

# The Comparison trend of suicide in Hamadan province in 2006 to 2010: A death registry system-based study

Kazhal Mobaraki<sup>1</sup>, Jamal Ahmadzadeh<sup>2\*</sup>

Received 01 Nov 2018, Accepted for publication 25 Mar 2019

## Abstract

**Background & Aims:** Suicide in developing countries is an important health problem that occurs at a young age. Our purpose in this study was to compare the suicide trends using epidemiological aspects in Hamadan province in 2006 to 2010.

**Materials & Methods:** The mortality data of suicide for the present study was extracted from the death registry for suicide in District Health Network in Hamadan province. The trend of suicide was examined by Age-Specific Mortality Rate (ASMR) for a different type of suicide in both genders and also by all age groups. Then, the Years of Life Lost (YLL) was evaluated for different suicide methods.

**Results:** Totally, we analyzed 542 suicide cases based on eight age groups that had successful death for suicide. Of these, 340 cases were in 2006 and 202 cases in 2010. The mean age of suicide was 58.46 [95% CI: 56.53, 60.39] in 2006 and 32.13 [95% CI: 30.23, 34.04] in 2010. This issue suggests that the trend of suicide had a transition from the middle-age to young age. We also can understand this subject from the comparison of ASMR in all age ranges and in both genders. Among different method of suicides, intentional self-harm by drug and opium and hanging had the most YLL.

**Conclusion:** The rate of suicide in 2006 in comparison to 2010 didn't show a dramatic decrease. The trend of suicide had a transition from middle-age to a young age and this is a danger alert for policymakers in Hamadan province.

**Keywords:** Suicide; Years of life lost; Life expectancy; Age-specific mortality rate

**Address:** Urmia University of Medical Sciences, Resalat Street, Urmia, Iran

**Tel:** +984432240641

**Email:** Ahmadzadeh.J@umsu.ac.ir

## Introduction

Suicide is an important public health problem worldwide (1). Suicide at each age range is a tragedy topic for family, friends, and Community. A large number of suicide occur in young and middle age (2).

The trend of suicide is different in various countries and it depends on individual factors and sociocultural acceptability (2, 3). We can understand the epidemiology and patterns of suicide by considering this difference (3, 4). According to World Health

Organization (WHO), the suicide rate in some countries, for example, New Zealand and Australia had a rising trend in young people and in some countries such as Japan and Hongkong, this rate had increased by age (5).

Suicide is a major cause of life lost due to premature death worldwide (6, 7). Most often suicide occurs in 15-44 age groups and damages economic and social workforce and causes an increase in YLL (8).

The concept of YLL estimates the average years a person would have lived if he or she had not died

<sup>1</sup> MSc in Epidemiology, Social Determinants of Health Research Center, Urmia University of Medical Sciences, Urmia, Iran

<sup>2</sup> MSc in Epidemiology, Social Determinants of Health Research Center, Urmia University of Medical Sciences, Urmia, Iran (Corresponding Author)

prematurely. This mortality index was used to help quantify social and economic loss due to premature death from suicide, disease, and injury. The age-specific mortality rate is another important mortality index and considers some essential variables, for example, age and gender and so on. But it can only reflect the number of deaths occurred in the population, and cannot reflect the economic and social burden of lost from disease and injuries (9, 10). The YLL is a useful mortality index for policymakers, in order to guide, research, priorities, and plan a health intervention program (11-13). Accordingly, the present study was conducted to compare the trends of various suicide methods in 2010 and compare it with five years ago in order to distinguish the major sources of premature mortality and age-specific trends for suicide in eight age groups in Hamadan province.

### Materials and Methods

This death registry system based study was conducted in Hamadan province [located in the West of Iran]. The death registry system is established in 1997 in most provinces of Iran. In this system the mortality data will be collected by technicians and physicians from five sources: District Health Department, Cemeteries, Forensic Medicine Organizations, Maternity, and hospitals. These gathered mortality data was reported to District Health network monthly. Mortality data was extracted from death certificate and saved in Excel template for each of death causes. We referred to Hamadan District Health Network and obtained all death occurred from suicide in 2006 and 2010. We checked all data for realizing duplicated cases of suicide by match unique variable, for example, national code and ID code in the Excel Software. The method of suicide on certificates was classified according to the International Classification of Diseases version 10 (ICD-10) (14).

For the comparison and monitoring suicide trends, we used two important mortality indexes: 1: Age-Specific Mortality Rate (ASMR) for both genders and by year, and 2: Years of Life Lost due to premature death (YLL) from suicide in 2006 and 2010. ASMR is a useful mortality index, because it considers some important variables such as age, gender and cause of death but it cannot show the burden of disease and injuries. Therefore, we had to calculate a mortality index that could estimate the burden of lost due to disease and injury. For this aim at first, we categorized age into eight ranges and then divided the frequency of suicide in each range by number population at midyear in this range in both genders by year. WHO produced a life table for all member states and we use a life expectancy that was specified by WHO in 2009. Life expectancy is a population indicator and shows the average time that she or he was expected to live. Life expectancy at birth for men and women was 70 and 75 years in 2009, respectively (15). To calculate YLL, we categorized all types of suicide and then calculated difference actual age at death from suicide and life expectancy and finally added them for each type of suicide. For computing YLL we used the following formula:

$$YLL = \sum D_i (E - I)$$

Where:

I= actual age at suicide

D<sub>i</sub>= number suicide occurred in age I

E=life expectancy at birth according to the 2009 life table has been reported based on gender

We also calculated the percentage of YLL (%YLL) for each type of suicide that is, the YLL from each type of suicide as the percentage of the total number of YLL for all suicides. In addition, we calculated the average of life lost (AYLL) by dividing total YLL by an actual number of death for each method of suicide. All analyses were performed using statistical software Stata 11 (Stata Corp, College Station, TX, USA) and we used

the Microsoft Excel program for description and figuring the trends.

## Results

We identified 542 deaths from all methods of suicide. Of these, 340 successful suicides occurred in 2006 and 202 occurred in 2010. The details of the dataset are shown in Table 1,2,3, and4. The average YLL due to suicide in 2006 was 12.46 [95% CI: 10.55, 14.37] and 12.69 [10.84, 14.55] and 11.44 [95% CI: 4.96, 17.92] in males and females respectively. The average YLL due to suicide in 2010 was 38.55 [95% CI: 36.61, 40.49] and 37.54 [35.44, 39.64] and 44.82 [95% CI: 40.22, 49.41] in males and females respectively.

The mean age for all persons that had successful suicide was 58.64 [95% CI: 65.53, 60.39] in 2006 and 63.55[95% CI: 57.07, 70.03] and 57.30[95% CI: 55.44, 59.15] for females and males, respectively. In contrast, this was 32.13 [95% CI: 30.32, 34.04] in 2010 and was 30.17[95% CI: 25.58, 34.77] and 32.45[95% CI: 30.35, 34.55] for females and males, respectively.

Figure 1 shows the age-specific mortality rate in eight age groups for all methods of suicide by gender in 2006 and 2010. Clearly, mortality rates have shown a peak in higher age in both genders in 2006 but this peak in 2010 gradually showed in young age. Clearly, this trend shows that suicide in higher age among females

increased gradually in 2006; however, this trend decreased in 2010. In 2010, the mortality rate in females in the age group 20-29 years had increased in comparison to mortality rates in males in 2006. The mortality rate in all age groups showed an increase in males in comparison to females in 2010.

Figure 2 shows the YLL for all types of suicide in Hamadan province in 2006 and 2010. The top bar shows the total percentage of YLL in all types of suicide and the bar below shows the percentage of YLL for each type of suicide. Clearly, we can see that the greatest YLL in 2006 and 2010 were due to hanging and intentional self-harm by drug or opium. The percentage of YLL increased dramatically for hanging (%18.73) in 2006 in comparison to its percentage (%65.56) in 2010 and the percentage of YLL decreased for intentional self-harm by drug or opium (%68.28) in 2006 in comparison to its percentage in 2010 (%14.66). Total YLL from all methods of suicide in Hamadan province in 2006 was 4238 [95% CI: 3587.81, 4888.18] and it was 721 [95% CI: 312.68, 1129.31] and 3517[95% CI: 3007.48, 4030.51] for females and males, respectively. Also, the total YLL from all types of suicide in Hamadan province in 2010 was 7788 [95% CI: 7396.86, 8179.13] and it was 1255 [95% CI: 1126.43, 1383.56] and 6533 [95% CI: 6167.52, 6898.47] for females and males, respectively.

**Table1:** The distribution of age-specific mortality rate per 100 in both genders, Hamadan, 2006

Age groups (yr)	Suicide (340)	Female (63)	Male (277)	ASMR in females (per100)	ASMR in males (per100)
10-19	10(2.94)	10 (15.87)	0 (0)	.05	0.0
20-29	0 (0)	0 (0)	0 (0)	0.0	0.0
30-39	46 (13.52)	0 (0)	46 (16.60)	0.0	3.3
40-49	62 (18.23)	3 (4.76)	59 (21.29)	0.3	6.3
50-59	7 (2.05)	6 (9.52)	1 (.36)	1.0	0.2
60-69	108 (31.76)	14 (22.22)	94 (33.93)	3.5	25.2
70-79	87 (25.58)	12 (19.04)	75 (27.07)	5.6	26.0
≥80	20 (5.88)	18 (28.57)	2 (.72)	19.3	2.0

**Table 2:** YLL related to suicide by methods and genders, Hamadan, 2006

Methods of suicide	ICD-10 Code	Suicide (340)	Gender	Suicide (340)	Total YLL (4238)	YLL% (100)	Average of YLL
Hanging	X70	92	Female	25	794	18.73	8.63
			Male	67			
Intentional self-harm by drug or opium	X60-X65	204	Female	16	2894	68.28	14.18
			Male	188			
Intentional self-harm by poison or chemical materials	X66-X69	16	Female	3	313	7.38	19.56
			Male	13			
Intentional self-harm by shot and others explosive maters	X73-X75	6	Female	2	35	.82	5.83
			Male	4			
Other external causes of intention self-harm	X78-X84	14	Female	11	157	3.70	11.21
			Male	3			
Self-burn	X76-X77	8	Female	6	45	1.06	5.62
			Male	2			

**Table 3:** The distribution of age-specific mortality rate per 100 in both genders, Hamadan, 2010

Age groups (yr)	Suicide N (%)	Female (28)	Male (174)	ASMR in females(per100)	ASMR in males(per100)
10-19	18 (8.91)	1 (3.57)	17 (9.77)	0.1	1.4
20-29	93 (46.04)	17 (60.71)	76 (43.68)	1.5	6.5
30-39	45 (22.28)	5 (17.86)	40 (22.99)	0.6	4.7
40-49	19 (9.41)	2 (7.14)	17 (9.77)	0.3	2.7
50-59	16 (7.92)	2 (7.14)	14 (8.05)	0.5	3.7
60-69	2.97 (6)	3.57 (1)	2.87 (5)	0.4	2.1
70-79	1.98 (4)	0 (0)	4 (2.30)	0.0	2.7
≥80	1 (.50)	0 (0)	1 (.57)	0.0	0.2

**Table 4:** YLL related to suicide by methods and genders, Hamadan, 2010

Methods of suicide	ICD-10 Code	Suicide (202)	Gender	Suicide (202)	Total YLL (7788)	Total YLL (%)	Average of YLL
Hanging	X70	131	Female	10	5106	65.56	38.97
			Male	121			
Intentional self-harm by drug or opium	X60-X65	30	Female	2	1142	14.66	38.06
			Male	28			
Intentional self-harm by poison or chemical materials	X66-X69	16	Female	5	473	6.07	29.56
			Male	11			
Intentional self-harm by shot and others explosive maters	X73-X75	1	Female	8	49	0.62	49.00
			Male	1			
Other external causes of intention self-harm	X78-X84	19	Female	3	813	10.43	42.79
			Male	11			
Self-burn	X76-X77	2	Female	0	205	2.63	102.50
			Male	2			

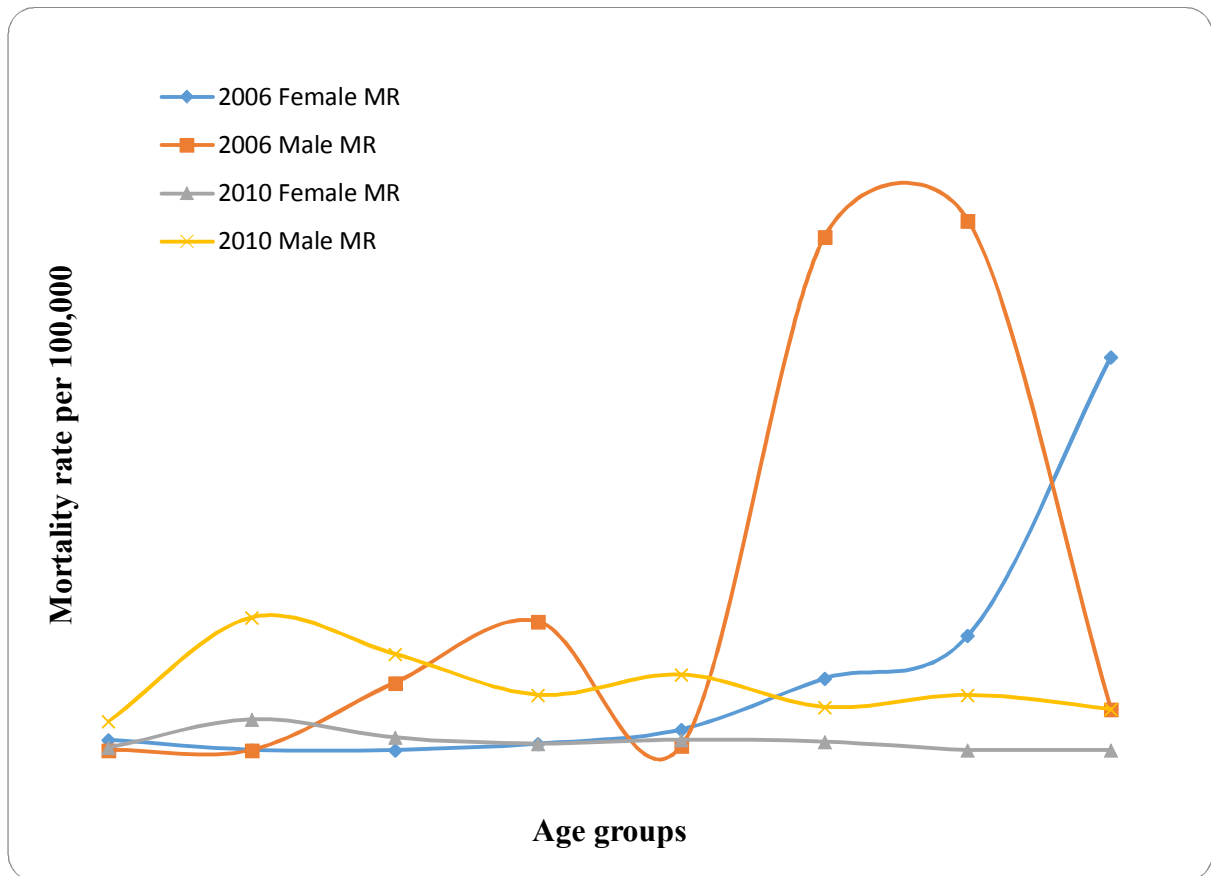


Figure 1: The age-specific mortality rate in all age groups related all methods of suicide by gender in 2006 and 2010.

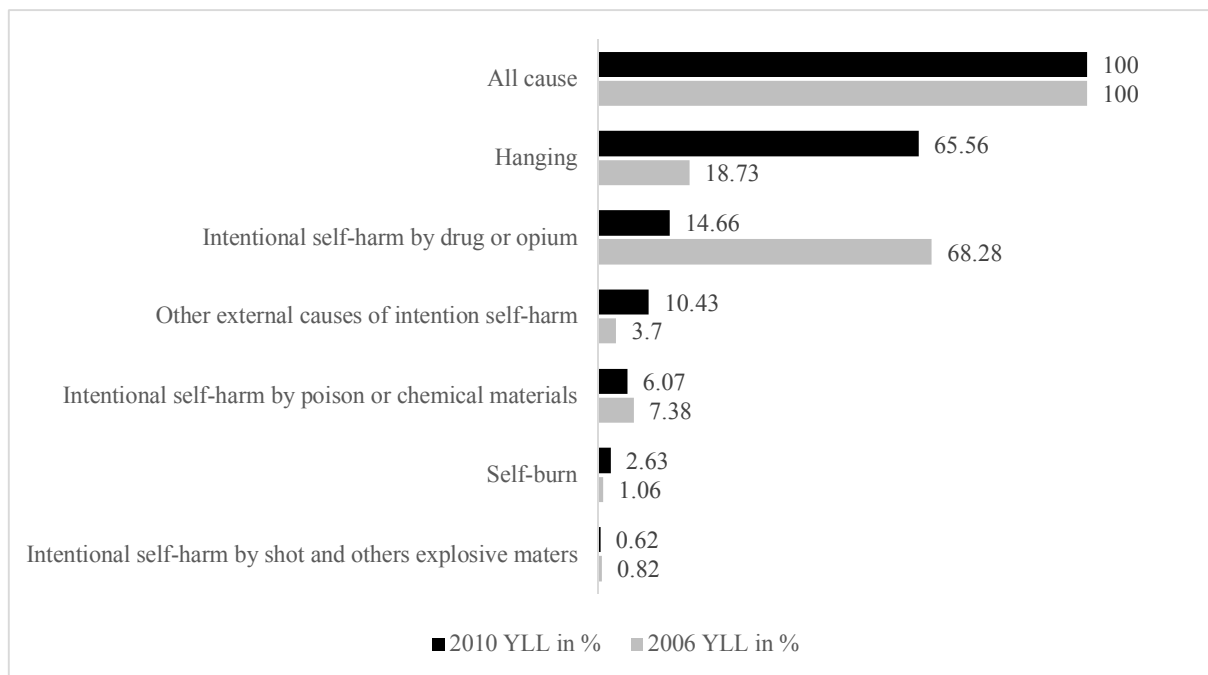


Figure 2: YLL in Hamadan province for all methods of suicide in 2006 and 2010.

## Discussion

Age-specific mortality rates simply can quantify mortality in a certain age group in both genders. Our results in figure 1 showed that trend of suicide in 2010 has changed rapidly in comparison to 2006 and the graph in 2010 in compare to 2006 shows that silent progressive epidemic of suicide among both genders has begun to start in younger age group. This trend in males in comparison to females is clearer. Our finding supports this issue that the trend for suicide have been stable or decreasing among females in most countries worldwide. While, this trend for males, particularly the younger age groups have been increasing (16).

YLL is another mortality index that is useful for research and priority in health problem (17). Also, YLL can be used for evaluating the effectiveness of program interventions (18). Our results show that the average YLL due to suicide for both genders had increased from 2006 in comparison to its average for both genders in 2010. YLL is more common among males. This finding is consistent with previous studies (19-21). Perhaps one of the reasons for this issue may be the rising mental health problem and the substance use disorder is much more common in males than females and males had more successful suicide especially in young age in Hamadan province. Today, most studies declared that 90 % of all types of suicide are due to a mental health problem (22-24).

Our finding in Figure 2 and Table 2 and 4 are in line with the previous studies that found the greatest YLL for hanging and intentional self-harm by drug or opium (25-28). This evidence may be useful for future research, policy, and treatment efforts aimed at understanding and preventing suicide.

Our study had limitations. Calculating YLL requires reliable data of suicide obtained from District Health Center and the quality and accuracy of the death registry system depend on the death certificate and the person that realize and specified background cause of death for

suicide, this issue may increase possibility information bias.

This cross-sectional showed that the relationship between some of the risk factors and the outcome (suicide attempt) is temporally difficult in such studies. Also, we strongly suggest that other researchers take more robust designs such as cohort to examine suicidal patterns and the burden related to all suicide methods over time. We also suggest that in the future studies, other researchers use YLL index and compute YLD index (years of lost due to disability) to create a more comprehensive index called DALY (disability-adjusted life year).

Despite the limitation of the current study policy makers can use the findings of this study. Data shows the situation of premature mortality related to different suicide and an increased trend of it in middle age toward younger age.

Our analysis suggests that the estimate of ASMR could provide evidence for the increasing trend of mortality for all types of suicide in middle-age toward younger age in 2006 in comparison to 2010. Furthermore, results of YLL analysis revealed that the burden of premature mortality related suicide in Hamadan province was dramatically attributable to intentional self-harm by drug, opium and hanging.

## Conflict of interest:

KM and JA have no conflicts of interest in this work.

## Acknowledgments

We would like to appreciate the all personnel in provincial health center (in Hamadan province) for their guidance and help. This paper is dedicated to our beloved children, Arsam Ahmadzadeh and Anil Ahmadzadeh.

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