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Original Research Article

Trends in suicide attempts and suicide mortality in Belize 2019-2023

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ABSTRACT

Background: Suicide and attempts present significant public health challenges, especially with the increasing prevalence of suicides carried out using violent means. This study aimed to analyze trends in suicide mortality and attempts, methods used, and gender differences in Belize from 2019 to 2023.
Methods: This retrospective quantitative study utilized secondary data from the Belize Health Information System for the period 2019 to 2023.
Results: The rate of attempted suicides decreased from 28.43 per 100,000 population in 2019 to 2022, then increased to 26.16 per 100,000 population in 2023. Conversely, the suicide rate steadily rose from 6.99 per 100,000 population in 2019 to 11.38 per 100,000 population in 2023. Attempted suicides were most prevalent among adolescents aged 15-19 years, while suicides were highest among individuals aged 15-34years. Females had a higher rate of attempted suicides, whereas males had a higher suicide mortality rate. The male-to-female suicide ratio varied from 2.38 in 2019 to 7.75 in 2021 and 3.60 in 2023. Poisoning via medication overdose was the most common method for attempted suicides, while hanging was the most common method for suicides, with no significant gender differences in methods used. Mental health and substance-induced disorders were the most frequently reported risk factors for both suicide and attempted suicide.
Conclusions: This study provides a comprehensive analysis of suicide attempts and mortality trends in Belize, highlighting the alarming increase in suicide rates as a serious public health concern. These findings underscore the urgent need for a multi-sectoral approach to suicide prevention.

Keywords: Trends, Suicide attempts, Suicide mortality, Risk factors, Male-female ratio, Methods

INTRODUCTION

Suicide and suicide attempts are major public health challenges, particularly given the rising prevalence of suicides carried out using violent means.[1] It is estimated that more than three quarters of all suicide deaths occur in low-and-middle income countries (LMICs), where most of the world's population live.[2] Although suicides are preventable and there are many effective interventions to reduce suicide and suicide attempts, the World Health Organisation (WHO) estimates that each year approximately 800,000 people die from suicide, which represents a global mortality rate of 16 people per 100,000 or one death every 40 seconds.2 Although the

global suicide rate is declining, many LMIC countries are witnessing rising rates and suicide continues to be a preventable cause of premature mortality.[2]

In 2019, the global age standardized suicide rate was nine people per 100,000 population, with significant variation across countries, ranging from fewer than two deaths per 100,000 to over eighty per 100,000 population. Suicide rates in the regions of Africa, Europe, and South-East Asia were higher than the global average, with the Eastern Mediterranean region having the lowest suicide rate.[2] Whilst the global rate of suicide has been decreasing, the Americas, including countries in North America, South America, Central America, and the Caribbean, is the only WHO region recording an increase in suicide.[3] In 2019, the age-standardized rate of completed suicide in this region was nine people per 100,000 population (14.2 per 100,000 males and 4.1 per 100,000 females).[3] In contrast to global trends, suicide has emerged as an increasing public health concern in Latin America over the past three decades. Between 2000 and 2019, the global suicide rate declined by 36%, while rates in Latin America and the Caribbean rose by 17%.[4] Additionally, the global age-standardized suicide rate was 2.3 times higher in males (12.6 per 100,000) compared to females (5.4 per 100,000). However, suicide attempts are more prevalent among females than male both globally and in Latin America and the Caribbean.[2]

The most common risk factors associated with suicide include previous suicide attempts, mental health disorders particularly depression, substance use disorders, and psychosis poverty, limited access to mental health services, and widespread stigma surrounding mental illness.[6,7] This study aimed to examine trends in suicide mortality and suicide attempts, methods employed for both, and gender differences in their occurrence in Belize between 2019 and 2023.

METHODS

Study design

This retrospective quantitative study utilized secondary data from the Belize Health Information System for the period 2019 to 2023, examining suicide mortality and suicide attempts, demographic differences in these outcomes, methods of suicide, and associated risk factors.

Ethical approval: The study didn't involve human and so no ethical approval was obtained. The study involved retrospective review of data generated from the national health information system.

Statistical analysis

Univariate analysis was done, and findings are presented using frequency (n) and percentage (%) distribution tables and graphs. SPSS version 23 was used for all analyses.

RESULTS

Trends in suicide attempts

Figure 1 shows the trend in the rate of suicide attempts between 2019-2023, showing a decrease from 28.43 per 100,000 population in 2019 to 21.64 in 2022, followed by an increase to 26.16 per 100,000 population in 2023. Likewise, suicide attempts among women decreased from 30.71 per 100,000 population in 2019 to 22.78 in 2022, but increased to 33.18 per 10,000 population in 2023. Among men, rates declined consistently across the study period from 26.08 per 100,000 population to 18.92 in 2023. The female-male suicide attempt ratio fluctuated over this period, ranging from 1.22 in 2019 to 1.15 in 2022, and increasing significantly to 1.81 in 2023.

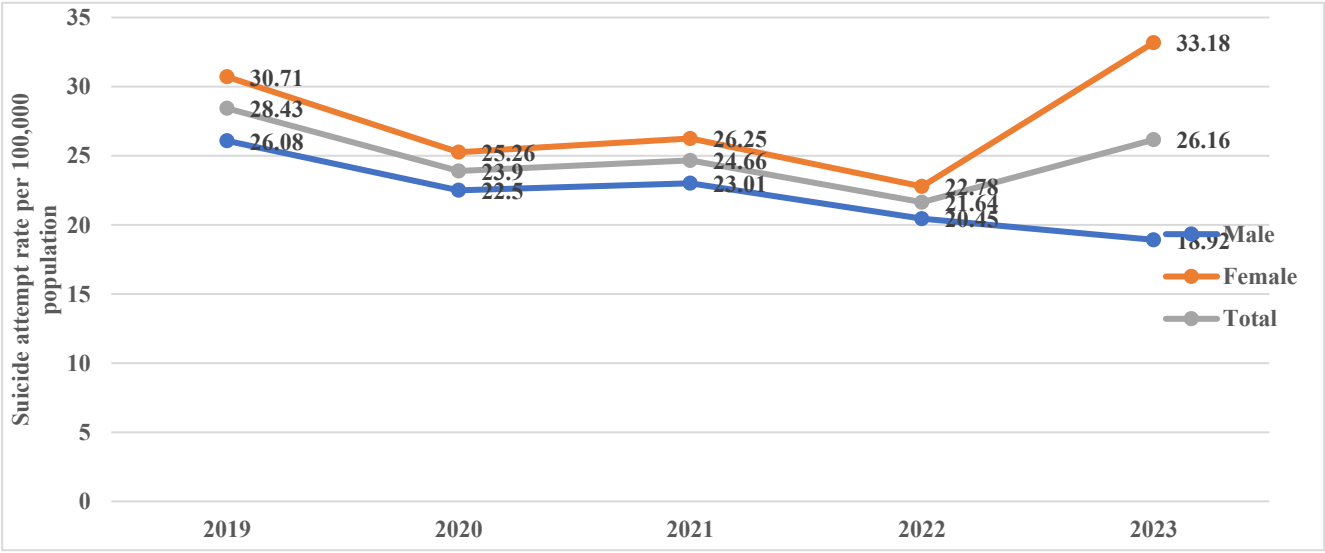

Figure 1: Trends in suicide attempt rate 2019-2023.

Table 1: Suicide attempt rate per 100,000 population by age group (2019-2023).

Age group (years)	2019	2020	2021	2022	2023	Average
10-14	1.17	1.62	1.14	1.19	3.54	1.73
15-19	5.86	5.04	7.81	4.28	5.98	5.79
20-24	6.62	5.71	4.07	6.04	5.95	5.68
25-29	5.22	4.51	3.54	2.77	3.33	3.87
30-34	4.28	4.9	4.46	4.31	3.57	4.31
35-39	4.65	1.14	2.61	3.25	1.64	2.66
40-44	2.70	3.08	0.43	3.25	1.64	2.22
45-49	1.98	0.48	1.88	0.84	2.86	1.68
50-54	0.61	0.60	1.16	1.4	0.52	0.86
55-59	1.67	0.81	1.57	0.54	0.64	1.05
60-64	2.49	2.43	2.38	0.66	0.78	1.75
65+	1.80	0.60	0.59	3.25	0.86	1.42

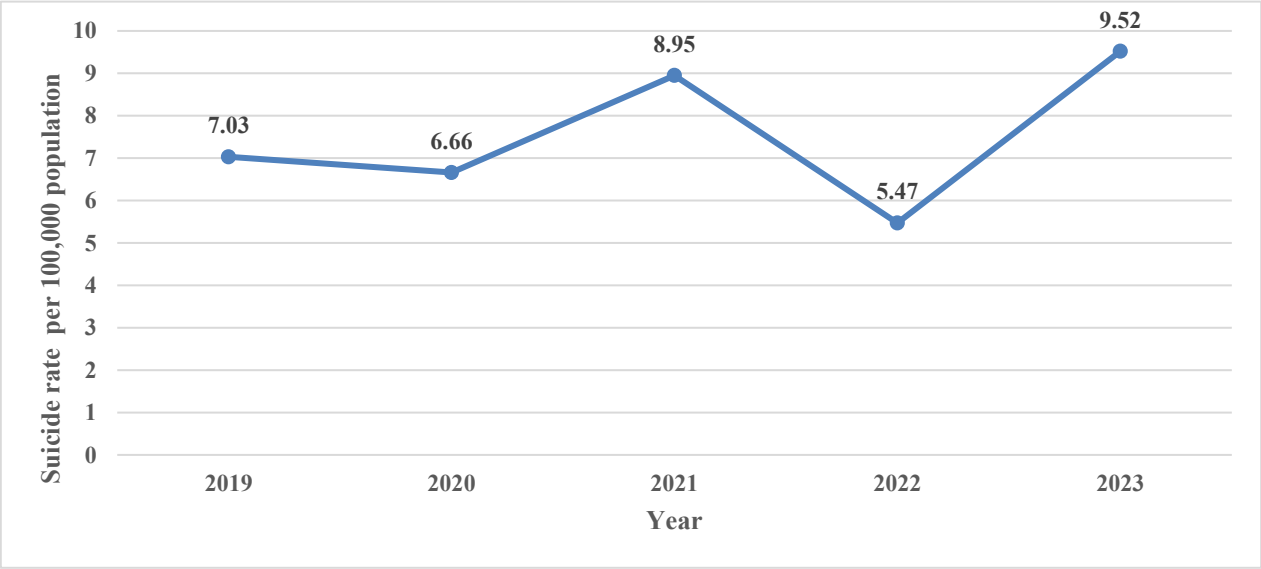

Figure 2: Trends in suicide attempt rate among adolescents (2019-2023).

Table 2: Methods used for suicide attempt by sex (2019-2023).

	Men	Women
Methods	Suicide attempts (n=217)	Suicide attempts (n=279)
Poisoning: medication overdose	78 (36)	137 (49)
Hanging	43 (20)	16 (5.8)
Sharp object	47 (21.6)	29 (10.4)
Poisoning: pesticide	11 (5.5)	58 (20.8)
Poisoning: chemical	12 (5.5)	24 (8.6)
Drowning	7 (3.2)	0
Others [a]	19 (8.2)	15 (5.4)

[a]Jumping from a height, intentional vehicle collision, or explosive fire

Table 1 shows the rate of suicide attempts per 100,000 population, divided into five-year age groups. Over the five-year study period, the data reveals that individuals aged 15-19 years had the highest average rate of suicide attempts at 5.79 per 100,000 population. This group is followed by those aged 20-24 years, 30-34 years, and 25-29 years, with average rates of 5.68, 4.31, and 3.87 per 100,000 population, respectively. Conversely, the lowest rates of suicide attempts were found among individuals aged 50-54 years and 55-59 years, with average rates of 0.86 and 1.05 per 100,000 population, respectively

Figure 2 shows the trend in attempted suicide rates among adolescents aged 10-19 years. The data indicates an

increase from 7.03 per 100,000 population in 2019 to 8.97 per 100,000 population in 2021. However, there was a notable decrease to 5.47 per 100,000 population in 2022, followed by a sharp rise to 9.52 per 100,000 population in 2023.

Table 2 illustrates the methods used for suicide attempts by men and women. Among women, the most common method was poisoning via medication overdose (49%), followed by poisoning with pesticides (21%), the use of sharp objects (10.4%), and poisoning with chemicals (8.6%). The least common method among women was hanging, reported in 5.8% of cases. For men, the most common method of suicide attempt was also poisoning via medication overdose (36%), followed by the use of sharp objects (21.6%), hanging (20%), and other methods (8.2%). The least common methods among men were drowning (3.2%) and poisoning via pesticides and other chemicals (5.5%).

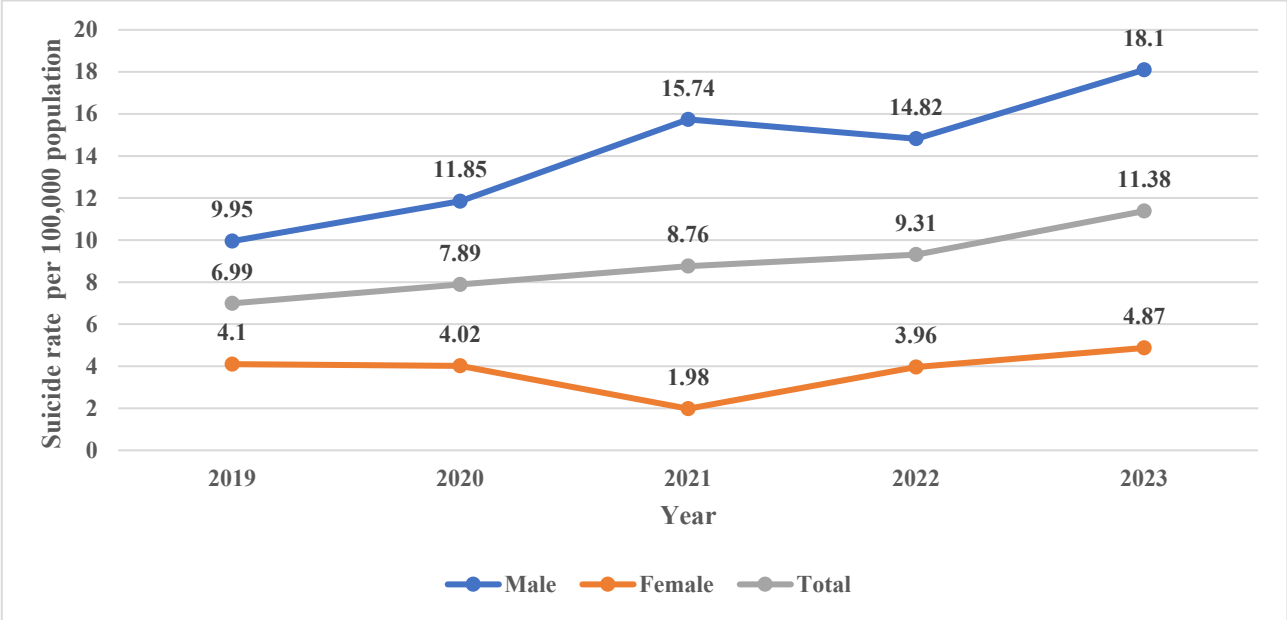

Figure 3: Trends in suicide rate 2019-2023.

Table 3: Suicide mortality rate per 100,000 population by age group (2019-2023).

Age group (in years)	2019	2020	2021	2022	2023	Average
10-14	0	0.23	0.46	0.24	0	0.19
15-19	1.95	1.68	1.18	0.5	1.99	1.46
20-24	0.53	1.04	0.76	3.29	2.16	1.56
25-29	0.61	2.11	2.36	1.54	1.51	1.63
30-34	1.07	1.05	2.06	1.66	3.89	1.95
35-39	0.39	1.14	1.12	0.72	0.71	0.86
40-44	1.80	0	0.43	2.1	0.82	1.03
45-49	0.99	1.44	1.41	1.46	0.48	1.16
50-54	0.61	0.6	0.58	0.54	1.55	0.78
55-59	2.5	0.81	1.57	0.66	1.28	1.36
60-64	2.49	0	0	0	1.56	0.81
65+	0.00	0.60	0.59	0	0.43	0.32

Trends in suicide mortality

Figure 3 illustrates the trend in suicide mortality rates from 2019 to 2023. The data indicates a steady increase in the overall suicide rate, which rose from 6.99 per 100,000 population in 2019 to 11.38 per 100,000 population in 2023. Similarly, the suicide rate among men consistently increased, going from 9.95 per 100,000 population in 2019 to 18.1 per 100,000 population in 2023. In contrast, the suicide rate among women initially decreased from 4.10 per 100,000 population in 2019 to 1.98 in 2021, but then increased to 4.87 in 2023. The male-to-female suicide ratio varied over the years, from 2.38 in 2019 to 7.75 in 2021, and then to 3.60 in 2023.

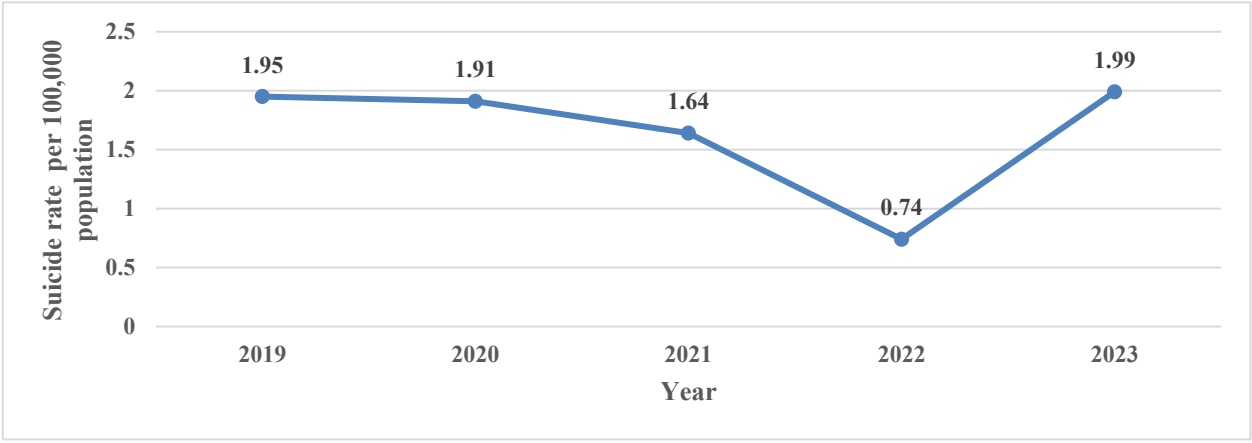

Figure 4: Trend in suicide rate among adolescents 2019-2023.

Table 4: Suicide mortality rate by district per 100,000 population.

District	2019	2020	2021	2022	2023
Corozal	0.42	0.21	0.62	0.22	0.66
Orange walk	1.38	0.97	0.19	0.92	2
Belize	0.43	0.5	1.07	0.88	0.52
Cayo	0.43	0.74	0.62	0.61	0.89
Stann creek	1.19	1.63	2.06	1.45	2.63
Toledo	1.09	1.35	0.8	1.89	0.8

Table 5: Methods used for suicide by sex (2019-2023).

	Male	Female
Methods	**Suicide (n=138)**	**Suicide (n=38)**
Hanging	111 (80.4)	30 (79)
Poisoning: pesticide	10 (7.2)	6 (15.8)
Firearms	10 (7.2)	0
Poisoning: chemical	4 (2.9	1 (2.6
Others [b]	3 (2.3)	1 (2.6)

[b]Drowning, jumping from a height, and explosive fire

Table 3 shows the suicide rates per 100,000 people, broken down by five-year age groups. Over the five-year study period, the highest average suicide rate was found in the 30-34 years age group, with a rate of 1.95 per 100,000 people. This was followed by the 25-29 years, 20-24 years, and 15-19 years age groups, with average rates of 1.63, 1.56, and 1.46 per 100,000 people, respectively. Conversely, the lowest suicide rates were observed in the 10-14 years age group, with an average rate of 0.19 per 100,000 people. The next lowest rates were in the age groups over 65 years, 50-54 years, 60-64 years, with average rates of 0.32, 0.78, and 0.81 per 100,000 people, respectively.

Figure 4 illustrates the trend in suicide rates among adolescents aged 10-19 years. The data shows a steady decline in the overall suicide rate, dropping from 1.95 per 100,000 population in 2019 to 1.64 in 2021, and further to 0.74 in 2022. However, there was a significant increase to 1.99 per 100,000 population in 2023.

Table 4 presents the suicide rates per 100,000 population across different districts in Belize. The data indicate that Stann Creek consistently had some of the highest rates, peaking at 2.63 per 100,000 in 2023. Similarly, Orange Walk showed fluctuations, but ended with a significant rise to 2.00 per 100,000 in 2023. In contrast, Corozal maintained relatively lower rates throughout the period, with a slight increase from 0.42 in 2019 to 0.66 in 2023. Belize District demonstrated variable rates, reaching its highest at 1.07 in 2021 before declining to 0.52 in 2023. Cayo experienced a steady increase from 0.43 in 2019 to 0.89 in 2023. Toledo showed fluctuations, with a peak of 1.89 in 2022 and the lowest rate of 0.80 in 2021 and 2023.

Table 5 shows the methods of suicide by gender. For women, the most common method was hanging (79%), followed by pesticide poisoning (15.8%), and chemical poisoning (2.6%). Similarly, for men, hanging was the most common method (80.4%), followed by pesticide

poisoning (7.2%), firearms use (7.2%), and chemical poisoning (2.9%).

Table 6: Risk factors among suicide cases (n=114)[c].

Risks factors	Men	Women	Total
Prior suicide attempt	19	8	27
Mental health disorder	66	21	87
Depressive disorder	27	10	37
Anxiety disorder	11	3	14
Schizophrenia	2	2	4
Substance induced disorder	19	3	22
Bipolar affective disorder	3	1	4
Childhood disorder	4	2	6

[c]Not all suicide cases had record of risk factors

Table 6 details the risk factors linked to 176 suicide cases, noting that not all cases had identifiable risk factors in the available data. The most common risk factor was a diagnosed mental health disorder, with depressive episodes (43%) and substance-induced disorders (27%) being the most prevalent. Men were disproportionately affected, with 74% of those diagnosed with Major Depressive Disorder and 90% of those with substance use disorder being male. Prior suicide attempts were noted in 27 cases, with 19 involving males and 8 involving females.

DISCUSSION

The study analyzed trends in suicide attempts and mortality, methods employed for both, and demographic differences in their occurrence in Belize between 2019 and 2023.

Suicide attempts

In the study, the rate of attempted suicide decreased from 2019 to 2022, but then increased in 2023. However, these findings contrast with other research in Latin America and Caribbean countries, where suicide attempts have consistently increased.[8] Additionally, the study indicated that women were more likely to attempt suicide than men, with female attempts consistently outnumbering male attempts each year. This trend is consistent with findings from other studies in Latin American and Caribbean countries, as well as globally, which consistently demonstrate higher rates of suicide attempts among women compared to men.[9-11] Research links higher rates of suicide attempts among women with a higher prevalence of depression, putting women at greater risk for suicidal behaviour.[10,11] This, however, was not assessed in our study. and future research would benefit from identifying if there is a correlation between rates of depression and suicide attempts within this population.

Analysis of age differences among individuals who attempted suicide revealed the highest rate among those aged 15-19 years. This finding aligns with global reports by the WHO and previous studies conducted in Latin America and Caribbean, Asia, and USA, which similarly report suicide attempts are more prevalent among adolescents and young adults.[12,13]

These findings highlight the urgent need for effective mental health support and intervention strategies for young people. Addressing these issues proactively can help reduce the risk of suicide attempts and improve overall well-being.

This study identified medication overdose as the most common method of suicide attempts, followed by the use of sharp objects, poisoning with insecticides, and hanging. This is consistent with research from other Latin America and Caribbean countries, where poisoning is consistently reported as the predominant method for suicide attempts, though the specific substances used vary and include agro-chemicals, analgesics, and benzodiazepines.[14,15] Similarly, global studies have reported deliberate self-poisoning as the most frequently used method for suicide attempts in countries such as the United States and China.[16,17] Furthermore, this study found limited differences in methods based by gender, with poisoning with pesticides and chemicals being the most common among both men and women. This observation is in line with previous research, which also identified similar methods across genders.[14,18,19]

Suicide mortality

The suicide mortality rate in Belize showed a progressive increase, rising from 6.99 per 100,000 population in 2019 to 9.31 in 2022, and further to 11.38 per 100,000 population in 2023. According to the most recent global data, the age-standardized suicides rate in 2019 was 9.0 per 100 000 population for 2019.[2] Globally, the suicide rate declined by 36% between 2000 and 2019, however, in Latin America and the Caribbean, the rate rose by 17% during the same period.[2,20,21] Within the Caribbean region, estimated rates vary widely, ranging from 2.4 per 100,000 population in Jamaica to 40.3 per 100,000 population in Guyana.[21] While Belize's suicide rate was below the global suicide rate in 2019, findings reveal a concerning upward trend. Similar to other Latin American and Caribbean countries, Belize's rates have risen at an alarming rate, surpassing the global rates by 2022, and continuing to increase further in 2023.

In this study, suicide mortality was found to be higher among men than men, consistent with global trends showing that men die by suicide at higher rates than women.[8,21,22] In Belize, male-to-female suicide mortality ratio peaked at 3.60:1 in 2023, indicating that men were almost four times more likely to die by suicide than women. As of 2019, the most recently available data, the global male-to-female suicide ratio was approximately

2.3:1,2 while in Latin America and the Caribbean, the ratio was similar to Belize's 2023 findings, at about 4:1.2 According to the WHO, these regional patterns differ from other LMICs, where the male-to-female ratio tends to be lower (1.8:1) compared to high-income countries, which typically have a ratio closer to 3:1.2

Study findings indicate that while women attempted suicide at higher rates than men, men died by suicide more frequently a pattern consistent with global suicide research.[9,23-25] This phenomenon, referred to as the "gender paradox in suicide," highlights the discrepancy between suicide attempts and mortality rates between genders.26 The higher suicide mortality rate among men is often attributed to their use of more violent and lethal methods, such as hanging and firearms, whereas women are more likely to use methods with lower fatality rates, such as medication overdose.[24,27,28] Study findings revealed similar patterns among Belizeans: hanging was the most common method used by both genders, but men were more likely to die by suicide due to the use of more lethal means. The methods of suicide mortality among Belizeans align with trends observed in other Latin American and Caribbean countries, where hanging is the most common means of suicide, followed by poisoning, medication overdose, and use of firearms.[29,30]

Additional factors contributing to higher suicide mortality rates among men include their decreased likelihood of disclosing suicidal thoughts to healthcare professionals and a more rapid progression from suicidal ideation to suicidal behavior.[31-33] Research finds that throughout Latin America and in the United States, traditional masculine norms discourage men from seeking help by promoting the suppression of emotions and the need to "be strong".[32,33] Specifically among young men, suicide is often perceived as a means to escape social challenges they feel unable to overcome.25 Another contributing factor to the gender disparity in suicide and suicide attempts relates to differences in how suicide occurs. A national survey in the United States on adolescent suicidal behavior found that girls are more likely to engage in a deliberate process involving ideation, planning, and attempts, whereas boys are more prone to act impulsively in times of crisis.34 This impulsivity, coupled with difficulties coping with acute stress, may lead to higher suicide mortality among men despite fewer suicide attempts.

Suicide mortality was highest among individuals aged 15-34years, followed by those aged 55-59years, 45-49 years, and 40-44 years. In contrast, the lowest suicide mortality rates were observed among those younger than 14years and older than 65years. These findings align with global research, which consistently identifies individuals aged 15-34 as the most affected demographic for suicide, which is often the leading cause of death in this age group.[2,24,35] Among Belizeans, the stability of suicide rates among adolescents aged 14-19 over the study period (1.95, 1.69, 1.18, .05, 1.99 per 100,000 population from 2019-2023), contrasts with the rising mortality rates observed in older youth and young adults. Specifically, individuals aged 20-24, 25-29, and 30-34 years experienced a steady increase in suicide mortality during the same timeframe. This trend may be due to the unique pressures faced by this cohort, who often serve as economic providers for their families.

Risk factors for suicide

While limited data were available to comprehensively assess risk factors associated with suicide attempts and suicide mortality, this study identified previous suicide attempts, mental health disorders, and alcohol and substance misuse as key risk factors among reported cases. These findings align with existing literature on suicide risk factors.[3,36] According to WHO self-reported survey data, approximately 20 individuals attempt suicide for every death by suicide.12 In Belize, previous research has highlighted additional risk factors tied to critical gaps in the country's psychiatric infrastructure. These include limited access to mental health treatment particularly for depression and alcohol or substance abuse and insufficient capacity of health workers in primary care facilities to effectively assess suicide risk. This is especially concerning given that a significant proportion of individuals who die by suicide visit a physician within weeks of their death.[37]

Additional systematic barriers in Belize include inadequate post-discharge care for those who have attempted suicide, a lack of follow-up, a shortage of human resources, and fragmented communication between general health services and mental health services.[37]

Similar challenges and barriers are observed across many Latin American and Caribbean countries. Stigma and cultural barriers are critical issues throughout the region, often leaving those with conditions like depression a major risk factor for suicide undiagnosed and untreated.[21,38] Research estimates that six out of every ten people with depression in Latin America and the Caribbean do not seek or receive the treatment they need.[21,38] Intimate partner violence (IPV), particularly violence against women, is another significant risk factor for suicide among women globally, with women in Belize specifically highlighting the profound impact of IPV on survivors' mental health.[39]

Prevention of suicide

A key strategy to achieve both the United Nations Sustainable Development Goals and the WHO Global Mental Health Action Plan target of reducing the global suicide mortality rate by one-third by 2030 is the decriminalization of suicide and suicide attempts.40 Belize is among the countries in the Latin America and Caribbean region that have decriminalized suicide and

suicide attempts, aligning with regional and global trends.[37,40]

In addition, Belize has developed its first National Suicide Prevention Plan, which is aligned with the core interventions and cross-cutting pillars outlined in the World Health Organization's LIVELIFE Implementation Guide for Suicide Prevention in Countries.[37] This plan focuses on a series of evidence-based interventions, including limiting access to the means of suicide, engaging with the media to promote responsible reporting of suicide, and fostering socio-emotional life skills in adolescents. The plan also emphasizes early identification, assessment, management, and follow-up for individuals affected by suicidal behavior, along with facilitating and increasing early access to treatment and referral pathways for those at risk. Furthermore, the plan includes implementing stigma reduction programs and strengthening suicide-related surveillance and alert systems. While these efforts mark important progress, Belize still faces numerous challenges that require ongoing commitment and innovation to fully address the complexities of suicide prevention and mental health care.

Strength and limitation of the study

The data presented in this study were extracted from the Belize Health Information System (BHIS) and do not include information from private hospitals who do not report using the BHIS or community sources, which may result in an underreporting of suicide attempts and mortality rates. Additionally, the high stigma associated with suicide, particularly in rural areas, may lead to underreporting of deaths as suicides, further limiting an accurate understanding of the true rates within the country. Despite these limitations, this study provides critical insights that can inform targeted program interventions and policy development.

CONCLUSION

This study provides a comprehensive analysis of the trends in suicide attempts and suicide mortality in Belize over a five-year period, highlighting the alarming increase in the burden of suicide as a serious public health concern. These findings underscore the urgent need for a multi-sectoral approach to suicide prevention, with a focus on strengthening the implementation of Belize's National Suicide Prevention Plan. Increased funding, coupled with efforts to expand mental health services, reduce stigma, and improve suicide-related surveillance systems, is critical to addressing this growing crisis. By building on these initiatives and fostering collaboration among stakeholders, Belize can take meaningful steps toward reducing suicide rates and supporting the mental health and well-being of its population. The insights from this study serve as a vital foundation for future research, policy formulation, and intervention strategies to combat suicide and its far-reaching impacts.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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