortality have been the main causes of death with 43.97%, 12.42%, 8.10%, 5.38%, and 3.92% respectively. In general, cardiovascular events increased up to 5.10% during these 5 years.

DISCUSSION AND CONCLUSIONS

In a study by Pilevar *et al*. titled "Influencing Factors on Geographical Distribution of Mortality in North Khorasan Province in 2004–2009," it was shown that at the first of the period the highest cause of mortality was related to cardiovascular events (>28%) and at the end of the period it was still the most common cause of death in the province (>25%).[19] Coronary artery disease is the first cause of mortality in different societies so that in the United States 500 thousand people die every year.[20] According to different reports in Iran, more than 40% of deaths are due to cardiovascular events and in Isfahan and Markazi provinces 34.3 and 32.2% of people have at least one risk factor while 19.3% and 15% of them have at least two risk factors for cardiovascular attacks.[21]

The second cause of mortality is associated with cancer and during 2007–2011 the highest degree of cancer mortality has been observed in Isfahan. The highest percentage of death belonged to Isfahan, Najafabad, and Lenjan with 39.14%, 9.4%, and 7.2% respectively while the lowest percentage belonged to Khor – Biabanak and

Table 1: Number and percentage of death in terms of death causes in Isfahan Province

Causes of death	2007		2008		2009		2010		2011	
	n	Percentage	*n*	Percentage	*n*	Percentage	*n*	Percentage	*n*	Percentage
Unintentional injuries	1774	10.75	1666	10.02	1360	8.93	1618	9.17	1455	8.1
Cancer	2000	12.12	2056	12.36	1989	13.07	2195	12.44	2231	12.42
Cardiovascular	7136	43.26	7113	42.78	6464	42.46	7627	43.24	7889	43.92
Endocrine, nutrition and metabolic	642	3.89	636	3.82	616	4.05	571	3.24	667	3.71
Suicide	73	0.44	95	0.57	92	0.6	97	0.55	80	0.45
Violence	98	0.59	103	0.62	70	0.46	89	0.5	77	0.43
Gastrointestinal	276	1.67	330	1.98	297	1.95	363	2.06	375	2.09
Mental diseases and behavior	154	0.93	199	1.20	130	0.85	231	1.31	215	1.20
Musculoskeletal	35	0.21	22	0.13	34	0.22	27	0.15	46	0.26
Prenatal mortality	734	4.45	849	5.11	649	4.26	731	4.14	704	3.92
Respiratory tract	1056	6.4	1119	6.73	1093	7.18	1149	6.51	1047	5.83
Genitourinary tract	477	2.89	414	2.49	390	2.56	417	2.36	451	2.51
Congenital malformations and chromosomal abnormalities	288	1.75	324	1.95	249	1.64	288	1.63	340	1.89
Infectious diseases	158	0.96	172	1.03	234	1.54	261	1.48	289	1.61
Nervous system	323	1.96	310	1.86	286	1.88	341	1.93	400	2.23
Ill-defined and ambiguous conditions	610	3.7	564	3.39	669	4.39	808	4.58	873	4.86
Skin	0	0	2	0.01	4	0.03	6	0.03	3	0.02
Hematopoietic and immune system	63	0.38	34	0.2	45	0.3	57	0.32	44	0.24
Maternal	2	0.01	6	0.04	4	0.03	3	0.02	2	0.01
Others	597	3.62	614	3.69	548	3.6	759	4.3	776	4.32
Total	16,496	100	16,628	100	15,223	100	17,638	100	17,964	100

Source: Vice Chancellor for Health, Isfahan University of Medical Sciences

Table 2: Cancer mortality in each city of Isfahan Province

Cities	2007	2008	2009	2010	2011	Rate (to 10000 people)
Tiran-Kervan	51	41	39	45	57	82.6
Fereydunshahr	33	24	33	25	31	80.5
Ardestan	29	24	23	30	31	74.9
Chadegan	15	18	15	27	25	73.7
Najafabad	173	168	117	188	211	70.3
Shahreza	58	61	65	80	104	69.5
Natanz	30	20	22	25	29	68.7
Lenjan	110	159	145	127	162	65.5
Isfahan	833	787	867	934	873	40.2

Source:Vice Chancellor for Health, Isfahan University of Medical Sciences

Table 3: Cardiovascular mortality in each city of Isfahan Province

Cities	2007	2008	2009	2010	2011	Rate (to 10000 people)
Khur-Biabanak	-	-	-	-	75	421.5
Ardestan	141	169	156	155	163	392.5
Nein	236	160	169	154	142	372.9
Natanz	129	116	151	165	134	317.2
Fereydan	222	235	216	237	245	307.2
Tiran-Kervan	176	143	158	194	207	299.8
Golpayegan	270	263	254	266	257	293.8
Khvansar	98	79	99	108	93	286.2
Chadegan	93	89	89	80	96	282.8
Dehaqan	100	105	90	95	87	249.7
Isfahan	2732	2819	2478	3183	3152	145

Source:Vice Chancellor for Health, Isfahan University of Medical Sciences

Table 4: Mental diseases mortality in each city of Isfahan Province

Cities	2007	2008	2009	2010	2011	Rate (to 10000 people)
Ardestan	0	1	4	3	4	9.7
Fereydan	2	3	7	5	5	6.3
Lenjan	14	21	14	15	15	6.1
Chadegan	0	0	3	0	2	5.9
Nein	2	2	0	3	2	5.3
Khomeyni Shahr	69	100	60	93	127	40.8
Natanz	0	1	0	0	2	4.7
Tiran-Kervan	1	1	0	1	3	4.3
Najafabad	13	19	2	6	10	3.3
Falavarjan	15	7	5	13	6	1.9
Isfahan	29	23	20	71	25	1.1

Source:Vice Chancellor for Health, Isfahan University of Medical Sciences

Dehaghan with 0.85% and 0.89% respectively. The highest mortality rate for every one hundred people was 106.8, 106.3, and 104.9 people in Khor – Biabanak, Golpayegan, and Khansar while the lowest mortality rate was 27.2, 40.2, and 41.7 in Falavarjan, Isfahan, and Khomeini Shahr. Mortality has had an 11% increase during 5 years with approximately 2% growth every year.

Table 5: Prenatal mortality in each city of Isfahan Province

Cities	2007	2008	2009	2010	2011	Rate (to 10000 people)
Natanz	4	3	0	2	4	9.5
Borkhar and Mimeh	18	14	19	13	9	8.3
Khomeyni Shahr	5.0	5	13	17	20	6.4
Fereydunshahr	10	11	9	15	19	49.6
Shahinshar	-	-	-	-	9	4.6
Khor-Biabanak	-	-	-	-	6	33.7
Mobarakeh	18	31	18	29	38	26.5
Nein	6	6	1	8	10	26.3
Lenjan	35	42	24	29	58	23.5
Najafabad	77	91	44	58	70	23.3
Isfahan	454	489	439	464	412	18.9

Source:Vice Chancellor for Health, Isfahan University of Medical Sciences

Table 6: Injuries mortality in each city of Isfahan Province

Cities	2007	2008	2009	2010	2011	Rate (to 10000 people)
Golpayegan	57	64	40	60	44	50.3
Shahinshar and mimeh	-	-	-	-	10	50.1
Tiran-Kervan	58	41	38	43	33	47.8
Chadegan	20	19	14	26	15	44.2
Shahreza	98	106	73	88	55	36.8
Semirom	48	43	22	37	23	35.5
Fereydan	68	68	50	43	27	33.9
Ardestan	30	23	23	24	14	33.8
Khor-Biabanak	-	-	-	-	6	33.7
Najafabad	167	171	118	158	95	31.6
Isfahan	601	581	569	722	259	11.9

Note that data include unintentional injuries, violence, suicide, and also traffic accidents in 2011. Source:Vice Chancellor for Health, Isfahan University of Medical Sciences

In Pilevar study, cancer is the third common cause of mortality which include over 10% of deaths in the study period. At present, cancer is the cause of 12% of deaths across the world and predictions show that cancer mortality would increase up to 45% during 2007–2030 (it would increase from 7.9 million to 12 million deaths). In Iran, cancer is the third causes of mortality. Annually, over 30000 people lose their lives because of cancer. According to WHO, cancer would affect 85653 people in Iran in 2020 and its mortality would increase up to 62897 cases.[8]

In a study by Kadivar *et al.* titled "Common Causes of Mortality in Fars Province in 2001," it was shown that cancer has been 35.5 cases for every one hundred deaths.[22] In a study by Kazemi and Sharifzadeh, cancer was introduced as the third cause of mortality with 5.7% of population covered by Birjand University of Medical Sciences.[23]

The third cause of mortality is traffic accidents, and Isfahan has had the highest rate of accidents mortality

during 1386–1390. The highest percentages are reported in Isfahan, Najafabad, and Khomeini Shahr with 30.08%, 11.03%, 8.13% respectively while the lowest percentages are reported in Khansar, Khor – Biabanak, and Natanz with similar percent of 0.69. The highest mortality rate for every one hundred people was 50.3, 47.8, and 44.2 people in Golpayegan, Tiran-Kervan, and Chadegan while the lowest mortality rate for every one hundred people was 5.1, 11.9, and 12.9 people in Shahin Shahr and Meymeh, Isfahan, and Borkhar respectively. Regarding accidents mortality, Markazi, Tehran, and Ilam provinces are at the lowest Decile with 3.2, 3.5, and 3.8, while Ghazvin, Busheher, and Isfahan Provinces are at the highest Decile with 18.2, 23, and 23.4 respectively.

According to research done by health center, in Iran in age groups from 1 month to 50 years the main cause of death is related to unintentional injuries, particularly traffic accidents. The outcomes which affect people's lives are costs of healthcare and rehabilitation, loss of income and production ability as well as psychological effects along with loss of health or life.[8] Traffic accidents mortality have the highest statistics in Iran among other countries and most people are at the age range of 20–30.[24] In a study done by Khatibi *et al.* in 2007 regarding prevalence and causes of accidents which led to hospitalization of people referring to emergency ward of Imam Hossein Hospital in Shahrood, a cross-sectional analytic study was performed on 3027 victims. The results of the study showed that most accidents were related to traffic accidents.[25] In a study done by Ahmadpur *et al*. titled "Investigating the Process and Prevalence of Accidents and Incidents in Ghazvin in 2009" it was shown that Ghazvin has the highest share of traffic accidents with 38.1% and the lowest share of suicide with 0.8%.[26] In a study done by Pilevar *et al*. it was shown that in 1383 out of 4216 deaths, 342 cases have been due to traffic accidents which include 8.1% of overall mortality in the province. This ratio increased up to 8.3% in 2006 and decreased to 5.9% in 1386. However, 2008 statistics represent the increase of this ration up to 7.1% which means 24% growth compared to 2007.

During 2007–2011, the highest prenatal mortality rate belonged to Isfahan. In 2011, the highest prenatal mortality rate belonged to Isfahan, Najafabad, and Lenjan with 58.11%, 9.87%, and 8.18% respectively, while the lowest mortality rate belonged to Dehaghan, Shahr Reza, Khansar, and Natanz with 1%, 1%, 1%, and 4% respectively. The highest mortality Rate for every one hundred people was 49.6, 33.7, and 26.5 people for Fereydan Shahr, Khor – Biabanak, and Mobarakeh, while the lowest mortality Rate for every one hundred people was 0.7, 2.9, and 4.6 people for Shahr Reza, Dehaghan, and Shahin Shahr. In 2008, 358000 women died due to childbirth and pregnancy complications. 99% of these deaths belonged to developing countries and <1% belonged to developed communities.[27] It is estimated that across the world, in every minute one woman and every day 1600 women die because of pregnancy complications.[28] Mortality rate of mothers is 1000 cases per every 100 thousand live births in 15 countries so that 99% of mothers' mortality is in developing countries where 85% of the world's population lives.[29] According to 2009 statistics, mortality rate of pregnant women is 20 in South Korea, 10 in France, and 9 out of every 100 thousand live births in Germany and Japan. Therefore, maternal and prenatal complications are also observed in developed countries. However, women receive less emergency and health care services in developing countries which will lead to higher rate of mortality among them.[30] In Pilevar study,[19] prenatal mortality, chromosomal and congenital abnormalities, as well as respiratory diseases are the main causes of mortality among the age group below 1-year-old.

In 2011, 215 deaths were recorded due to psychological diseases with 59.06% in Khomeini Shahr and 11.62% in Isfahan. The highest mortality rate for every one hundred people was 40.8 people in Khomeini Shahr. In a study performed by Aeinparast *et al*., the amount of depression was investigated across the country, and the results showed that 74.2% of population is not depressed or is a little depressed. However, the amount of deep depression was estimated 8.3%. If we add mild depression to this amount, depression will increase up to 25%. This implies the probability of psychological disorders or its background in about one-quarter of the population which needs more concerns.[31]

While cardiovascular and respiratory diseases are considered as the effects of urbanization and it is believed that air and water pollution as well as urban life conditions are important, the question arises that why the highest rates belong to Khor – Biabanak where most of people there still have a rural lifestyle. It seems that this issue has made confusions and probably refers to the traditional pyramid of different populations in Isfahan Province.

Imbalance among different cities of Isfahan regarding social, economic, and cultural aspects has led to special chaos in settlements, fast and excessive growth of Isfahan, and changing the cities into marginal spaces with the outcome of imbalance in special structure of the province. Centralized planning has represented its harmful effects in different ways. Absorption of a big part of funds in the center of the province and reduction of funds and resources in other cities have played a major role in more migrations to the center of the province and draining the small towns of active forces.[32] This has led to less young population and more old people which would subsequently lead to higher mortality rate due to heart attacks.

Regarding mental problems, there is a specific discussion that why the number of patients is higher in some cities compared to other cities. Moreover, social consideration should be focused on these problems.

Maternal mortality is associated with health facilities. Health facilities reconstructions have affected infants' deaths which cannot be observed in other factors. Our system is not efficient for patients with heart problems, cancers, and who experienced traffic accidents. We didn't pay enough attention to building a proper framework to create the favorable lifestyle to reduce the risk factors of noncontagious chronic diseases.

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Conflicts of interest

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