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Original Article

Rate and Causes of Suicide in Ilam: A Report of the Suicide Registry

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Abstract

Objective: Suicide is one of the most important health problems in the world. Financial, academic, social, and environmental difficulties along with genetic, physical, and mental disorders affect suicide attempts. This study aimed to find risk factors for completed suicide in Ilam province according to the suicide registry in Ilam province.
Method: This was a prospective study and was performed based on suicide case registration data, pre-determined checklist data, and death registration data in Ilam province from March 2019 to September 2020. Logistic regression models and the Chi-square test were used to determine the relationship between completed suicide and its risk factors.
Results: Among 1,410 attempted suicides, 66 (4.7 %) were executed. Rate of completed suicides was higher in men (6.5%) compared to women (4.5%), (p = 0.005), age groups over 65 years (P < 0.001), retirees and farmers (P = 0.009), illiterate people (P < 0.001), villagers (P = 0.02), people motivated due to physical problems (P = 0.016), suicide by physical methods (P < 0.001) and self-immolation (P < 0.001). Logistic regression showed that incidence of completed suicide was significantly higher in the age group over 65 years, illiterate people, people using physical methods, villagers, and men. Multivariate logistic regression also showed that men and individuals using physical methods of suicide were significantly more successful in suicide.
Conclusion: Men, the elderly, illiterates, villagers, and people who used physical suicide methods were in high-risk groups. Despite lower prevalence of suicide, a higher rate of completed suicide was demonstrated. To decrease completed suicide rates, we must pay attention to these groups.

Key words: *Completed Suicide; Prevalence; Risk Factors; Suicide Attempt*

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Suicide is often an impulsive act due to transient life crises, most of which do not lead to death (1). Suicide outcomes, including non-fatal suicide attempts and completed suicide, are the main safety issues (2). Suicide is the third leading causes of death for people aged 15-24 years. Research showed that without intervention, more than one-third of people with suicidal thought commit suicide within a year (3). Suicide attempt is an important predictor of completed suicide (4). Programs for suicide prevention in individuals should be aware of the current process of suicide, its actions, and risk factors involved (5).

Daliri *et al.* investigated suicide incidence rate in Iran during the years between 2001 to 2014 using systematic review and meta-analysis, they estimate suicide incidence in Iran was about 8 in 100000 (6). Padmaja *et al.* (2020), in a review study on records of patients admitted to a third-degree clinic, showed that self-harm in elderly attempters were higher than in younger groups (7). Amini *et al.* used four classification analytical methods to assess high-risk groups for suicide and tried to predict the risk factors for completed suicide in Hamedan province. Sensitivity, specificity, positive predicted value, negative prediction value, accuracy, and area under the curve were compared (8). Many studies on suicide have been conducted in different years including epidemiology of suicide attempts (9), seasonality of suicide occurrence (10), incidence of successful suicide and suicide attempt and related factors (11), prevalence of complete and attempt suicide (12), investigation of suicides due to mental disorders (13), the process of suicide attempt and completed suicide (14), variety of suicides by invasive methods, epidemiology of intentional suicide with poisoning and physical methods over the period of 20 years (15-17) and the time trend of suicide attempts in Ilam province (18).

As suicide is associated with many psychiatric symptoms, there is a need for a comprehensive assessment of suicide risk factors (19) and given that suicide is the second leading cause of death in people aged 15 to 24 years in Ilam province (16), priority of Ilam University of Medical Sciences was to establish a registry and to complete suicide statistics in Ilam. Therefore, due to the incomplete recorded information on suicide, more data were collected from experts who deal with those who commit suicide. Therefore, this study aimed to determine high-risk groups based on various factors such as age, gender, marital status, education level, occupation, motivation, means of suicide, type of suicide, county and place of residence when attempted suicide and successful suicide in Ilam province.

Materials and Methods

Study Design and Population

The method for this descriptive study was cross-sectional and the sample size included all data related to all cases of suspected suicide or attempted suicide between March 2019 and September 2020 (except February and March 2020 due to spread of Covid-19). Collection was through the registry by the census method. The reason for choosing the 1.5-year period was due to the university's limited budget of the university and high cost of accurate and specialized registration of suicides and follow-up of suicide attempts to prevent recurrence. This registry was first initiated by inviting experts including psychiatrists, psychologists, suicide researchers in Ilam province, and representatives of executive bodies such as education, welfare, prison administration, and forensic medicine to attend a three-hour session to review questions on suicide to be included in registry forms which led to approval of data collection. Secondly, another meeting with clerks responsible for collecting suicide data in Ilam province hospitals was conducted in order to justify the goals of the suicide registry. All questions were raised in a 5-hour session in presence of 25 experts, discussed and reviewed and each of the questions was edited, added, or subtracted.

Then the questionnaire was finalized in a meeting including members of the registry team (psychiatrists and psychologists). The final form of data collection and the way to implement it were signed by the president of the university and forwarded to the officials of hospitals and health centers for implementation. During data collection, to justify and solve problems in data collection, the executive director of the project, Dr. Kourosh Sayehmiri, attended health centers and met with experts in charge of data collection, the hospital manager, and the head of the hospital. In connection with quality control of completed forms, the important points were reviewed.

Ethical Consideration

This research was approved by the ethics research committee of Ilam University of Medical Sciences (Approval No: IR.MEDILAM.REC.1398.056). All cases of suspected suicide or attempted suicide between March 2019 and September 2020 (except February and March 2020 due to the spread of Covid-19) were followed up in hospitals throughout the province. If any suicide was confirmed, a questionnaire of individual information could be collected by experts. The questionnaire included questions related to demographic characteristics of individuals, tools, causes, and means used to commit suicide, the mental and physical condition of the patients before and after suicide, and spatial-temporal characteristics of suicide.

Data Analyses

After obtaining consent from the individual who made the suicide attempt or his companions, through interviews by the expert, these questionnaires were

completed, and to obtain more complete suicide data, the information contained in the suicide registration system and the death registration system in Ilam province was used by the census method. After completing the final list and recording the required data based on the objectives of the study and defining the variables, the data were encoded into SPSS Ver24. The Chi-square test was used to evaluate differences in the frequency of variables related to suicide. Logistic regression is one of the most common methods of classifying medical data for analysis.

Considering that our outcome variable and success in suicide was binary (complete, incomplete), logistic regression was used to examine its relationship with the variables and estimate risk of death. In categorical logistic regression with dummy variables, a variable that has a k-state is defined as two-state k-1 variables, and the odds ratio (OR) in each group relative to a reference group is calculated. The choice of the reference group is optional. The reference group can be selected as a group in which the risk of suicide is lower relative to others.

Results

From 1,410 suicides during March 2019 to September 2020, a total of 1,330 (95.3%) cases were incomplete and 66 (4.7%) were completed. From the gender point of view, 571 (42.9%) were men. Further, among the deceased (completed suicides) 40 were men versus 26 women. Frequency of completed suicides was significantly higher in men (6.5% and $P = 0.005$), as well as in the age group over 65 years (30.8% and $P < 0.001$). Completed suicides were more common in retirees and farmers than in other occupations (14.3% and $P = 0.009$) and also in those physically impaired compared with others with different suicidal motives (13.2% and $P = 0.016$) (Table 1).

Illiterate people had significantly higher completed suicide rates than the educated (13.5% and $P < 0.001$), likewise in rural people versus people in urban areas (7.9% and $P = 0.02$). Based on suicide devices/ tools, self-immolation has had the highest percentage of completed suicides (50% and $P < 0.001$), as well as physical methods versus chemical ones (23.3% and $P < 0.001$). Out of all counties, Dehloran showed the highest rate (12.3%) for completed suicides but this number was not significant (Table 2). Using logistic regression, risk of completed suicide in the age group over 65 was almost 15 times higher than in the age group of 10-14 years. Risk of completed suicide in illiterate people was 2.2 times higher than those with primary education. Risk of completed suicide became much less in those with higher level of education. Risk of suicide leading to death was 3.2 times higher in rural areas than in urban and 3.4 times higher in men than in women. People with physical problems had 3.6 times higher, addicted people had 2.1 times higher, and people with academic problems had 1.9 times higher risk of suicide than the reference group (people with mental problems). In other groups, the risk was lower. Risk of completed suicide in Dehloran was twice as high as in Abdanan county. In Mehran, it was 1.3 times as high as in Abdanan county. In other cities, the risk of completed suicide was lower than in Abdanan county (Table 3).

Risk of completed suicide was 2.7 times higher in widows and separated people than in single people. Single and married people had almost the same amount of risk. Risk of completed suicide in retired and farmers was 4.3 times, in students was 3.1 times, and in office workers were 1.9 times higher than housewives. Risk of completed suicide in the self-immolated was 3.5 times and in those who hanged themselves was 1.9 times higher than those who used self-mutilation. Other devices had yet lower risk of completed suicide. Risk of completed suicide in people who used physical methods was 15 times greater than people who used chemical schemes (Table 3).

Univariate logistic regression showed that variables of age, residence, suicide type, gender, and education can predict chances of completed suicide while, according to beta sign, gender and education had a significant negative relationship with the chance of complete suicide. Other variables showed a positive and significant relationship with the chance to complete suicide. Therefore, we entered these five variables into multivariate logistic regression (Table 4), and the results showed that the two variables of gender and type of suicide can significantly determine the chances of successful suicide in people who attempted suicide. Multivariate logistic regression showed that risk of successful suicide was almost 4 times higher in men than women, and that those who used physical methods for suicide had approximately 19 times the risk of successful suicide compared to those who used chemical methods.

Table 1. Demographic Characteristics of Suicides in Ilam Province during March 2019 to September 2020

Variable		Suicide type				DF	P-value
		Incomplete		Complete			
		N	%	N	%		
Marital status	Single	643	97.1	19	2.9	3	0.64
	Married	648	96.9	21	3.1		
	Separated or widow	13	92.9	1	7.1		
	Unknown	24	100	0	0		
Gender	Male	571	93.5	40	6.5	1	0.005
	Female	759	96.7	26	3.3		
Age group	10-14	35	97.2	1	2.8	5	< 0.001
	15-24	592	97	18	3		
	25-34	440	95.9	19	4.1		
	35-44	179	94.7	10	5.3		
	45-64	55	85.9	9	14.1		
	> 65	18	69.2	8	30.8		
Occupation	Housewife	369	96.3	14	3.7	9	0.009
	Unemployed	193	96.5	7	3.5		
	Self employed	188	96.9	6	3.1		
	Office worker	27	93.1	2	6.9		
	University student	33	89.2	4	10.8		
	Worker	13	100	0	0		
	Student	214	98.6	3	1.4		
	Soldier	11	100	0	0		
	Retired and farmer	12	85.7	2	14.3		
	Unknown	263	98.9	3	1.1		
Motive	Mental problem	215	96	9	4	7	0.016***
	Physical problem	33	86.6	5	13.2		
	Family problem	412	98.1	8	1.9		
	Educational problem	12	92.3	1	7.7		
	Economical problem	47	97.9	1	2.1		
	Unemployment	7	100	0	0		
	Addiction	11	91.7	1	8.3		
	Unknown	566	97.4	15	2.6		

*** Fisher's exact test

Table 2. Contributing Factors to Suicide in Ilam Province during March 2019 to September 2020

Variable		Suicide type				DF	P-value
		Incomplete		Complete			
		N	%	N	%		
Education	Illiterate	32	86.5	5	13.5	5	< 0.001
	Primary	42	93.3	3	6.7		
	Secondary	210	95.9	9	4.1		
	High School	672	98.5	10	1.5		
	Academic	209	95.9	9	4.1		
	Unknown	152	96.8	5	3.2		
Place	City	368	97.4	10	2.6	2	0.02
	Village	129	92.1	11	7.9		
	Suburbs	13	100	0	0		
County	Abdanan	100	93.5	7	6.5	7	0.16
	Ilam	745	95.8	33	4.2		
	Eyvan	105	96.3	4	3.7		
	Dare-shahr	176	95.7	8	4.3		
	Dehloran	50	87.7	7	12.3		
	Shirvan-Chardavol	94	96.9	3	3.1		
	Mehran	32	91.4	3	8.6		
	Malekshahi&Badreh	24	96	1	4		

Device	Self-mutilation	14	77.8	4	22.7	9	< 0.001***
	Hanging	11	64.7	6	35.3		
	Poisoning	122	94.6	7	5.4		
	Tableting	1070	98.6	15	1.4		
	Self-mutilation with a weapon	15	100	0	0		
	Self-immolation	4	50	4	50		
	Plaster	3	100	0	0		
	Alcohol	15	100	0	0		
	Others	46	92	4	8		
	Unknown	27	96.4	1	3.6		
Device type	Chemical suicide	1233	98	25	2	2	< 0.001***
	Physical suicide	46	76.7	14	23.3		
	Unknown	48	96	2	4		

*** Fisher's exact test

Table 3. Univariate logistic Regression to Investigate Factors Affecting Incidence of Suicide in Ilam Province

Variable		β	P-value	OR	95% CI for OR	
					Lower	Upper
Age group	10-14	reference	< 0.001			
	15-24	0.062	0.952	1.064	0.13	8.2
	25-34	0.413	0.692	1.511	0.19	11.6
	35-44	0.671	0.529	1.955	0.24	15.7
	45-64	1.745	0.105	5.727	0.69	47.1
	> 65	2.744	0.013	15.556	1.8	134.2
Education	Illiterate	reference	0.002			
	Primary	-0.78	0.3	0.45	0.1	2.05
	Secondary	-1.29	0.02	0.27	0.08	0.87
	High school	-2.35	< 0.001	0.09	0.03	0.29
	Academic	-1.28	0.02	0.27	0.08	0.87
	Unknown	-1.55	0.01	0.21	0.05	0.77
Motive	Mental problem	reference	0.017			
	Physical problem	1.28	0.029	3.620	1.143	11.465
	Family problem	-0.76	0.119	0.464	0.176	1.219
	Educational problem	0.68	0.53	1.991	0.233	17.026
	Economical and unemployment	-0.81	0.444	0.442	0.055	3.567
	Unknown	-0.45	0.287	0.633	0.273	1.468
	Addiction	0.77	0.48	2.172	0.252	18.700
County	Abdanan	reference	0.21			
	Ilam	-0.45	0.28	0.63	0.27	1.46
	Eyvan	-0.6	0.34	0.54	0.15	1.91
	Dare-shahr	-0.43	0.41	0.64	0.22	1.84
	Dehloran	0.69	0.21	2	0.66	6.01
	Shirvan-Chardavol	-0.78	0.26	0.45	0.11	1.81
	Mehran	0.29	0.68	1.33	0.32	5.48
	Malekshahi&Badreh	-0.51	0.63	0.59	0.07	5.07
Gender	Male	reference				
	Female	-0.715	0.006	0.489	0.29	0.81
Marital status	Single	reference	0.62			

	Married	0.12	0.68	1.13	0.6	2.1
	Separated and widow	0.93	0.35	2.7	0.33	21.7
Place	City	reference				
	Village	1.17	0.009	3.24	1.3	7.8
Occupation	Housewife	reference	0.01			
	Unemployed	-0.04	0.92	0.95	0.38	2.4
	Self employed	-0.17	0.72	0.84	0.31	2.22
	Office worker	0.66	0.39	1.95	0.42	9
	University student	1.16	0.05	3.19	0.99	10.26
	Unknown	-1.28	0.04	0.27	0.078	0.96
	Student	-0.99	0.12	0.36	0.1	1.3
	Retired and farmer	1.48	0.06	4.3	0.89	21.5
Device	Self-mutilation	reference	< 0.001			
	Hanging	.647	0.395	1.909	0.43	8.483
	Poisoning	-1.605	0.02	0.201	0.052	0.773
	Tableting	-3.015	0.000	0.049	0.014	0.167
	Self-immolation	1.253	0.167	3.500	0.592	20.679
	Others	-1.730	0.024	0.177	0.04	0.793
	Unknown	-2.043	0.08	0.13	0.013	1.273
Device type	Chemical suicide	reference	< 0.001			
	Physical suicide	2.709	< 0.001	15.010	7.325	30.758
	Unknown	0.720	0.337	2.055	0.473	8.927

Table 4. Multivariate logistic Regression to Investigate Factors Affecting Incidence of Suicide in Ilam Province

Variables		β	P-value	OR	95% CI for OR	
					Lower	Upper
Education	Illiterate	reference				
	Primary	-1.764	0.177	0.171	0.013	2.212
	Secondary	-2.725	0.041	0.066	0.005	0.892
	High school	-3.249	0.015	0.039	0.003	0.527
	Academic	-2.292	0.096	0.101	0.007	1.507
	Unknown	-19.615	0.999	0.000	0.000	
Gender	Male	reference				
	Female	-1.426	0.016	0.240	0.075	0.770
Place	City	reference				
	Village	0.951	0.074	2.589	0.911	7.359
Age group	10-14	reference				
	15-24	-1.159	0.339	0.314	0.029	3.373
	25-34	-0.672	0.578	0.511	0.048	5.457
	35-44	-0.281	0.822	0.755	0.065	8.773
	45-64	-1.987	0.255	0.137	0.004	4.208
	> 65	-0.640	0.727	0.527	0.015	19.088
Device type	Chemical suicide	reference				
	Physical suicide	2.946	< 0.001	19.031	4.874	74.313
	Unknown	-16.892	1.000	0.000	0.000	
	Constant	0.158	0.926	1.171		

Discussion

Our study found that 4.7 percent of all suicides resulted in death. Frequency of completed suicides was significantly higher in men, the age group over 65 years, retirees and farmers, illiterate people, villagers, those who had self-immolated, people who used physical methods of suicide, and those with physical handicap. Univariate logistic regression showed that variables of age, residence, suicide type, gender, and education predict chances of a completed suicide and after entering these five variables in multivariate logistic regression, it was shown that gender and suicide type can significantly predict chances of a successful suicide.

Various studies conducted in Ilam showed that incidence of suicide leading to death is higher in men than women (12-16), but in another study, incidence of suicide leading to death is higher in women than men (11). The Daliri *et al.* study in 1995 showed that incidence of completed suicide was much higher in men than women (6). Our study showed that completed suicides in Ilam during 2019-2020 were 4.7%. Also, completed suicides were significantly higher in men than women while 57% of suicide attempts were women and 43% were men. The study of Azizpour *et al.* in 2017 showed that in the age group over 65 years, completed suicides were greater, while more unsuccessful suicide was seen in 25-34 age group; likewise, in another study the risk of death by suicide in the age group of 55–64 years was 2.93 compared with the age group of 10–14 years (15, 17). In our study, completed suicide was higher in the age group over 65 years, and the lower age groups demonstrated greater uncompleted suicides.

In our study, the ratio of completed to incomplete suicides in people over 65 was about 4 to 10. These numbers decreased in the younger age groups to less than 1 in 20 in the less than 35-year old age group. Padmaja *et al.* also founds that suicide rate for men and women was 2 to 1 in the elderly, while in the younger age groups it was almost equal in both sexes. The ratio of completed suicide to suicide attempts was determined to be 1 to 5 which was 1 to 15 in the younger age groups: for example, a 3 times greater ratio of completed suicides in the elderly. This reflects death from concomitant diseases in the elderly (7). Azizpour's *et al.* study showed that lower education associated with greater suicide via poisonings (16). Also in this study, lower education level was significantly associated with completed suicide.

In the Amini *et al.* study in 2016, gender, age, and occupation were identified as the most eminent risk factors for completed suicide by all four statistical methods used (8). In our study, age and gender had a significant relationship with completed suicide. Although women, young people aged 15-34, urban people, highly educated people, people using chemical suicide methods, people with family problems, and people using tablets were more likely to attempt suicide, the results showed that men, the elderly, the illiterate, the rural, those attempting suicide with physical methods, and the self-immolated were high-risk groups with a higher complete suicide rate despite the lower incidence of suicide attempts.

Limitation

Several limitations can be considered for the present study. First, due to Covid-19 and quarantine restrictions in February and March 2020, suicide data for these two months were not available. Secondly, causal inferences are not very strong due to the cross-sectional nature of this study.

Conclusion

According to this study, men, the elderly, the illiterate, villagers, and those who used physical methods for suicide were high-risk groups who, despite fewer suicide attempts, had significantly greater successful suicides. Therefore, by providing more regular mental health services, effective steps should be taken to prevent suicide in these groups.

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Conflict of Interest

None.

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