

Analysis of Cause of Death in Inner Mongolia of China, 2008-2014

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Abstract

Objective: The aim of our study was to analyze the character of cause of death in Inner Mongolia of China from 2008 to 2014. **Methods:** We collected data from monitoring points of the Death Registry System (DRS) in Inner Mongolia. We calculated the mortality rates by gender, year and age-specific. We calculated the proportion, the mortality rate and potential years of life lost (PYLL) of various system deaths. **Results:** During the period 2008-2014, the average crude mortality rate of all cause of death was 539.33/10⁵. The mortality rate increased semilogarithm linearly with age. The top four system deaths were circulatory system, neoplasm, respiratory system and injury. In 2014, the mortality rates of circulatory system were increased and the mortality rates of certain infectious and parasitic diseases, neoplasms, respiratory system, genitourinary system and injury were decreased compared to those in 2008. **Conclusion:** Through analysis the indicators of proportion, the mortality rate and PYLL indicated that health status of a population in Inner Mongolia was at a better level.

Keywords

Cause of Death, Mortality Rate, PYLL

1. Introduction

Mortality rate is one of the indicators that reflect health status of a population

*Shuli Xing, Zhiqiang Sun, and Maolin Du contributed equally to this paper.

[1]. The age-standardized mortality rate of all cause is declined in most regions in world including China in 2000 compare to 2012 [2]. Ischaemic heart disease, stroke, chronic obstructive lung disease (COPD) and lower respiratory infections were the top leading cause of death in the past decade [2].

The mortality rate of heart disease and stroke is decreased in America [3]. The mortality rate of cancer declined in some countries in recent years [4] [5] [6]. Cancer accounts for more deaths than heart disease in persons younger than 85 years in America in 2010 [7] and is the biggest killer of people under 75 in England [4]. Digestive organ cancers are the biggest contributor to all cancer deaths in Inner Mongolia in 2008-2010 [8].

The proportion of injury is the fifth leading cause of death in China [9]. The injury mortality rate decreased for women in recent year in China [10].

Mortality statistics were needed for policy formulation in order to improve the status of health of the people, so we designed to analyze the character of cause of death by using data of Inner Mongolia from 2008-2014. Our result might provide a reference for local government to establish strategies on prevention of disease and priorities of disease prevention.

2. Materials and Methods

2.1. Data Source

Annual cause of death data was provided from the Death Registry System (DRS) which were established by the Chinese Ministry of Health and the Center for Disease Control (CDC) of Inner Mongolia. We use all data of monitoring points in 2008-2014. Data of each death collected included demographics, place of residence, underlying cause of death and related information etc. Codes from the 10th version of International Classification of Diseases (ICD-10) was used to define the underlying cause of death, including: Certain infectious and parasitic diseases (codes A00-B99), Neoplasms (codes C00-D48), Endocrine, nutritional and metabolic diseases (codes E00-E90), Diseases of circulatory system (codes I00-I99), Diseases of respiratory system (codes J00-J99), Diseases of digestive system (codes K00-K93), Diseases of genitourinary system (codes N00-N99), Injury (codes S00-Y98), Other causes (codes D50-D89, F00-H95, L00-M99, O00-R99). The population data provided by CDC of Inner Mongolia.

2.2. Statistical Analysis

The mortality rates were calculated as the mean annual number per 100,000 persons by gender, year and age-specific. The age-specific mortality rate was calculated from the age of 5. The proportion of various system deaths for men and women were computed and plotted on a graph, the mortality and potential years of life lost (PYLL) also were calculated. PYLL was specifically calculated as $PYLL = \sum(ai \times di)$, where ai = loss of life-years for a certain age group, i , and di = the number of deaths in that particular age group [11]. The change of mortality rate in various system cause of death for men and women was calculated by the mortality rate in 2008/in 2014. All statistical analyses were performed using SPSS

13.0 software (SPSS, Chicago, Illinois, USA). The Chi-squared test was used to determine whether the differences for men and women were statistically significant, and the test was also used to examine trends of annual change in crude rates. Two-sided P values were reported and were considered to indicate statistical significance when they were less than 0.05.

3. Result

During the period 2008-2014, the average crude mortality rate of all cause of death was 539.33/10⁵. The average crude mortality rate in men was 652.52/10⁵, which was 1.57-fold higher than in women (416.32/10⁵). The difference was statistically significant ($\chi^2 = 6039.66$, $P < 0.001$). **Figure 1** showed time trends in total mortality for men and women. Over the past 7 years, the change of curve in men is similar to women, with some fluctuations. The mortality rate was lowest in 2009, 618.68/10⁵ in men and 365.66/10⁵ in women, the highest mortality rate was 709.49/10⁵ in men in 2011 and 451.61/10⁵ in women in 2012.

Figure 2 showed age-specific mortality rate for men and women in 2008 and 2014. The variance trend of curve was similar for men and women in 2008 and 2014. The mortality rate increased semilogarithm linearly with age.

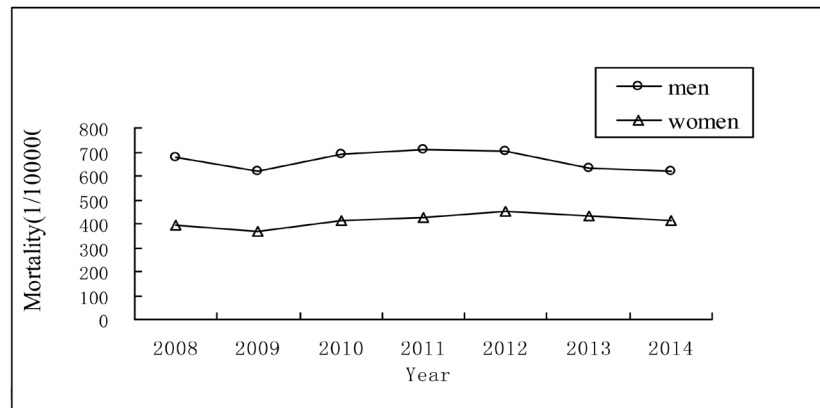


Figure 1. Crude mortality rate for men and women in Inner Mongolia of China, 2008-2014.

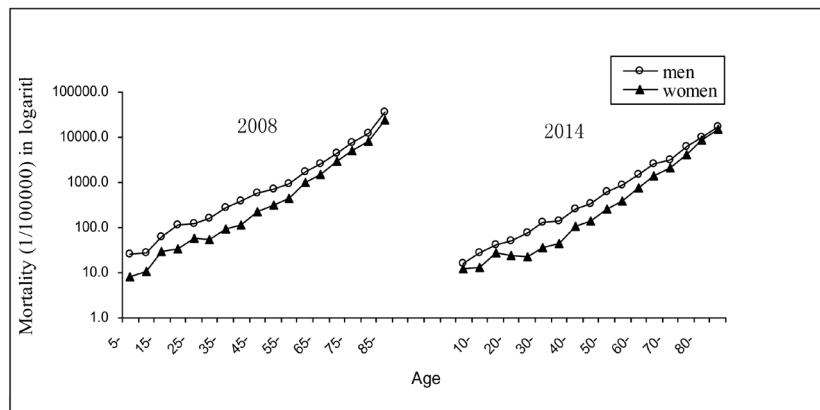


Figure 2. Age-specific mortality rate for men and women in Inner Mongolia of China between 2008 and 2014.

During the seven years, circulatory system, neoplasm, respiratory system and injury were the top four system deaths. The percentage for circulatory system was 52.08%, for neoplasm was 22.82%, for respiratory system was 8.39% and for injury was 7.21%. In 2011 injury ranked as the third and the respiratory system ranked as fourth. In men the respiratory system ranked as third, injury ranked as the fourth in 2013. In women the top four system deaths was no change.

Figure 3 showed the proportion of various system deaths for men and women in Inner Mongolia from 2008-2014. The proportions of circulatory system in all causes of death were listed as the first for men and women, responsible for the

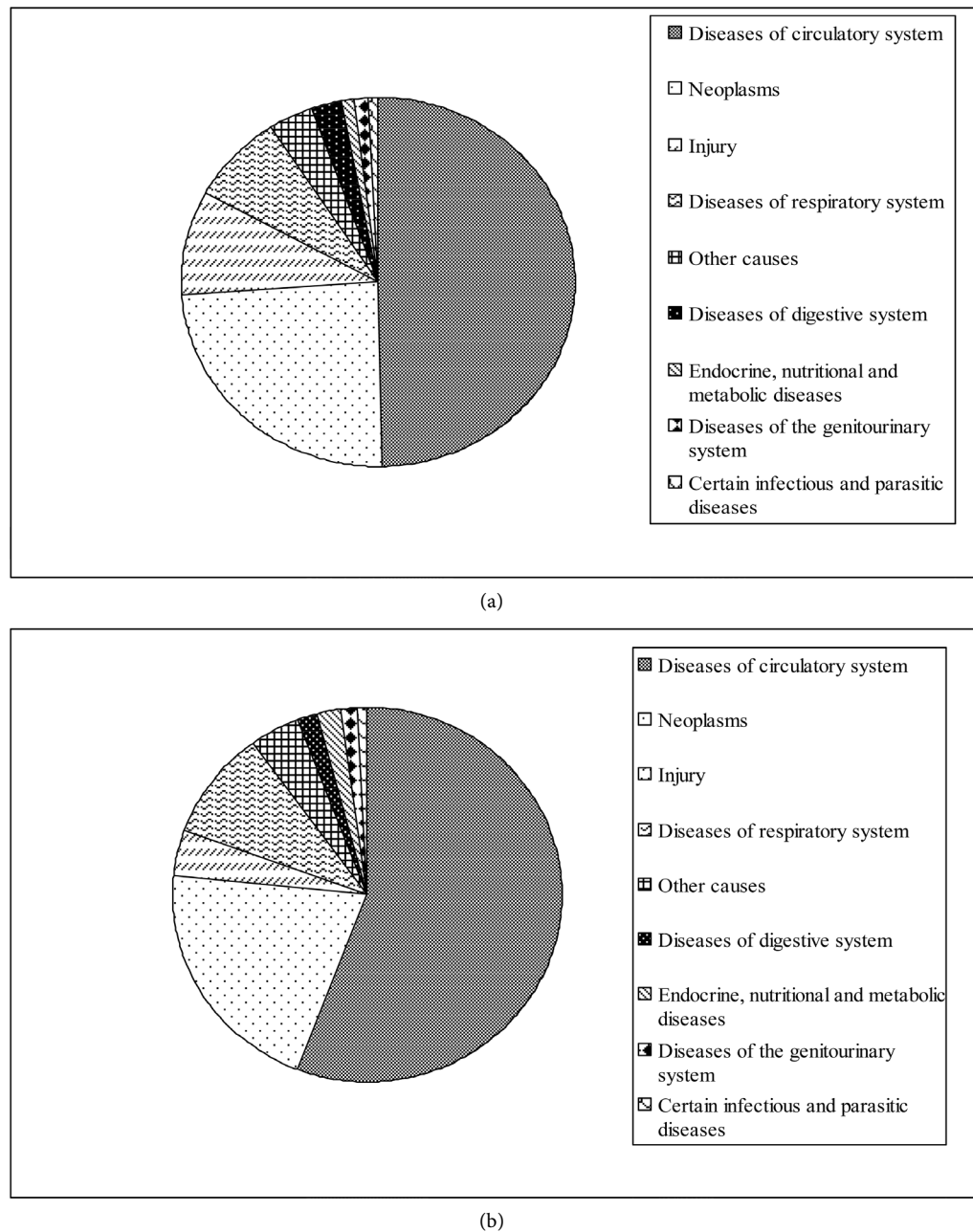


Figure 3. (a) Proportion of various system death for men in Inner Mongolia, 2008-2014. (b) Proportion of various system death for women in Inner Mongolia, 2008-2014.

half and surpass half of the proportion, followed by neoplasm. Injury ranked as the third for men, followed by diseases of respiratory which ranked the third for women. The proportion of injury was the fourth for women.

Table 1 showed the mortality and PYLL of various system deaths for men and women in Inner Mongolia from 2008-2014. The mortality and PYLL of disease of circulatory system were the highest for men and women. The mortality rate of diseases of circulatory system in men was 1.40-fold higher than in women. The PYLL of diseases of circulatory system in men was 1.56-fold higher than in women. The mortality rate of neoplasm in men was 1.83-fold higher than in women. The PYLL of neoplasm in men was 1.39-fold higher than in women. The mortality rate of injury in men was 3.69-fold higher than in women. The PYLL of injury in men was 3.53-fold higher than in women.

Table 2 showed the change of mortality rate in various system cause of death for men and women between 2008 and 2014. In 2014 the mortality rates of

Table 1. Mortality and PYLL of various system death for men and women in Inner Mongolia, 2008-2014.

Cause of death	Men		Women		Total	
	Mortality	PYLL	Mortality	PYLL	Mortality	PYLL
	(1/100,000)	(person-year)	(1/100,000)	(person-year)	(1/100,000)	(person-year)
Diseases of circulatory system	324.99	356,151.02	232.93	228,190.57	280.87	589,827.60
Neoplasms	157.11	226,294.42	86.04	162,265.71	123.05	399,099.00
Injury	59.11	227,691.09	16.93	64,530.63	38.90	303,645.80
Diseases of respiratory system	51.47	30,064.37	38.54	28,343.54	45.27	56,978.30
Other causes	22.84	64,990.03	17.40	49,639.91	20.23	114,960.80
Diseases of digestive system	16.80	34,582.82	6.85	9561.58	12.03	46,284.70
Endocrine, nutritional and metabolic diseases	7.55	8458.59	8.58	10,972.62	8.05	18,605.60
Diseases of the genitourinary system	6.58	11,232.15	5.99	12,026.65	6.30	22,934.50
Certain infectious and parasitic diseases	6.07	13,772.23	3.05	7812.79	4.62	22,147.10

Table 2. The change of mortality rate in various system cause of death for men and women between 2008 and 2014.

Cause of death	Men			Women			Total		
	08/14	Range		08/14	Range		08/14	Range	
Diseases of circulatory system	0.98	296.75	381.97	0.88	192.21	267.58	0.94	245.63	327.24
Neoplasms	1.20	143.96	191.71	1.03	81.50	92.22	1.13	115.67	142.76
Injury	1.33	51.35	72.68	1.12	15.65	20.31	1.25	34.49	46.53
Diseases of respiratory system	1.11	47.70	55.86	1.10	32.28	42.23	1.10	42.42	48.22
Other causes	0.94	17.38	30.22	0.87	13.03	21.06	0.91	15.25	25.82
Diseases of digestive system	1.23	15.58	19.23	0.80	5.76	7.43	1.08	11.02	13.12
Endocrine, nutritional and metabolic diseases	0.79	5.99	9.43	0.97	6.43	9.26	0.87	6.20	9.09
Diseases of the genitourinary system	1.63	5.02	8.17	1.44	5.21	7.69	1.53	5.18	7.93
Certain infectious and parasitic diseases	1.62	4.47	10.22	1.05	2.11	5.46	1.39	3.54	7.89

circulatory system was increased and the mortality rates of certain infectious and parasitic diseases, neoplasms, respiratory system, genitourinary system and injury were decreased compared to those in 2008. The mortality rates of other system were no change.

4. Discussion

The crude mortality rate in Inner Mongolia was $539.33/10^5$, higher than America ($488.4/10^5$) and some Asia countries such as Japan ($318.6/10^5$), Republic of Korea ($389.1/10^5$) in 2012, lower than China average level ($668.2/10^5$), India ($1051.2/10^5$) and South Africa ($1426/10^5$) [12]. The crude mortality rate in Inner Mongolia from 2008 to 2014 was at a middling level.

The top four system deaths in Inner Mongolia were diseases of circulatory system, neoplasms, diseases of respiratory system and injury. Circulatory system was the first leading cause of death, followed by neoplasms, this is consistent with previous studies [3] [13] [14].

The mortality rates of various system cause of death were varied between 2008 and 2014. The mortality rate of circulatory system in 2014 was increased compared to that in 2008 in Inner Mongolia, this is consistent with Nunes's in Brazilian Amazon [15]. Some reports indicated that dietary habits and PM2.5 has significant association with circulatory system diseases [16] [17]. Malignant neoplasm mortality rate in China was decreased [18] [19], the trend in Inner Mongolia was consistent with China's. The mortality rates of injury between 2000 and 2012 were decreased in Europe [12]. The mortality rates of injury in Asia, Africa and Latin America were unstability, the mortality rates were increased in some countries such as Malawi, Somalia and Guyana, the mortality rates were decreased in some countries such as Bahamas, Benin, India and Republic of Korea, the mortality rates were no change in some countries such as Japan, Angola, Morocco, Brazil and America [12]. The mortality rate of injury was decreased in Inner Mongolia and China's trend was consistent with ours. Inner Mongolia was consistent with China and has experienced rapid economic development in around 2008. The mortality rate of injury was at a high level. An association between economic development and unintentional injury mortality in children and adults was reported in low and middle income countries [20]. The economic development was steady in recent years. Some prevention measures such as enforcement of laws for drinking and driving, use of seat belt and control of pesticides may be the reasons of reductions in injury deaths [21].

Limitations

We only analysis the various system cause of death and don't analysis specific death diseases due to the length of the article.

5. Conclusion

The proportion, mortality and PYLL of disease of circulatory system in all systems were the highest. The mortality rate of circulatory system was increased in

recent years. So local government should establish relevant strategies on prevention of disease in order to decrease the mortality rate. There was a good indication that the mortality rates of neoplasms, certain infectious and parasitic diseases, respiratory system, genitourinary system and injury were decreased.

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