

## ⇒ Research Article



# Trend of Incidence Rate of Suicide and Associated Factors in 2011-2015 in Zarand-Iran

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## Abstract

**Background:** Study of suicide and identify mental health problems, social, cultural and environmental communities are effective for preventive measures and reducing risk factors.

**Objectives:** This study aimed to study epidemiology of suicide and its associated factors over 2011-2015 in Zarand.

**Methods:** In this epidemiological study, all people who committed suicide in 2011-2015 were investigated. A standardized questionnaire was used to record the demogeraphic characteristics of the cases. Data was analyzed by SPSS software using descriptive statistics, chi-square tests, and logistic regression analysis.

**Results:** During 2011-2015, 2401 persons (372 at 100000) committed suicide of which 33 cases (5.1 at 100000) died. The results showed that suicide attempt rate in people with middle school education was 15.7 times greater than educated ones. Similar results showed the rate of suicide of the people in age group 15-29 was 6.3 times higher than other age groups. Suicide attempt in retired and unemployed was 3.1 times more than employed and urban had suicide attempt rate of 1.6 times higher than rural.

**Conclusion:** In Zarand, the incidence of suicide is much higher than the global, country, and province average (more than three to four times) and leading to death was much less than expected. However, there are significant differences in the cause and manner and demographic characteristics with other studies which require Creation SRCs (suicide registry centers) and qualitative studies with form layer analysis of causes in Zarand.

**Keywords:** Epidemiology, Suicide, Risk factors, City of Zarand

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Received March 28, 2020, Accepted: July 21, 2020, Published Online: November 11, 2020

## Background

The World Health Organization (WHO), describes suicide as a knowing endeavor with fatal end attempted by a person aware of this consequence (1). Suicide is a mental health problem and the third reason of death in the age range of 15 to 44 years old, estimated to be of 1 million people, annually (2). In view of sociologists and by definition of Emile Durkheim's – top sociologist-suicide is applied to every case of death which results directly or indirectly from a positive or negative act, carried out by the victim himself, knowing that it will produce this result. In this view, four sorts of suicide based on levels of balance in social force, social solidarity, and moral conscience are assumed. First, egoistic suicide occurred when an individual was detached from others in his/her community. Second, altruistic suicide due to extreme knit correlation of a person with other society members. Third, anomic suicide occurs when there is lack of control on society norms and disillusionment. Fourth,

fatalistic suicide which is due to destiny with heavy and permanent limitations that makes life fruitless (3).

Contrasting to sociologists, psychologists further concentrate on personal characteristics and they consider suicide's origin in the psychological state of people (4). Suicide motives are categorized into three areas of mental disorders, social issues, and somatic illnesses, or in illness classification, suicide is in then group of violence and in subgroup of self-directed violence. Based on the outcome of a person's action, suicide is classified into two groups of attempted suicide and fatal suicide (5,6). WHO reports, 804000 occurrences of suicidal deaths in 2012 when the suicide was regarded as the second cause of death at the age group of 15 to 29 years old, worldwide (7). In other hand, year 2000 reports revealed that 1000 cases of suicidal deaths are occurred daily where attempted suicide is 8 to 10 times more. World Health Organization estimates approximately 1 500 000 cases of suicidal death and 10 to 20 times more than this figure, attempted

suicide in year 2020. This estimation shows that by 2020 suicide occurrence will be increased approximately 4 times than year 2000 (9). Studies associated to suicide in Iran shown prevalence rate of 6.7 cases per 100 000 people, therefore Iran in WHO reports is considered as a country with low level of suicide (10). Nevertheless, the rate of attempted suicide is estimated to be 60 to 130 per 100 000 population. The most dominant method of suicide in men was hanging and in women was self-emolition (11) and the most prevalent grounds were low education level, unemployment, and mental disorders (10). The predominant areas were Iran western Kurdish provinces especially rural areas as post war possible complications (12). Most of studies in Iran are conducted using problem-expressing approach and with descriptive studies on personal characteristics (11,13,14).

### Objectives

The city of Zarand is located in 108 kilometers far from the capital of Kerman province with the population of 130 000 people, two hospital, 6 urban health centers, and 9 rural health centers (17)

Suicide rate in Kerman province and Zarand are reported to be 3.1 and 7.3 cases per 100 000 person and with an estimated rate of 10 to 20 times, it is expected that attempted suicide of Zarand is something between 70 000 to 140 000 cases. Age group of 20 to 24 years had the most cases and suicide cases in men was twice more than women (15). In a study on suicide attempt conducted in the city of Jiroft, 95% of suicide cases used drugs and poisons. Moreover, 48% of suicide cases were due to domestic fights and spouse's conflicts and 30% of cases were related to mental disorders (16). The increasing trend of this portentous phenomena in the country and in province urges further precise and expansive inquiries. On the other hand, it is necessary to advance the studies from problem-expressing approach to causal layered network and social epidemiology models.

### Methods

This study is considered as an epidemiological study. Demographic characteristics of suicide attempters whom referred to hospitals, health centers, public and private clinics in Zarand during 2011-2015 were recorded using a standard questionnaire. Data includes age, sex, education, employment status, marital status, place of residence, date of attempt, reason and method of suicide. On the other hand, basic population data of the Zarand including distribution of age, gender, educational level, marital status and residential place in the city was obtained from the national statistics office and census data and city's health center and estimated according to growth rate of population in stated years. The data were analyzed using SPSS version 22. We reported the descriptive and inferential analysis in this study. The descriptive results included mean and standard deviation for quantitative

data, and frequency table and percentage for quantitative data. The inferential results included Chi-square and logistic regression to determining relative risk of affected factors. In this study p-value <0.05 was considered to be significant.

### Results

From 2011 to 2015, 2041 (372 cases per 100 000) cases of attempted suicide and 33 (5.1 per 100 000) cases of deaths were reported. Annual average rate of suicide attempt  $372 \pm 31$  and led to death were  $5.1 \pm 1.6$  per 100 000 of population. Meanwhile, the highest rate of suicide attempt and completed suicide were in 2011 and 2013, respectively. From 2011 to 2015, suicide attempts rate continued to decline and in average one in 71 cases of suicide attempt was fatal (Table 1). The results showed that the number of suicide attempts in the age group of 15-29 years was 6.3 times more than other age groups, retired and unemployed 3.1 times than employed, singles and loners 2.1 times than married and middle school educated 15.7 times than other education groups. 90% of suicide cases were at the age group of 15 to 49 years old even though with 8.8 cases per 1000 person the highest rate was related to the age group of 15 to 29 years old (884 per 100 000) besides there was no significant difference among gender groups where men referred slightly more than women. Annual suicide rate among unemployed and retired was 10.4 per 1000, unaccompanied and single individuals was 7.2 per 1000 and among persons with middle school educational level was 12.6 per 1000 which is higher than other similar groups (Table 2). Furthermore, frequency distribution in different seasons, months, and days revealed no significant difference (Table 3). More than 82% of suicide reasons declared as unknown, 14% was due to family conflicts (71% without considering unknown causes), about 10% was related to mental disorders, 4.6% affection and passionate and other causes consisted 6%. 90% of all suicides were through consumption of pills and poisons and less than 2.5% used harsh, self-injury, self-emolition, hanging, etc. Only 5.6%

**Table 1.** Incidence Rate of Suicide Attempt and Completed Suicide From 2011 to 2015 in the Zarand

Suicide Death Rate		Suicide Attempt		Population	Year
Rate in 100 000	Amount	Rate in 100 000	Amount	Frequency	
6.5	8	436	532	122141	2011
4	5	400	498	124585	2012
7.1	9	387	492	127076	2013
2.3	3	340	440	129617	2014
6.1	8	331	439	132210	2015
5.1	66	372	2401	129104	Total*

\*Totals were calculated in average population aggregation of five-years period from 2011 to 2015 (mid periods) and 129104 people was the criteria for population of Zarand.

**Table 2.** Frequency Distribution of Population and Suicide Attempt in Relation With Demographic Features From 2011 to 2015

Variables	Group	Average 5 Years Population		5 Years Suicide Attempts		Annual Suicide Rate in 100000	P value
		Population	Percent	Population	Percent		
Age	<10	23829	18.5	0	0	0	0.001*
	10-14	10610	8/2	118	4.9	222	
	15-29	39488	30.6	1745	72.7	884	
	30-49	35269	27.3	447	18.6	253	
	>=50	19908	15.4	91	3.8	91	
	Total	129104	100	2401	100	372	
Gender	Male	64501	49.96	1257	52.4	390	0.8
	Female	64603	50.04	1144	47.6	354	
Employment	Retired unemployed	6272	4.8	326	13.6	1039	0.001*
	Age over 19 years, Employed or housewife	77165	59.8	1256	52.3	402	
	Under 20 years	45667	35.4	819	34.1	359	
Marital Status	Married and housewife	64737	50.1	1139	47.3	352	0.001*
	Single	35135	27.2	1262	52.6	718	
	Teenager and other	29232	22.7	-	-	-	
	Illiterate	19991	15.5	27	1.1	270	
Education	Primary school	46418	36	283	11.8	122	0.001*
	High school and diploma	32280	25	2034	84.7	1260	
	Higher education	15288	11.8	57	2.4	75	
	Under 6 years old	15127	11.7	-	-	-	

\*Average population aggregation of five-year period (mid periods).

of cases had recorded history of suicide by either person or his/her family (Table 4). In locational and residential place distribution, the highest annual incidence rate of suicide was in Reyhanshahr and Zarand with about 509 and 447 cases per 100 000, respectively (Table 5). Data analysis with logistic regression revealed that the age group of 15 to 29 years old, unemployed, and retired people, alone and single people, and living in urban areas were 6.3, 3.1, 2.1, and 1.6-folds more at risk for suicide, as compared with the sum of other similar groups. Those people with middle educational level had 15.7 times more suicide rate in comparison with peoples with illiterate, low educational level, and also high educational level (Table 6).

### Discussion

Results in the Zarand, demonstrated that completed suicide rate was relatively lower than worldwide, Iran and even provincial rates meanwhile there was differences in 2014 compared to previous years. Almost certainly higher attention of political, health and treatment authorities had an effective role in decreasing death rates. Decreasing trend of suicide attempt has further complex reasons which needs closer look in to this study. Collectively, we

are facing 3- to 4-fold more suicide attempt prevalence and incidence rate as compared with other reports in Iran and Kerman province (17-21). There may be some features including environmental, geographical, social, cultural, economic, worldview, unconscious in the city which may have role in this phenomenon. Findings revealed that the age of suicide attempt in Zarand from 2011 to 2015 was  $26.7 \pm 7.5$ , while the mean age of covered community in the current study was  $29.14 \pm 15.6$  which is significantly different and demonstrates younger age of suicide attempt as compared with the community, although literature review has not revealed this difference (community and suicide ages) but WHO reports have mentioned mostly the risk group of age group of 15 to 29 years old (2, 5) which is consistent with results of the current study. A study conducted in Iran from 1989 to 2007, introduced the same group as the highest at-risk group for suicide (7). Another finding of the mentioned study concludes illiteracy as one of the main causes of suicide which is not consistent with the findings of the current study in which the lowest suicide rate was related to illiteracy, elementary and higher educational level and the highest incidence rate of suicide was related to middle school to high school level with 15.7 times more rate. In fact, from illiteracy to

**Table 3.** Frequency Distribution of Suicide Attempt According to Season and Day From 2011 to 2015 in Zarand

	No.	Percent	P value
Season			
Spring	665	27.7	
Summer	656	27.3	0.82
Autumn	507	23.2	
Winter	523	21.8	
Total	2401	100	
First 10 days of month	773	32.2	
Second 10 days of month	792	33	0.9
Third 10 days of month	836	34.8	

**Table 4.** Frequency Distribution of Suicide Attempt Considering Causes, Methods, and Previous History of Suicide From 2011 to 2015 in Zarand

Variable	No.	Percent	P value
Reason			
Familial fights	336	13.99	
Mental disorder	41	1.71	
Love	19	0.79	
imprisoned	14	0.58	0.001
Drug abuse	10	0.42	
Mistaken consumption	3	0.13	
Not known	1978	82.38	
Pills	1835	76.4	
Poison	326	13.6	
Method			
Illicit drugs	151	6.3	0.001*
Self-injury	58	2.4	
other	31	1.3	
Person	94	3.9	
Suicide history			
Family	41	1.7	0.001*
No history	2266	94.4	

diploma, incidence rate of suicide rises significantly with the rise of educational level which is an unexpected result in Iran (10). Interpretation of the reverse relationship between educational level and suicide is very complicated and needs further sociologic investigations. Probably, heterogeneous development trend of Zarand was without considering social, psychological, and sociological changes due to environmental and physical development. Moreover the results are consistent with Maynard et al (22) that attempting suicide is more likely in high school drop outs than their counterparts who graduated from high school after controlling for the effects of age, gender, race/ethnicity and family income. Other important point of

the current study was lack of significant difference among gender groups regarding frequency, causes, and methods of suicide which was mostly different as compared with other studies (16,18,19). Other results including suicide frequency among unemployed and single young people were consistent with the most of studies (20,21,23,24). Incidence rate of suicide demonstrated decreasing trend from 2011 to 2015. Seasonal or time frequency distribution were not significantly different which was inconsistent in comparison with a study conducted in Kerman (15). Another significant point is the variance in incidence rate in county sections of Zarand including Reyhanshahr, Baha Abad, and Zarand, however there was no significant difference in living in rural or urban areas. High incidence rate in the mentioned areas needs further environmental studies including water, soil, and weather and also nutritional conditions of at-risk population. Another basic difference in the current study; as compared with other studies; was previous history of suicide attempts and mental disorders so that in some studies the portion of mental disorders has been reported to be 50%, while the portion of mental disorder in the present study was only 6%. In the most of studies, 40% of reasons for suicide was due to previous history of attempting suicide, while this rate in the current study was only 4% (23-25). It seems that conducting descriptive studies and assessment of general health status; especially about mental disorders; would be necessary in the Zarand. The difference between current study and other studies maybe due to data records; especially mental health status of these people which was limited to self-expressing and family interviews. In order to determine the causality network and the relationship of personal and environmental variables with suicide, it is necessary to conduct extensive researches using causal layered analysis in the Zarand. In a study on relation of masochism behaviors with psychological and environmental factors, findings revealed high frequency of non-lethal suicides (suicide gesture) which is congruent with the current study (26). Before conducting any study, it is necessary to determine the relation of masochism behaviors and suicide pretending with suicide attempt (real intention to suicide) in the Zarand which necessitates cohort studies and setting up suicide registry centers (SRCs) in this field. Significant differences in the result of present study concerning both the rate and the frequency of suicide among age, gender, educational level, residential place groups and of course causes, methods, and previous history of mental health disorders and the result of other studies revealed the structural feature of the view of cultural, social, economic, developmental, and attitude manifest of the population of this city. For preventive interventions in short term program, reinforcing mental health units and comprehensive education throughout the city is required also since the suicide attempt rate in high school drop outs is higher than other age groups

**Table 5.** Incidence Rate of Suicide Attempt Considering Residential Place From 2011 to 2015 in Zarand

Place of living	Population		Suicide		Annual Incidence Rate
	Number	Percent	Number	Percent	
Zarand	60915	47.2	1361	56.7	447
Reyhanshahr	6252	4.8	159	6.6	509
Baha Abad	8028	6.2	151	6.3	376
Village 2	8320	6.4	156	6.5	375
Village 1	11254	8.7	192	8	341
Dasht-Khak	3700	2.9	55	2.3	297
Khanook	3092	2.4	46	1.9	298
Jarfafak	1145	0.9	14	0.6	244
Roohabad	10611	8.2	130	5.4	245
Yazdanshahr	10373	8.1	106	4.4	210
Siriz	3260	2.5	31	1.3	190
Sarbanan	1897	1.5	0	0	0
Hatken	256	0.2	0	0	0
Total	129104	100	2401	100	372

*P* value = 0.8

**Table 6.** Affecting Factors and Relative Risk of Them in Suicide Attempt From 2011 to 2015 in Zarand

Variables	Annual Incidence Rate	OR	Lower	Upper	<i>P</i> Value
15-30 years old	8.8 in 1000	4.51	3.93	5.16	0.001*
Retired and unemployed	10.4 in 1000	3.13	2.62	3.74	0.001*
Singles and divorced	7.2 in 1000	2.06	1.82	2.32	0.001*
High school graduate or drop outs	12.6 in 1000	14.37	12.15	17.01	0.001*
Zarand and Reyhanshahr	4.5 in 1000	1.6	1.41	1.81	0.001*
Year 2001 – suicide attempt	4.4 in 1000	1.2	1.09	1.32	0.001*
Year 2003 – fatal suicide	7 in 100000	3.6	2.31	4.12	0.001*

therefore a school-based suicide prevention program based on theory and evidence seems to be necessary. In order to determine the causality network, it is necessary to conduct social epidemiologic studies and causal layered analysis, so in this context more precise programs could be prepared with scientific information. It is vital to conduct simultaneous fundamental and practical studies to improve the level of readiness among accident and emergency units, hospitals, doctor's offices, private clinics, and patient transportation in the city of Zarand. It is recommended to set up SRC in the city to conduct practical research led to preventive actions.

One of the strengths of current study is its observational cohort approach which was actively conducted and patients and families went under psychologists' consultation. One of the probable causes of decreased level of suicide among those people with previous history of

suicide was active following up of patients. Furthermore, the help and interest of Zarand governor can be regarded as an affecting factor in this regard (The governor has MSc degree of psychology). On the other hand, amongst disadvantages and limitations of the current study was unavailability of mild suicides. Although a few cases did not refer to therapeutic centers and were treated at home by familiar doctors or they were referred to city of Kerman by private vehicles.

#### Authors' Contribution

Acquisition of Data: HK; Study concept and design: MRA; Analysis and interpretation of data: BA; Drafting of manuscript: RMZ ; Critical revision: PD; Admin and material support: HK, RMZ; Study supervisor: MRA, PD.

#### Conflict of interests

The authors declare that they have no conflicts of interests.



### Ethical Approval

The current study was verified by Ethical Committee of Kerman University of Medical Science (IR.KMU.REC.1394, 275) and all necessary actions regarding the confidentiality and safe keeping of people's information were taken.

### Funding/Support

Research Center for Tropical and Infectious Diseases, Kerman, University of Medical Sciences, Kerman, Iran.

### Acknowledgments

Current study was extracted from research project 94/304 with ethical code of IR.KMU.REC.1394. 275 conducted in collaboration with Zarand Governor's Office and Neuroscience research Center of Kerman University of Medical Sciences. Hereby, the authors acknowledge and express gratitude to Mr. Ali Sadeghzadeh (political and security deputy of Zarand governorate), Dr. Dehghan (Zarand health and treatment network manager), Dr. Niloofar JabalBarezi (psychiatrist), and Mr. Mahmood Mirza Hosseini (internal manager of Zarand hospitals' affairs).

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