



OPEN Epidemiology and predictors of suicide and suicide attempt in Northwest Iran: a pilot study for local prevention strategies

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The suicide rate in Bonab County, northwest Iran, has been reported to exceed 16 per 100,000. To develop and implement an effective suicide prevention program (SPP) at the local level in this County, a population-based epidemiological study was conducted to investigate factors associated with suicide and suicide attempts (SA). In this population and registry-based descriptive-analytical study, all deaths of suicide and SA from 2021 to 2023 were analyzed. Data were collected through a population-based registry for suicide and using community health workers in primary care. The study compared epidemiological characteristics and related risk factors between suicide and SA. Multiple logistic regression was used to adjust for potential confounders and calculated the adjusted odds ratios (AOR) for the likelihood of suicide compared to attempts. During 2021–2023, the suicide rates were 16.2, 11.44, and 12.08, while the SA rates were 212, 234, and 237 per 100,000 people. Overall, the suicide rate decreased, whereas the SA rate increased during this period. In the final analysis, males (AOR = 1.97: 1.2–3.6), individuals aged 35–60 (AOR = 1.56: 1.01–3.7), hanging (AOR = 7.4: 2.6–14.2), family conflicts (AOR = 2.65: 1.8–6.13), stressful life events (AOR = 1.25: 1.1–3.9), and unemployment (AOR = 1.8: 1.04–3.5) were associated with an increased likelihood of suicide. The suicide rate in this county surpasses the national average. Predictors of suicide and SA exhibit fundamental differences in this County. The study identified family conflicts, stressful life events, the hanging method, male gender, unemployment, and adult age as reliable predictors for suicide, while factors such as having psychiatric disorders, previous SA, and being female were linked to SA. These factors should be taken into account when developing SPP in Bonab County. Furthermore, the study highlights the need to consider various socioeconomic and cultural factors when developing SPP.

Keywords Suicide prevention, Suicidal behaviors, Mental disorder, Epidemiology

Abbreviations

AOR	Adjusted odds ratio
CI	Confidence interval (CI)
SLE	Stressful life event
SA	Suicide attempt
SPP	Suicide prevention program
LMICs	Low- and middle-income countries

Annually, nearly one million people worldwide die by suicide. However, this figure represents only the tip of the iceberg, owing to the absence of effective suicide prevention programs, underreporting of suicides, and various social stigmas^{1,2}. Despite this underreporting, suicide is the second leading cause of death among people aged 15 to 29, with most cases occurring in low- and middle-income countries (LMICs). Since 2013, the World Health Organization (WHO) has developed a global mental health action plan to reduce suicide by 10% by 2020 in all countries³. However, only 18% of countries have a suicide registration system. Most national and comprehensive

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suicide prevention programs (around 38 programs) have been established in developed countries. In contrast, suicide rates have increased significantly in LMICs over the past few decades^{4–6}.

Based on the latest estimates, the global age-standardized suicide rate for 2019 was 9.0 per 100,000 population, while the age-adjusted suicide rate increased to 14.21 per 100,000 people in 2022⁷. According to the current meta-analysis in Iran, the prevalence of suicide attempts (SA) is 131 cases per 100,000 people, with a 95% confidence interval (CI) of 124–137. The prevalence of SA is 152 per 100,000 in women and 128 per 100,000 in men. The prevalence of death by suicide is 8.14 per 100,000 people, with a 95% CI of 7.8–8.5. Suicide rate is 5 per 100,000 in women and 9.1 per 100,000 in men⁸. Other reports indicate that the suicide rate in Iran is 6.8%, which is lower than the global rate, ranking 58th among countries worldwide⁹.

There has been limited research on suicide trends and rates in East Azerbaijan Province. The four-year suicide prevention project in Malekan County, which took place from 2015 to 2018, is among the few impactful longitudinal studies. This community-based suicide prevention program was integrated into the county's healthcare system in collaboration with the Health Deputy at Tabriz University of Medical Sciences. Various strategies were developed and implemented to prevent and reduce suicides and SA. The findings of this study indicated that the rates of suicide, SA, and re-attempts have declined⁴. Another epidemiological study in East Azerbaijan Province analyzed the 12-year trend of suicide-related deaths using data from the Forensic Medicine registration system and the Mortality Registration system of the Ministry of Health from 2007 to 2018. The study indicated that the incidence rate of suicide in this province has been steadily increasing. Specifically, the incidence rate of suicide rose from 2.7 per 100,000 people in 2014 to 5.65 per 100,000 people in 2018¹⁰.

Zeinalzadeh et al. estimated the rate of SA in East Azerbaijan Province to be 101 per 100,000 population in 2010. The rate of SA was higher in women (63.7%) compared to men (36.3%). The mortality rate from suicide among individuals who attempted suicide was generally estimated to be 2.7%, with this ratio being 4.9% for men and 1.3% for women. Studies have shown that the most common method of suicide for both genders is drug overdose. Variables such as male gender, occupation, marital status, and education level have had a significant correlation with death from suicide¹¹. A systematic review and meta-analysis conducted in Iran indicated that mental illness, particularly depressive disorders and family conflicts, are the most prevalent risk factors for suicide attempts¹².

Most Muslim countries had lower age-standardized suicide rates than the global average^{13,14}. Suicide is generally an under-researched and poorly understood issue in Muslim-majority countries¹⁵. However, the suicide rate in northwest Iran- Bonab County has been reported to be more than 16.2 per 100,000 people in 2021. Identifying local risk factors related to suicide in this context can be useful not only at the national level but also for Islamic countries for suicide prevention^{15–17}. Bonab County is situated in northwestern Iran, within East Azerbaijan Province. According to the latest census, the total population of this county is 149,100 (61.5% urban and 38.5% rural), and all residents are Muslim.

Currently, to control and reduce the suicide rate in Bonab County, a longitudinal suicide prevention program (SPP) is being conducted by the health system in two phases: development and implementation. Since the determinants of suicide and SA vary at the local level, identifying the predictors and risk factors of suicide and SA was essential for developing an effective SPP. Therefore, this study aimed to investigate the epidemiological status of suicide and suicide attempts, along with the associated risk factors of suicide in Bonab County. Another objective is to utilize the findings from this pilot study to develop suicide prevention interventions within the healthcare system of this County.

Methods

Study population and setting

A population and registry-based study using a descriptive-analytical design was conducted in Bonab County, northwest Iran. The target population of the study comprised all cases of suicides (deaths) and suicide attempters (SAs) in Bonab County from 2021 to 2023 who were recorded in the suicide registry system. Likewise, the study sample size comprised all suicides and suicide attempters who were recorded in the registry for suicide system during 2021 to 2023. Given the high suicide rate in Bonab County, a suicide prevention program (SPP) using a mega-project has been developed with two main strategies: “development” and “implementation.”

The present study follows the first phase-stage (development) with the aim of understanding the epidemiological profile and risk factors associated with suicide at the local level. Its goal is to inform the design of effective interventions. The current study first calculated the incidence rate of suicide and SA during 2021–23 at the population level using the suicide registry system and population census statistics, and then compared the risk factors between suicide and SA.

Data collection

Baseline and epidemiological data

Data related to suicide and SA were extracted from the national suicide registration system. In this registration system, all cases of suicide and SA are recorded by medical universities. The study extracted suicide and SA cases recorded between 2021 and 2023, along with their demographic characteristics. In suicide registration system, demographic characteristics, the history of any suicidal behaviors, mental illness, and other clinical risk factors were recorded. These data were recorded in the electronic system using community healthcare providers. Community healthcare providers have face-to-face contact with large numbers of community members as part of their usual routine performance in Iran⁵.

Stressful life events

In this study any acute and chronic stressful life event (SLE) and family conflicts were collected. Family conflicts was defined as any disagreement, conflicts, or familial discord with spouse and/or a first-degree family member.

SLE was also defined as any stressful and/or negative life events in the past year. The study collected the history of any SLE based on the validated Persian version of the Holms and Rahe questionnaire¹⁸ from all suicide (the first degree family) and SAs (themselves). The questionnaire was validated by Roohafza et al. in Iran among 3,951 adults aged 18 years and older. The Cronbach's alpha index for the questionnaire was 92%, and its validity and correlation with the General Health Questionnaire (GHQ-12) were found to be appropriate¹⁹. This questionnaire consists of 43 items measuring various common stressful life events that have occurred in the past year for respondents to answer. Some important SLE in this questionnaire include the death of a spouse or children, divorce, separation/distance between spouses, death of close family members, severe personal injury or illness, marriage, retirement, sexual problems, major financial changes, major life changes, and marital discord, among others. The Persian version of this tool has previously been used in the study area in a study related to suicide²⁰.

We relied on community healthcare providers to gather reliable and valid data. As part of the Iranian healthcare system, these providers typically follow up and care for patients under their coverage, thus maintaining direct contact and communication with the general population^{4,21}.

Analysis

Data were analyzed using Stata version 14 software. This study was a population-based study using the registry for suicide. The total population of the Bonab County by year and all suicides and attempters were available. The incidence of suicide and SA were calculated by dividing the number of events (suicide or SA) by the at-risk population per 100,000 people. The chi-square test was carried out to compare categorized variables. The independent T-test (if normal) and Mann-Whitney test (if non-normal) were used to compare quantitative data. All variables with P-values less than 0.2 in the univariate analysis were included in the multiple logistic regression analysis after assessing the potential confounding role of the variables using a Directed acyclic graph (DAG) and prior knowledge²². Multiple logistic regression analysis was utilized to estimate the crude and adjusted odds ratios (AOR) for the risk of suicide and attempted suicide with a 95% confidence interval²³.

Results

Descriptive results: incidence of suicide and SA

Overall, 59 suicides and 683 SA were recorded in Bonab County during the years 2021 to 2023. Table 1 demonstrates the incidence rates of suicide and SA in Bonab during the years 2021 to 2023. The suicide rate during these years was reported as 16.2, 11.44, and 12.08 per 100,000 population, respectively, while the suicide attempt rate was reported as 212, 234, and 237 per 100,000 population, respectively. This indicates a decreasing trend (from 16.2 to 12.08 per 100,000 population) in suicide cases but an increasing trend in SA (from 212 to 237 per 100,000 population).

Analytical results

Table 2 shows the scio-demographic characteristics and baseline features of individuals involved in suicide and SA in Bonab County. More than 64% of suicide cases occurred in males, while the majority of SA were in females (54.6%). There was a significant association between death by suicide and male gender ($P=0.006$). Significant associations were also found regarding age and occupation with suicide ($P<0.05$). In terms of age group, the age group of 15 to 34 years was the most common age group for both suicide (52.5%) and SA (68%). The age group of 35 to 60 years accounted for approximately 40% of suicides, whereas only 22.2% of SA were in this age group. Significant associations were also observed between occupational groups and the distribution of suicide and SA ($P=0.012$).

Housewives accounted for 39% of SA but were involved in 18.6% of death by suicides. Furthermore, the rate of suicide was higher compared to the rate of SA in unemployed individuals (13.5 vs. 8.5), self-employed individuals (8.5 vs. 4.7), and laborers (15.2 vs. 6.3). Both suicide and SA were more common in married individuals. Suicide and SA were more common among married individuals and those with an average level of education. However, there was no statistically significant difference between the frequencies of suicide and SA in terms of marital status and education level subgroups ($P>0.05$).

Table 3 indicates the frequency distribution of suicide and SA categorized by suicide methods, previous SA, psychiatric disorders, family conflicts, and stressful life events (SLE). Of individuals who committed suicide, 11.3% had a history of prior SA, compared to 6.15% of individuals who attempted suicide. However, this difference was not statistically significant ($p=0.166$).

There was a significant difference between individuals who died by suicide and those who attempted suicide in terms of suicide method ($p=0.001$). Nearly 75% of suicide cases chose the violent method of hanging, which significantly increased the chance of death ($OR=17.9$; 7.3–43.8). Conversely, exactly the opposite was observed in individuals who attempted suicide, where 75% of cases occurred due to poisoning.

Year	Population	Rate of Suicide		Rate of Suicide Attempted	
		N=59	Rate*	N=683	Rate*
2023	149,100	18	12.08	237	159.0
2022	148,600	17	11.44	234	157.5
2021	148,100	24	16.2	212	143.1

Table 1. Rates of suicide and SA in Bonab County by years. * Cumulative incidence rate (Per 100.000 persons).

Variables		Attempters 683 (92.05%)	Suicides 59 (7.95%)	P-value
Sex	Female	373 (54.6)	21 (35.6)	0.006
	Male	316 (45.4)	38 (64.4)	
Age	5–14	42 (6.15)	1 (1.7)	0.023
	15–34	465 (68.1)	31 (52.5)	
	35–60	152 (22.25)	20 (33.9)	
	> 60	24 (3.5)	7 (11.8)	
Occupation	Housewife	267 (39.1)	11 (18.6)	0.012
	Unemployed	58 (8.5)	8 (13.5)	
	Student (school or university)	170 (24.9)	7 (11.8)	
	Free	32 (4.7)	5 (8.5)	
	Worker (labor)	43 (6.3)	9 (15.2)	
	Others	113 (16.5)	19 (32.2)	
Marital status	Single	248 (36.3)	21 (35.6)	0.789
	Married	382 (55.9)	33 (55.9)	
	Widow and divorced	38 (5.5)	3 (5.0)	
	Unknown	15 (2.2)	2 (3.4)	
Educational level	Primary school	40 (5.8)	4 (6.8)	0.432
	Secondary school	571 (83.6)	44 (74.6)	
	High School and Academic	44 (6.4)	5 (8.5)	

Table 2. Socio-demographic characteristics of suicides and suicide attempters in Bonab County (2021–23).

Variables		Suicide 92 (7.95%)	Suicide attempted 683(92.05%)	95% CI	P-value
History of SA	Yes	6 (11.3)	107 (15.6)	0.54 (0.18–1.31)	0.166
	No	53 (88.6)	561 (84.4)	-	
Methods	Hanging	44 (74.6)	14 (2.1)	17.9 (7.3–43.8)	0.001
	Any poisoning	9 (15.2)	515 (75.4)	1	1
	Others*	6 (10.2)	154 (22.5)	2.2 (0.64–7.1)	0.124
History of psychiatric disorders	Yes	16 (27.1)	165 (24.2)	1.16 (0.6–2.18)	0.611
	No	43 (72.9)	518 (75.8)	1	
History of stressful life events**	Yes	36 (61.0)	282 (41.6)	2.21 (1.25–4.01)	0.0035
	No	23 (39.0)	399 (58.4)	1	
Any family conflicts	Yes	45 (76.3)	332 (48.6)	3.65 (1.9–7.5)	0.001
	No	13 (23.7)	351(51.4)	1	

Table 3. Risk factors for suicide and suicide attempted in Bonab County (2021–23). * Self-injury, jumping from height, self-immolation, intentional accident, ** In the last 12 months.

There was a history of psychiatric disorders in individuals who committed suicide and those who attempted suicide (27% vs. 24.2%), but this difference was not statistically significant ($p = 0.611$). However, the study found a statistically significant difference in the frequency of suicide and SA in individuals with a history of family conflicts and stressful life events ($P < 0.05$). Specifically, having a family conflict increased the chance of suicide by 3.65 times, and experiencing a stressful life event in the past year increased the possibility of fatal suicide by 2.21 times.

Table 4 displays the results of multiple logistic regression analysis, indicating the adjusted odds ratio (AOR) of suicide risk with a 95% confidence interval after controlling for the potential confounders. After controlling for potential confounding variables, being male (AOR = 1.97; 95% CI: 1.2–3.6), the age group of 35 to 60 years (AOR = 1.56; 95% CI: 1.01–3.7), suicide by hanging (AOR = 7.4; 95% CI: 2.6–14.2), having a family conflict (AOR = 2.65; 95% CI: 1.8–6.13), a stressful life event in the past year (AOR = 1.25; 95% CI: 1.1–3.9), and unemployment (AOR = 1.8; 95% CI: 1.04–3.5) significantly increased the odds of fatal suicide.

Discussion

Incidence of suicide

This population and registry-based study found that the incidence rate of suicide in Bonab County is higher than the national average, with a decreasing trend from 16.2 per 100,000 individuals in 2021 to 12 per 100,000 individuals in 2023. In contrast, the trend of SA has shown a slight increasing slope, from 212 per 100,000

Variables		Adjusted OR 95% CI	P-value
Age	5–14	0.35 (0.08–2.2)	0.261
	15–34	1	1
	35–60	1.56 (1.01–3.7)	0.032
	> 60	2.1 (0.71–6.2)	0.163
Sex	Female	1	1
	Male	1.97 (1.2–3.6)	0.022
Occupation	Housewife	1	1
	Unemployed	1.8 (1.04–3.5)	0.042
	Student (school or university)	1.1 (0.42–2.2)	0.895
	Free	1.98 (0.92–4.7)	0.129
	Worker (labor)	1.7 (1.0–9.7)	0.038
	Others	1.6 (0.75–4.4)	0.213
Hanging method		7.4 (2.6–14.2)	0.001
Psychiatric disorders		1.02 (0.27–1.3)	0.355
Stressful life events		1.25 (1.1–3.9)	0.035
Family conflicts		2.65 (1.8–6.13)	0.002
History of SA		0.68 (0.11–1.8)	0.238

Table 4. Results of multiple logistic regression* analysis to estimate adjusted odds ratios and 95% confidence intervals for the risk of suicide. *Adjusted for educational level and marital status.

individuals in 2021 to 237 per 100,000 individuals in 2023. Therefore, the evidence highlights the necessity of implementing interventions to prevent suicide and SA in this county.

A meta-analysis by Asadiyun M et al. (2023) in Iran found that the prevalence of SA is 131 cases per 100,000 individuals, with a 95% confidence interval (CI) of 124 to 137. The prevalence of death by suicide is also 8.14 per 100,000 individuals, with a 95% CI of 7.8 to 8.5. This rate is 5 and 9.1 per 100,000 individuals for women and men, respectively⁸. Other reports indicate that the suicide rate in Iran is 6.8 per 100,000 persons, which is lower than the global rate and ranks 58th among countries worldwide⁹.

Bonab County is located in northwestern Iran, in East Azerbaijan Province. A similar epidemiological survey in East Azerbaijan Province from 2007 to 2018 showed a slight increase in suicides in this province¹⁰. Consistent with our findings, the above study mentioned hanging as the most common method chosen by suicide victims^{8,10}. In the current study, 75% of suicide cases committed by hanging, which increased the risk of death. Hanging is a very violent method of ending one's life, with a very low chance of survival if nobody intervenes. Therefore, effective interventions should be implemented by the healthcare system of Bonab County to prevent this violent method. Consistent with the present study, Hajebi et al.²⁴ and Mahdavi et al.²⁵ identified hanging as the most common method of suicide among all suicide cases in Iran. A recent meta-analysis conducted in Iran estimated the pooled prevalence rates of suicide among males (64.3%), individuals over 25 years old (57.9%), those with less than a diploma (73.4%), people facing employment issues (66.4%), urban residents (61.7%), individuals with a past medical history (8.5%), those with a past psychiatric history (20.7%), previous suicide attempts (12.2%), a history of substance abuse (28.4%), occurrences in the spring season (29.8%), and the hanging method (46.1%)²⁶. Another study in Iran indicated that the average incidence rates of self-harm attempts and suicide among individuals aged 10–39 years were 93.87 and 7.55 per 100,000 individuals, respectively²⁷.

Associated risk factors for suicide

The present study showed a significant difference in age and sex between suicide and SA. Similar previous studies in Iran and worldwide reported that suicide was more common in men^{4,28}, while SA were more prevalent in women²⁹. Women often chose poisoning as the method for SA. SA were more common among individuals aged 14 to 34, and suicides resulting in death were more frequently reported in the age group of 34 to 60. This suggests that the intention to commit suicide is more severe and poses a greater danger in adults, highlighting the need to adopt interventions to prevent suicide and taking into account the factors that increase the risk of suicide in adults.

One of the most significant findings of the present study was the association of suicide with family conflicts. Family conflicts with a spouse or a family member increase the risk of suicide. These findings have also been demonstrated in a meta-analysis of suicide studies in Iran^{30,31}, highlighting family conflicts as strong predictors of suicidal behavior. According to the results of a case-control study in Iran, family issues, especially early marriage, have increased the likelihood of suicidal behavior²³. Empowering individuals and developing life skills to manage and mitigate family conflicts, particularly between couples, as well as addressing the issue of early marriage—which is prevalent in this context—should be prioritized in suicide prevention programs by health managers and policymakers³².

Stressful life events were another identified risk factor in the current study. Individuals who had experienced at least one stressful life event in the past year were at a higher risk of suicide^{20,33}. A study by Azizi et al. in Malekan County, Iran, identified stressful life events as one of the suicide risk factors^{20,33}. Several studies have also highlighted stressful life events as a notable risk factor³⁴ especially in the Asian context. For example, Arafat

et al. found that stressful life events were responsible for the largest proportion of suicide deaths in Bangladesh³⁵. In a study involving 547 Asian outpatients diagnosed with major depressive disorder, recruited from China, South Korea, Malaysia, Singapore, Thailand, and Taiwan, negative life events and social support were significantly linked to suicidality in female patients with depression³⁶. In another study in Southeast Asia, stressful life events were found to be the most common risk factors among suicidal patients³⁷. Acute stressful events, especially among adolescents and young adults, can increase impulsive suicides, necessitating attention and planning by healthcare systems for suicide prevention³⁴. Recent studies indicate that even stressful situations, such as the Covid-19 pandemic, can elevate suicidal behaviors^{38,39}.

In the present study, unemployed and self-employed individuals were at a higher risk of suicide. The association between suicide and occupation and economic issues can be explored in Durkheim's theory⁴⁰. Durkheim's structural approach to suicide, along with his sociological theories, led to the development of a complex concept of suicide. Large-scale European empirical studies support the impact of unemployment on suicide rates. These studies have shown that a 1% increase in unemployment leads to a 0.09% increase in the suicide rate (per 100,000 people)⁴¹. It is noteworthy considering that the unemployment rate in men peaks during their working ages, although other studies do not confirm this relationship^{42,43}. Regarding economic parameters, an increase in gross domestic product (GDP) and gross value added (GVA) shows a negative correlation with suicide rates in Europe⁴¹. An Italian study that examined the relationship between inflation, employment status, and suicidal behavior in a classified sample demonstrated that unemployed individuals are at a higher risk of suicide, especially those who were previously employed⁴⁴. The change in social status resulting from job loss imposes greater vulnerability to inflation compared to those who have never worked. These studies indicate a complex interplay of socio-economic factors influencing suicidal behavior, which remains an open question. Therefore, investigating some sociological theories related to economic factors along with aspects related to mental illness seems essential, and we believe they should be carefully considered in the suicide discourse⁴⁰.

These economic, structural, and socio-cultural issues are considered barriers to the implementation of suicide prevention programs. These findings challenge single-factor intervention models in reducing suicide and underscore the necessity of considering a wide range of background and socio-economic and socio-cultural factors when implementing suicide prevention programs^{1,3}.

A community-based study by Azizi et al. in Malekan County (adjacent to Bonab County, the area under the current study) during the years 2015 to 2018 aimed to prevent and reduce suicide. According to the health needs assessment of Malekan County Health Center, suicide was identified as a priority problem. The implementers conducted the following interventions in collaboration with the regional health system and Tabriz University of Medical Sciences: searching and collecting the highest level of evidence in suicide prevention, consultation with experts, reporting to the health system, improving suicide registration coverage, researching to identify local risk factors, Follow-up and care for suicide attempters, identifying and caring for depression and other psychiatric disorders, training and retraining health service providers, and conducting educational campaigns and raising awareness in high-risk areas. According to the reported results, the incidence of suicide and SA decreased from 11.22 to 2.63 and 203 to 157 per 100,000 people, respectively, from 2015 to 2018. The rate of re-attempted suicide also reduced from 12% in 2015 to 6.7% in 2018. Overall, at the end of the study, suicide, SA, and re-attempts decreased by 75%, 22%, and 42%, respectively⁴.

The results of this study can be used for the development of suicide prevention programs and suicide research in Bonab County and similar Iranian contexts. This study also provides a broad outlook for bridging the gap between research and field programs and/or policies, emphasizing the need for suicide prevention programs in the community^{4,45}, media campaign⁴⁶, and hospital settings^{28,47}, as well as pre-hospital settings. All of these aspects underscore the need to strengthen awareness about suicide behavior and evaluate the effectiveness of the national health approach in addressing suicide issues.

Strengthens and limitations

This study aimed to identify predictors and associated factors for suicide and SA, and to use the results of this study to develop and implement effective suicide prevention interventions at the local level. The main strength of this study was its population-based study using the suicide registry system, which encompassed the entire population of individuals targeted for suicide and attempt. However, the study had some limitations. Suicide is a multifactorial outcome affected by various clinical, personal, and socio-cultural characteristics as potential confounders, and the current study may not have measured or collected all of these factors. Therefore, to obtain detailed and in-depth information, face-to-face interviews may be needed, but suicides could not be accessed due to death, and this is part of the inevitable limitation of suicide studies. Nonetheless, to solve this problem, the study used the registered information of the health system and community health workers to collect detailed valid and reliable data (to reduce differential and non-differential misclassification). The study also used multiple logistic regression analysis to adjust the impact of potential confounders and to estimate AORs with 95% CIs. The study also used community health workers to collect reliable and valid data. Secondly, it is necessary to have control groups without suicidal behaviors to accurately identify the risk factors associated with suicide. To address this issue, we compared suicides with suicide attempters at the population level.

Another concern was the relatively brief period of three years to evaluate suicide trends. However, the primary aim of this study was to identify the predictors and risk factors of suicide and SA to inform the health system in the design and implementation of the SPP. By gathering three years of data, the study aimed to provide more precise information for developing effective interventions.

Conclusions

The rate of suicide in Bonab County is higher than the national average (according to meta-analysis studies). Predictors such as family conflicts, experiencing stressful life events, suicide by hanging, being male,

unemployment and the adult age group are identified as risk factors for suicide death. Additionally, variables such as having psychiatric disorders, previous SA, and being female are recognized as risk factors for SA. These factors can be considered in designing effective interventions for suicide prevention.

The results of this research question the effectiveness of intervention models that focus on a single component in preventing suicide. Instead, it highlights the need to take into account several environmental, socio-economic, and cultural aspects when developing suicide prevention programs.

Data availability

Suicide data are not publicly available based on the institute policy. However, the data that support the findings of this study are available from the corresponding author upon reasonable request.

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Author contributions

HA developed the first draft of the manuscript and data analysis and interpretation. All authors contributed to the protocol development. ASK, AM, VA, MH, PK and FK developed the protocol, interpreted and analyzed data, collected data, provided technical comments and interpretations. All authors contributed to the manuscript development and/or made substantive suggestions for revision. All authors read and approved the final version of the manuscript.

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Competing interests

The authors declare no competing interests.

Ethical approval and consent to participate

The present study has been approved by the Ethics Committee of Tabriz University of Medical Sciences to number: IR.TBZMED.REC.1403.121. The data and informations for this study were obtained from registry for suicide and suicidal behavior system at Tabriz University of Medical Sciences. No human subjects or interviews were used for data collection. The study was conducted in accordance with the Declaration of Helsinki.

Additional information

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