Journal of Adolescent Health 54 (2014) 262–268

ELSEVIER

JOURNAL OF ADOLESCENT HEALTH

www.jahonline.org

Original article

Suicide Among Young People in the Americas

Meaghen Quinlan-Davidson, M.P.H. [a], Antonio Sanhueza, Ph.D. [b], Isabel Espinosa, M.P.H. [a], José Antonio Escamilla-Cejudo, M.D., Ph.D. [b], and Matilde Maddaleno, M.D., M.P.H. [a,*]

[a] *Department of Adolescent Health Within the Area of Family and Community Health, Pan American Health Organization/Regional Office of the World Health Organization, Washington, DC*

[b] *Department of Health Information and Analysis Within the Area of Health Surveillance and Disease Prevention and Control, Pan American Health Organization/Regional Office of the World Health Organization, Washington, DC*

Article history: Received February 22, 2013; Accepted July 11, 2013

Keywords: Adolescent and youth suicide mortality rates; Relative risks; Average annual percent variation; Suicide in young people

See Related Editorial p. 245

A B S T R A C T

Purpose: To examine suicide mortality trends among young people (10–24 years of age[1]) in selected countries and territories of the Americas.

Methods: An ecological study was conducted using a time series of suicide mortality data from 19 countries and one territory in the Region of the Americas from 2001 to 2008, comprising 90.3% of the regional population. The analyses included age-adjusted suicide mortality rates, average annual variation in suicide mortality rates, and relative risks for suicide, by age and sex.

Results: The mean suicide rate for the selected study period and countries/territory was 5.7/100,000 young people (10–24 years), with suicide rates higher among males (7.7/100,000) than females (2.4/100,000). Countries with the highest total suicide mortality rates among young people (10–24 years) were Guyana, Suriname, Nicaragua, El Salvador, Chile, and Ecuador; countries with the lowest total suicide mortality rates included Mexico, Venezuela, Cuba, and Brazil, and the U.S. territory of Puerto Rico. During this period, there was a significant increase in suicide mortality rates among young people in the following countries: Argentina, Chile, Ecuador, Mexico, and Suriname; countries with significant decreases in suicide mortality rates included Canada, Colombia, Cuba, El Salvador, and Venezuela. The three leading suicide methods in the Americas were hanging, firearms, and poisoning.

Conclusions: Some countries of the Americas have experienced a rise in adolescent and youth suicide during the study period, with males at a higher risk of committing suicide than females. Adolescent and youth suicide policies and programs are recommended, to curb this problem. Methodological limitations are discussed.

IMPLICATIONS AND CONTRIBUTION

Suicide mortality among young people is a growing public health issue in the Americas. To develop effective suicide prevention programs and policies, public health policy and decision makers should consider the magnitude of the problem in different settings, groups most at risk, and the risk of suicide mortality over time.

A decade into the 21st century, the adolescent and youth population is the largest cohort in the history of the Americas, representing 26% of the total population [1]. These young people face a myriad of obstacles excluding them from health that are closely linked with poverty, marginalization, and discrimination. Whereas morbidity and mortality are relatively low during

[1] The World Health Organization defines young people as individuals between the ages of 10 and 24 years. Adolescents comprise the 10- to 19-year age group, and youth the 15- to 24-year age group.

* Address correspondence to: Matilde Maddaleno, M.D., M.P.H., Department of Adolescent Health, Pan American Health Organization, 525 23rd St, NW, Washington, DC 20037.

E-mail address: maddelem@paho.org (M. Maddaleno).

1054-139X/$ – see front matter
http://dx.doi.org/10.1016/j.jadohealth.2013.07.012

adolescence, the major causes of death for this age group are externally related, with suicide ranking among the top three causes of adolescent and youth mortality. Indeed, each year in the Americas, approximately 220,000 young people between the ages of 10 and 24 years commit suicide [2], which raises concern among policy and decision makers about the issue and its associated consequences in this region. This is not only because rates of suicide within this age group are increasing markedly in many countries, but also because it affects individuals, families, and communities.

Despite prevention efforts, suicide rates have increased globally over the past 45 years among young people (10–24 years). Suicide rates in young men have risen steadily between 1950 and 2000, whereas suicide rates in young women have declined at this time. Europe had the highest percentage of deaths from suicide, followed by the Western Pacific region, the Southeast Asian region, the region of the Americas, the Eastern Mediterranean region, and the African region [3,4]. In the United States, suicide ranked as the third leading cause of death among young people between 1999 and 2010, with rates almost 10 times higher among those aged 15–24 years [5]. Although it is difficult to explain variations between countries, research suggests that the differences in rates may result from socioeconomic, geographic, cultural, and social factors [6].

Suicide rates in the Americas vary by age. Among adolescents 10–14 years of age, suicide ranks as the 10th most common cause of death among boys, but not among girls. By 15–19 years of age, suicide was the third most common cause of death among males and the leading cause among females, whereas among those 20–24 years of age, it was the third most common cause of death among both [2].

Suicidal behavior varies by sex. Although adolescent girls are more likely to attempt suicide and experience suicidal ideation, adolescent boys are more likely to commit suicide [7] across all regions. It has been suggested that this may result from increased substance use, aggressive behaviors, and the ease with which males have access to more lethal means. In fact, young women are more likely to use less lethal means and less likely to die from suicide attempts [8]. Other factors that may be associated with male suicide are the shift in gender roles and socioeconomic inequalities [9].

Suicide methods vary by region. Hanging is the most common suicide method in Europe, Australia, and Japan, whereas poisoning is the most common method in China and India [10–12]. For attempted suicides, the methods generally used involve pharmaceutical or chemical products.

The purpose of this study was to estimate suicide rates, describe trends, identify suicide methods, estimate relative risk, and provide an overall picture of suicide among young people (10–24 years) in selected countries of the Americas, to bridge the data gap, further knowledge on suicide, and ultimately inform adolescent and youth suicide policy and programming.

Methods

To investigate adolescent and youth suicide mortality in selected countries of the Americas, an ecological study was performed using data collected between 2001 and 2008 by the Pan American Health Organization, the Regional Office of the World Health Organization in the Americas. Data are collected on an annual basis from Pan American Health Organization member states' national death registries. The countries use the International Classification of Diseases, 10th Revision to code deaths that occur annually (using codes X60–X84) consistently reporting on at least five variables (which was used in the final analyses): country name, year, age, sex, and basic cause of death. The variability across countries in the accuracy of these data is accounted for by measuring the percentages of deaths that have not been registered (under-registered) and the percentage of ill-defined causes of deaths (as outlined in Chapter XVIII of the International Classification of Diseases, 10th Revision). Although 48 countries were initially considered for analysis, 19 and one territory were selected based on the completeness and consistency of data. The 19 selected countries and territory, representing 90.3% of all young people in the region, include Argentina, Belize, Brazil, Canada, Chile, Colombia, Costa Rica, Cuba, Ecuador, El Salvador, Guyana, México, Nicaragua, Panama, Paraguay, Suriname, Trinidad and Tobago, the United States of America, Venezuela, and the U.S. territory of Puerto Rico.

A descriptive exploratory analysis was carried out by computing crude and age-adjusted suicide mortality rates for all countries. Crude suicide mortality rates were calculated using the number of suicide deaths as the numerator and the annual mid-period population by age and sex for the study period as the denominator [13]. Age-adjusted suicide mortality rates were computed using the standard population, as set by the World Health Organization's world population age-structure for the period 2000–2025 [14]. Descriptive statistical analyses were conducted computing trends and age-adjusted and crude suicide mortality rates by sex and age. A linear regression model was used to fit the logarithm of the age-standardized rates as the response and year as the covariate. This model estimated the average annual percentage rate variation, confidence intervals, and p values. In addition, negative binomial regression models were used to compute the estimated relative risk of dying, by country and sex. This model accounted for the inherent variability within a country. The data were analyzed using the statistical program SAS (SAS Institute Inc., Cary, NC).

Results

Suicide mortality among young people

Of the 1,233,251 deaths of young people (10–24 years) in the 19 countries and one territory between 2001 and 2008, suicide accounted for 92,530 (7.5%) of all deaths, with 35,064 suicides (37.8%) occurring in the United States.

The age-adjusted mortality rate among young people (10–24 years) was 5.7/100,000 young people. When disaggregated by age, rates were 3.8 and 8.0 among 10- to 19-year-olds and 15- to 24-year-olds, respectively (Table 1).

Suicide mortality rates varied across countries and were higher among men, with the exception of the adolescent group (10–19 years) in El Salvador, Ecuador, Paraguay, and Suriname, where women were more likely to commit suicide.

Countries with the highest total suicide mortality rates among young people (10–24 years), adolescents (10–19 years), and youth (15–24 years) include (per 100,000): Guyana (22.4, 15.6, and 31.4, respectively), Suriname (15.3, 10.7, and 19.8, respectively), Nicaragua (9.9, 7.1, and 14.0, respectively), El Salvador (9.9, 6.8, and 14.0, respectively), Chile (8.9 among young people and 12.6 among youth), and Ecuador (8.5, 6.8, and 8.5, respectively); the countries and territory with the lowest total suicide mortality rates include Mexico (4.5, 3.3, and 6.1, respectively), Venezuela (4.3, 3.0, and 5.8, respectively), Cuba (4.0, 2.5, and 5.8, respectively), Brazil (3.4, 2.1, and 4.8,

Table 1
Age-adjusted suicide mortality rates[a] among young people (10–24 years of age), adolescents (10–19 years of age), and youth (15–24 years of age) from 2001 to 2008, by sex, in selected subregions, territories, and countries of the Americas

Subregion	Country/Territory	Total	10–24 years		Total	10–19 years		Total	15–24 years	
			Male	Female		Male	Female		Male	Female
North America	Canada	7.8	11.6	3.9	5.4	7.3	3.3	11.1	16.8	5.2
	United States	6.9	11.2	2.3	4.3	6.7	1.7	9.9	16.1	3.2
	Puerto Rico	3.6	6.3	.9	1.8	3.0	.7	5.2	9.0	1.3
Mexico	Mexico	4.5	6.9	2.2	3.3	4.6	2.1	6.1	9.6	2.7
Central America	Costa Rica	5.4	7.9	2.7	3.5	4.4	2.5	7.7	11.5	3.6
	El Salvador	9.9	12.1	7.8	6.7	6.4	7.1	14.2	17.9	10.7
	Nicaragua	9.9	12.8	7.1	7.1	7.4	6.8	14.0	18.4	9.7
	Panama	5.6	8.7	2.4	3.7	5.1	2.2	7.8	12.2	3.3
Latin Caribbean	Cuba	4.0	5.3	2.6	2.5	3.1	1.9	5.7	7.6	3.7
Andean area	Colombia	7.0	9.3	4.8	5.4	6.0	4.7	9.6	13.1	6.2
	Ecuador	8.5	9.8	7.3	6.8	6.4	7.1	11.1	13.0	9.3
	Venezuela	4.3	6.3	2.2	3.0	3.7	2.2	5.8	8.8	2.7
Brazil	Brazil	3.4	5.0	1.7	2.1	2.8	1.5	4.8	7.2	2.3
Southern cone	Argentina	8.3	12.8	3.8	6.2	8.7	3.5	11.7	18.2	5.0
	Chile	8.9	13.9	3.8	5.7	8.0	3.2	12.6	19.9	5.1
	Paraguay	5.0	5.7	4.3	4.0	3.8	4.2	6.6	7.8	5.4
Non-Latin Caribbean	Belize	8.5	11.3	6.4	5.7	8.0	5.6	11.7	16.0	8.5
	Guyana	22.4	26.8	18.1	15.6	15.9	15.3	31.4	38.7	24.3
	Suriname	15.3	18.9	11.5	10.7	10.0	12.9	19.8	25.1	14.3
	Trinidad and Tobago	7.1	10.2	4.0	4.8	5.5	4.1	10.2	14.8	5.5

[a] Rate per 100,000 population. Source: Pan American Health Organization, Health Information and Analysis Project. Health situation in the Americas: mortality databases 2000–2008. Washington, DC; 2012.

respectively), and the U.S. territory of Puerto Rico (3.6, 1.8, and 5.2, respectively).

Methods of suicide among young people

Table 2 reflects the percentage and number of deaths between 2001 and 2008 owing to suicide methods in selected countries of the Americas among young people (10–24 years), disaggregated by age and sex. The three main methods used to commit suicide for all age groups were hanging, firearms, and poisoning. Among young people (10–24 years), the percentages of deaths due to hanging, firearms, and poisoning were 49.4%, 28.0%, and 15.9%, respectively. When disaggregated by sex, the order remained the same for males, but for females poisoning became the secondary method and firearms the tertiary.

Countries in which poisoning was the primary method of committing suicide among the study group include Colombia, El Salvador, Ecuador, Guyana, Nicaragua, Suriname, and Trinidad and Tobago. Interestingly, the United States was the only country that listed firearms as the primary method of committing suicide, and Cuba was the only country that listed smoke/fire/flame as a secondary method of committing suicide.

Suicide mortality trends

Although age-adjusted suicide rates remained relatively stable among all age groups during this period, some differential country patterns emerged (Figure 1). For example, Argentina, Chile, Ecuador, Mexico, and Suriname had increased suicide rates, whereas Canada, Cuba, Colombia, El Salvador, and Venezuela decreased rates. For most of the countries, the changes in rates were in the same direction for both genders.

The average annual percent variation (AAPV) is the percent growth rate mean of a series of consecutives years and a useful indicator to look at how much an event is growing or declining within a period of time. Table 3 shows the AAPV in total suicide mortality rates by country between 2001 and 2008 among young people (10–24 years). This table also presents the AAPV for the region (approximately .04%) showing that total suicide mortality rates remained stable at this time. Statistically significant decreases in suicide mortality rates in all age groups were found in Canada, Colombia, Cuba, El Salvador, and Venezuela, whereas statistically significant increases in suicide were found in Chile, Ecuador, and Suriname.

Relative risk of suicide

Table 4 shows the estimated relative risks, confidence intervals, and p values by country and sex (with Brazil and women serving as the reference points because they had the lowest rates) by fitting a negative binomial regression model to the suicide mortality data. Results indicate that men had a higher risk of dying from suicide than did women (men were 3.2 times more likely to commit suicide than were women).

When analyzing country differences, the risk of dying from suicide in Guyana was 6.1 times higher than in Brazil. Similar patterns were observed in Suriname, Nicaragua, El Salvador, Chile, Ecuador, Belize, Argentina, Canada, Trinidad and Tobago, the United States, and Colombia, because all of these countries had a relative risk $\geq$2.0.

Discussion

The present study contributes to the limited body of information on suicide among young people (10–24 years) in the Americas by presenting the trends and magnitude of suicide in 19 selected countries and one territory, identifying the most common methods of suicide, and contributing to the knowledge on suicide in this age group. Given the paucity of data on the subject, this study provides an important starting point from which further studies can be based.

The study found that suicide mortality was higher among youth. In accordance with previous literature, suicide completion increases with age from adolescence to youth. This may be

Table 2
Percentage and number of deaths owing to methods of suicide among young people (10–24 years of age), adolescents (10–19 years of age), and youth (15–24 years of age) in selected countries and territories of the Americas (2001–2008), by sex

Method	10–24 years		Method	10–19 years		Method	15–24 years	
	Deaths	%		Deaths	%		Deaths	%
Hanging	45,671	49.4	Hanging	22,013	52.4	Hanging	41,058	47.9
Firearms	25,946	28.0	Firearms	10,533	25.1	Firearms	24,946	29.1
Poisoning	14,679	15.9	Poisoning	7,155	17.0	Poisoning	13,658	15.9
Jumping	2,008	2.2	Jumping	716	1.7	Jumping	1,963	2.3
Others	993	1.1	Not specified	420	1.0	Others	964	1.1
Not specified	952	1.0	Others	396	.9	Not specified	893	1.0
Blunt/sharp object	762	.8	Drowning	232	.6	Blunt/sharp object	736	.9
Drowning	682	.7	Blunt/sharp object	228	.5	Drowning	648	.8
Smoke/fire/flame	510	.6	Smoke/fire/flame	175	.4	Smoke/fire/flame	500	.6
Vehicle collision	327	.4	Vehicle collision	143	.3	Vehicle collision	322	.4
Total	92,530			42,011			85,688	
Males								
Hanging	36,443	51.32	Hanging	16,236	55.37	Hanging	33,342	49.8
Firearms	22,826	32.14	Firearms	8,918	30.41	Firearms	22,099	33.0
Poisoning	7,225	10.17	Poisoning	2,654	9.05	Poisoning	7,022	10.5
Jumping	1,472	2.07	Jumping	476	1.62	Jumping	1,454	2.2
Others	778	1.10	Others	296	1.01	Others	764	1.1
Blunt/sharp object	643	.91	Not specified	231	.79	Blunt/sharp object	629	.9
Not specified	628	.88	Blunt/sharp object	177	.60	Not specified	603	.9
Drowning	528	.74	Drowning	168	.57	Drowning	505	.8
Smoke/fire/flame	240	.34	Vehicle collision	95	.32	Smoke/fire/flame	237	.4
Vehicle collision	235	.33	Smoke/fire/flame	72	.25	Vehicle collision	234	.3
Total	71,018			29,323			66,889	
Females								
Hanging	9,228	42.90	Hanging	5,777	45.53	Hanging	7,716	41.0
Poisoning	7,454	34.65	Poisoning	4,501	35.47	Poisoning	6,636	35.3
Firearms	3,120	14.50	Firearms	1,615	12.73	Firearms	2,847	15.1
Jumping	536	2.49	Jumping	240	1.89	Jumping	509	2.7
Not specified	324	1.51	Not specified	189	1.49	Not specified	290	1.5
Smoke/fire/flame	270	1.26	Smoke/fire/flame	103	.81	Smoke/fire/flame	263	1.4
Others	215	1.00	Others	100	.79	Others	200	1.1
Drowning	154	.72	Drowning	64	.50	Drowning	143	.8
Blunt/sharp object	119	.55	Blunt/sharp object	51	.40	Blunt/sharp object	107	.6
Vehicle collision	92	.43	Vehicle collision	48	.38	Vehicle collision	88	.5
Total	21,512			12,688			18,799	

Source: Pan American Health Organization, Health Information and Analysis Project. Health situation in the Americas: mortality databases 2000–2008. Washington, DC; 2012.

attributed to cognitive development, developmental changes, the individual's ability to take action against himself, the impact that critical and sensitive periods have across the life course, and their conceptualization of death. Therefore, suicide prevention efforts should begin early in life to reduce youth suicide rates [15].

The study found that suicide rates varied across countries. Countries with the highest total suicide mortality rates among young people (10–24 years) were at least twice as high as countries with the lowest total suicide mortality rates, and included Guyana, Suriname, Nicaragua, El Salvador, Chile, and Ecuador. The data are in line with the Global School-Based Student Health Survey in that Guyana, Chile, and Ecuador had higher percentages of students (23.2%, 20.3%, 18%, respectively) (13–15 years) who had seriously considered attempting suicide in the 12 months before data collection than did other countries. Indeed, suicide attempt is an important risk factor for completion.

In addition, it has been suggested that low income level and slow economic growth are associated with increased suicide rates [16], which may explain the high rates in Guyana, Suriname, Nicaragua, El Salvador, and Ecuador, as they have low gross domestic product per capita. Other considerations for higher suicide rates may result from governmental regulation of prescribed medication as studies have found that non-medical use of prescribed medication is associated with an increased risk of suicide [17], a lack of policies and programs targeting the prevention of substance use [18], and a lack of mental health policies and programs [19]. Furthermore, suicide and cultural variables such as tolerance of suicide, belief in God, and national pride were not associated with suicide in young people (10–24 years) [20]. Nevertheless, research in these countries is needed to determine why suicide mortality among young people is high and what is being done in countries with lower suicide mortality rates.

In line with previous research, men were more likely to commit suicide than were women (except in El Salvador, Ecuador, Paraguay, and Suriname, where adolescent females were more likely to commit suicide), which indicates that gender differences exist in suicidal behavior across cultures [7]. Risk factors associated with female suicide are less well known because they do not fall into preconceived high-risk suicide categories. Prior research on female suicide has suggested that intimate partner violence and adolescent pregnancy are risk factors [21,22]. Furthermore, females who commit suicide are more likely to have experienced sexual abuse [23]. In a study conducted in China where there is a higher incidence of female suicide, researchers suggested that higher female suicide rates may result from gender inequality and lower socioeconomic status [24].

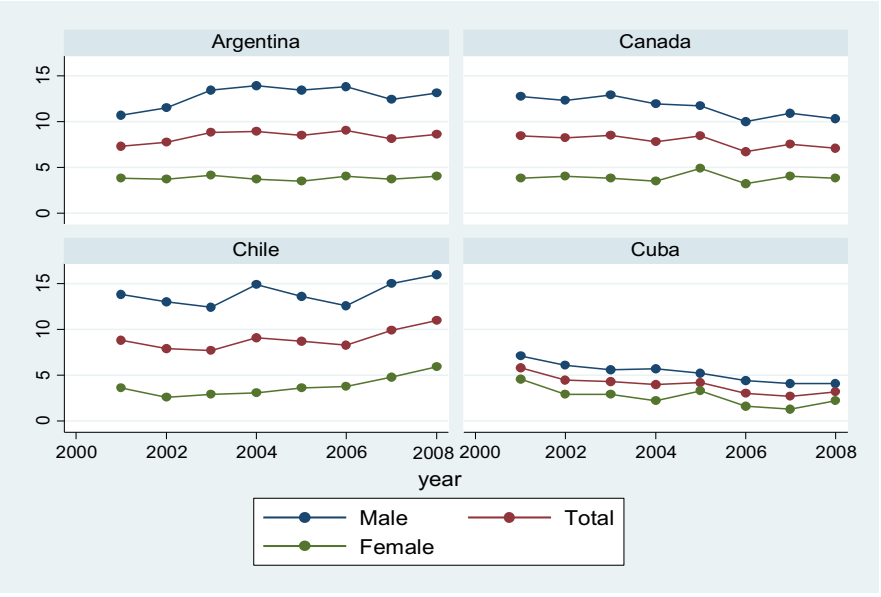

Figure 1. Age-adjusted suicide mortality rates (per 100,000 population), by selected country and sex, among young people (10–24 years of age), 2001–2008. Source: Pan American Health Organization, Health Information and Analysis Project. Health situation in the Americas: mortality databases 2000–2008. Washington, DC; 2012.

The three preferred methods of committing suicide in the Americas include hanging, firearms, and poisoning among male youth. In countries of the region where poisoning was the method of choice, research found that this may be the result of a lack of governmental regulation of prescription medication and pesticides and ease of accessibility [17]. Furthermore, Cuba was the only country in which fire was a secondary method of choice. Further research needs to be conducted on this, because there is no current literature on the topic.

Table 3
Average annual percent variation (AAPV) in total suicide mortality rates among young people (10–24 years of age) in selected countries and territories of the Americas (2001–2008)

Country/Territory	Average annual % variation	95% confidence interval		
		Lower limit	Upper limit	*p*
Argentina	1.7	−.3	3.8	.1510
Belize	−18.9	−32.9	−2.0	.0728
Brazil	.7	.0	1.4	.0974
Canada	−2.6	−4.4	−.7	.0352
Chile	3.5	.7	6.4	.0468
Colombia	−4.7	−5.7	−3.8	<.0001
Costa Rica	1.5	−4.9	8.3	.6661
Cuba	−8.8	−12.0	−5.6	.0021
Ecuador	6.5	3.0	10.1	.0104
El Salvador	−5.1	−6.9	−3.3	.0015
Guyana	−.5	−5.3	4.5	.8362
Mexico	1.1	.1	2.0	.0627
Nicaragua	−1.6	−3.8	.6	.2072
Panama	.9	−5.1	7.2	.7920
Paraguay	1.0	−3.5	5.8	.6838
Puerto Rico	−1.4	−10.5	8.6	.7821
Suriname	18.1	10.0	26.9	.0038
Trinidad and Tobago	8.1	−4.8	22.7	.2743
United States of America	−.4	−1.2	.4	.3950
Venezuela	−8.5	−9.7	−7.2	<.0001
Americas	.04	−.4	.4	.8537

Source: Pan American Health Organization, Health Information and Analysis Project. Health situation in the Americas: mortality databases 2000–2008. Washington, DC; 2012.

This study had limitations. The reliability of suicide statistics is often questioned. For cultural and religious reasons, as well as different classification procedures, suicides are often under-reported by approximately 30% [25]. Unfortunately in the case of young people (10–24 years), death owing to suicide is often misclassified or masked by other mortality diagnoses (classified as death by unknown intention). To examine potential misclassification of suicide across countries, some studies have analyzed the association among suicide rates, autopsy rates, and death rates of undetermined and ill-defined causes, respectively [26]. To address this limitation, the quality of the data in this study was assessed by checking the completeness and consistency of the information. An additional validation process was performed considering the following selected variables: sex, age, and underlying cause of death [27].

It is acknowledged that indigenous persons are more likely to experience multiple disadvantages and suicide risk factors such as unemployment, substance dependence, and geographic remoteness from support services. The nature of data used in this study precluded the possibility of examining suicide rates by ethnic diversity, and highlights the need to disaggregate mortality data by ethnicity. Further research on the social and cultural factors affecting indigenous youth and the relation to suicide should also be conducted, allowing for the development of culturally appropriate suicide prevention policies [28].

Findings from this study highlight the need for mental health research. For example, most young people (10–24 years) who commit suicide experience mental disorders such as depression or substance abuse [29]. Suicidal young people are more likely to have impulse control problems, a recent exposure to a stressor,

Table 4
Relative risk of suicide mortality based on negative binomial regression model among young people (10–24 years of age) in selected countries and territories of the Americas (2001–2008)

	Relative risk	Lower limit	Upper limit	*p*
Guyana	6.1	5.3	7.1	<.0001
Suriname	4.5	3.7	5.4	<.0001
Nicaragua	2.8	2.5	3.1	<.0001
El Salvador	2.7	2.4	3.0	<.0001
Chile	2.5	2.3	2.8	<.0001
Ecuador	2.5	2.2	2.7	<.0001
Belize	2.4	1.9	3.2	<.0001
Argentina	2.4	2.2	2.7	<.0001
Canada	2.3	2.1	2.6	<.0001
Trinidad and Tobago	2.2	1.9	2.6	<.0001
United States of America	2.0	1.8	2.2	<.0001
Colombia	2.0	1.8	2.2	<.0001
Panama	1.6	1.4	1.8	<.0001
Costa Rica	1.6	1.4	1.8	<.0001
Paraguay	1.4	1.3	1.6	<.0001
Mexico	1.3	1.2	1.4	<.0001
Venezuela	1.2	1.1	1.4	.0003
Cuba	1.1	1.0	1.3	.0554
Puerto Rico	1.1	.9	1.2	.5426
Brazil	Reference	–	–	–
Male	3.2	3.0	3.4	<.0001
Female	Reference	–	–	–

Source: Pan American Health Organization, Health Information and Analysis Project. Health situation in the Americas: mortality databases 2000–2008. Washington, DC; 2012.

and maladaptive coping strategies, seeking refuge in drugs and alcohol and less likely to accept help [30]. Research should also consider gender diversity and data disaggregated by sexual orientation, because homosexuals and bisexuals are more likely to attempt suicide [31].

Recommendations

Despite these challenges, a number of important factors should be addressed through suicide prevention programs and policies.

To effectively reach young people (10–24 years) and lower current suicide rates, it is essential that decision makers have a clear idea of the group they are attempting to reach. This can be achieved by building or using already existing national strategic information systems that collect and analyze suicide data and their associated risk factors (disaggregated by age, sex, ethnicity, sexual orientation, and socioeconomic level). For example, data on youth suicide attempts are currently being collected by the Youth Risk Behavior Surveillance System at the Centers for Disease Control and Prevention in the United States [32] and the Global School-Based Student Health Survey [33]. This information can then be disseminated to key stakeholders, to establish priorities and guide each country's national adolescent and youth suicide prevention programs, including the development of policies, planning, and evaluation of those programs.

Evidence suggests that countries should develop and enforce legal and political protection as a method to reduce suicide risk factors and rates among young people (10–24 years). Studies have found a slight reduction in suicide by firearms when policy is implemented limiting firearm control [34,35]. For instance, an Australian study found that the adoption and implementation of a national suicide prevention strategy was instrumental in lowering adolescent suicide rates by raising awareness, implementing early detection strategies, and providing support services [10]. Based on the literature and the current study's findings, suicide prevention may be achieved through developing and implementing strategies that limit the access and use of these materials.

Health systems and services should target suicide prevention and be accessible, appropriate, affordable, flexible, and based on evidence. This can be achieved by taking advantage of existing programs that address suicide risk and protective factors, including those that may not yet include suicide prevention as an area of focus, such as mental health services or family strengthening programs. For example, many school-based programs seek to prevent drug use and violence among youth by building problem-solving skills and increasing connectedness with teachers and other caring adults in the community. These strategies can also be useful for suicide prevention [36] and should be tailored to men and women separately. Importantly, suicide prevention components should be included in the design and evaluation of programs.

In addition, multidisciplinary teams should be created to ensure the most effective response to the health and development of young people (10–24 years). Health service providers and groups, such as schoolteachers, university professors, and community health promoters, have proven instrumental to improving the health of young people. Further educational information on youth suicide prevention is offered at the Centre for Suicide Prevention in Calgary, Alberta, Canada. The Centre offers several comprehensive workshops, online courses, toolkits, and brochures that educate people on this topic [37].

Furthermore, a favorable youth-friendly environment is essential to prevent suicide as well as to achieve positive health and educational results. This can be accomplished by fully involving young people (10–24 years) in youth development and suicide prevention programs and policies so they can articulate their needs. The Canadian Association for Suicide Prevention outlines how communities can build "suicide safer communities" so that individuals, families, and organizations can prevent adolescent and youth suicide, promote public health education and awareness, provide support to people who have been affected by suicide, and promote the mental health and wellbeing of its citizens. A combination of youth and parent interventions addressing multiple, co-occurring youth suicide risk factors and behaviors have produced significantly greater reductions in these risk factors while increasing protective factors [38].

Moreover, the implementation of adolescent and youth suicide programs requires concerted multi-sectorial collaboration and action by strategic actors, partners, and alliances. This includes all government sectors, the private sector, and nongovernmental, civil society, and international organizations that participate in the development of suicide policies and programs for this age group. The presence of gay–straight alliances and positive environments in high schools have been associated with a reduction in suicide attempts among lesbian, gay, and bisexual young people (10–24 years) [39].

Finally, it is essential to work with mass media networks to promote positive adolescent and youth images while incorporating technologies that target health promotion and suicide prevention interventions. Technology allows users confidential access to information and helps them make informed decisions about their lives. It also provides a powerful voice for young

people (10–24 years) to actively engage with each other in anonymous ways. For example, Canada has struggled with high adolescent and youth suicide rates, and provides a Kids Help Phone [40] staffed with professionals available to assist young people who are experiencing suicidal ideation.

Suicide among young people (10–24 years) has risen in some countries of the Americas; however, further data and research are needed to determine the characteristics related to adolescent and youth suicide. For example, research is needed regarding the roles that mental health and gender diversity have; and longitudinal studies need to be conducted to determine causality and the contextual factors that influence suicidal behaviors. Furthermore, countries need to check and improve suicide mortality data quality to provide meaningful data for surveillance and prevention. The results of this study add to the understanding of suicide among young people in the Americas and can be used to inform suicide policy and programming.

References

[1] World Population Prospects: The 2010 Revision. Population database. New York: United Nations, Department of Economic and Social Affairs, http://esa.un.org/wpp/Excel-Data/population.htm; 2012 [accessed 10.03.12].

[2] Mortalidad y causas de defunción en adolescentes y jóvenes. Regional Health Observatory. Washington, DC: Pan American Health Organization, http://new.paho.org/hq/index.php?option=com_content&view=article&id=5178&Itemid=2391; 2012 [accessed 04.10.12].

[3] Viner RM, Coffey C, Mathers C, et al. 50-year mortality trends in children and young people: A study of 50 low-income, middle-income, and high-income countries. Lancet 2011;377:1162–74.

[4] Patton GC, Coffey C, Sawyer S, et al. Global patterns of mortality in young people: A systematic analysis of population health data. Lancet 2009;374:881–92.

[5] Web-based Injury Statistics Query and Reporting System: Leading causes of death reports, national and regional, 1999-2010. Centers for Disease Control and Prevention. http://webappa.cdc.gov/sasweb/ncipc/leadcaus10_us.html [accessed 15.06.13].

[6] Goldsmith SK, Pellmar TC, Kleinman AM, et al., eds. Reducing Suicide: A National Imperative. Washington, DC: National Academies Press; 2002.

[7] Pitman A, Krysinska K, Osborn D, et al. Suicide in young men. Lancet 2012;379:2383–92.

[8] Cantor C. Suicide in the Western world. In: Hawton K, van Heeringen K, eds. International Handbook of Suicide and Attempted Suicide. Chichester (UK): Wiley; 2000.

[9] Mittendorfer-Rutz E. Trends of youth suicide in Europe during the 1980s and 1990s—gender differences and implications for prevention. J Men's Health Gender 2006;3:250–7.

[10] Morrell S, Page AN, Taylor RJ. The decline in Australian young male suicide. Soc Sci Med 2007;64:747–54.

[11] Varnik A, Kolves K, Alllik J, et al. Gender issues in suicide rates, trends and methods among youths aged 15-24 in 15 European countries. J Affect Disord 2009;113:216–26.

[12] Ojima T, Nakamura Y, Detels R. Comparative study about methods of suicide between Japan and the United States. J Epidemiol 2004;14:187–92.

[13] United Nations, Department of Economic and Social Affairs Report of United Nations Expert Group Meeting on Mortality Crises: Conflicts, violence, famine, natural disasters and the growing burden of non-communicable diseases. New York: UN DESA; 2011.

[14] Ahmad OB, Boschi-Pinto C, Lopez AD, et al. Age standardization of rates: A new WHO standard. Geneva (Switzerland): World Health Organization; 2001.

[15] Bingham CR, Bennion LD, Openshaw DK, et al. An analysis of age, gender and racial differences in recent national trends of youth suicide. J Adolesc 1994;17:53–71.

[16] Lester D, Yang BJ. Microsocioeconomics versus macrosocioeconomics as a model for examining suicide. Psychol Rep 1991;69:735–8.

[17] Buckley NA, Whyte IM, Dawson AH, et al. Correlations between prescriptions and drugs taken in self-poisoning: Implications for prescribers and drug regulation. Med J Australia 1995;162:194–7.

[18] Colucci E, Martin G. Ethnocultural aspects of suicide in young people: A systematic literature review part 2: Risk factors, precipitating agents, and attitudes toward suicide. Suicide Life-Threatening Behav 2007;37:222–37.

[19] Evans E, Hawton K, Rodham K. Factors associated with suicidal phenomena in adolescents: A systematic review of population-based studies. Clin Psychol Rev 2004;24:957–79.

[20] Eckersley R, Dear K. Cultural correlates of youth suicide. Soc Sci Med 2002;55:1891–904.

[21] Stephens B. Suicidal women and their relationships with husbands, boyfriends, and lovers. Suicide Life-Threatening Behav 1985;15:77–89.

[22] Bayatpour M, Wells RD, Holford S. Physical and sexual abuse as predictors of substance use and suicide among pregnant teenagers. J Adolesc Health 1992;13:128–32.

[23] Wunderlich U, Bronisch T, Wittchen HU, et al. Gender differences in adolescents and young adults with suicidal behaviour. Acta Psychiatr Scand 2001;104:332–9.

[24] Ji J, Kleinman A, Becker AE. Suicide in contemporary China: A review of China's distinctive suicide demographics in their sociocultural context. Harvard Rev Psychiatry 2001;9:1–12.

[25] Madge N, Harvey J. Suicide among the young—the size of the problem. J Adolesc 1999;22:145–55.

[26] Kapusta ND, Tran US, Rockett IR, et al. Declining autopsy rates and suicide misclassification: A cross-national analysis of 35 countries. Arch Gen Psychiatry 2011;68:1050–7.

[27] Health Statistics from the Americas, 2006 edition. Special topic: The ten leading causes of death in countries of the Americas, Registered Mortality. Technical notes. Washington, DC: Pan American Health Organization, www.paho.org/HSA2006; 2006 [accessed 28.08.12].

[28] McPhedran S, Baker J. Suicide prevention and method restriction: Evaluating the impact of limiting access to lethal means among young Australians. Arch Suicide Res 2012;16:135–46.

[29] Bridge JA, Goldstein TR, Brent DA. Adolescent suicide and suicidal behavior. J Child Psychol Psychiatry 2006;47:372–94.

[30] Gould MS, Velting D, Kleinman M, et al. Teenagers' attitudes about coping strategies and help-seeking behavior for suicidality. J Am Acad Child Adolesc Psychiatry 2004;43:1124–33.

[31] Silenzio VM, Pena JB, Duberstein PR, et al. Sexual orientation and risk factors for suicidal ideation and suicide attempts among adolescents and young adults. Am J Public Health 2007;97:2017–9.

[32] Healthy People 2020. Mental health status improvement. Washington, DC: United States Department of Health and Human Services, http://healthypeople.gov/2020/topicsobjectives2020/objectiveslist.aspx?topicId=28; 2012 [accessed 10.10.12].

[33] The Global School-Based Student Health Survey. Atlanta: Centers for Disease Control and Prevention, http://www.cdc.gov/gshs/; 2012 [accessed 28.08.12].

[34] Cantor CH, Slater PJ. The impact of firearm control legislation on suicide in Queensland, preliminary findings. Med J Australia 1995;162:583–5.

[35] Niederkrotenthaler T, Till B, Herberth A, et al. Can media effects counteract legislation reforms? The case of adolescent firearm suicides in the wake of the Austrian firearm legislation. J Adolesc Health 2009;44:90–3.

[36] 2012 National Strategy for Suicide Prevention: Goals and objectives for action. Washington, DC: United States Department of Health and Human Services Office of the Surgeon General and National Action Alliance for Suicide Prevention; 2012.

[37] Straight talk: Youth suicide prevention workshop. Calgargy, Canada: Centre for Suicide Prevention, http://suicideinfo.ca/Training/WorkshopDescriptions.aspx; 2012 [accessed 03.09.12].

[38] Building suicide safer communities. Winnipeg, Canada: Canadian Association for Suicide Prevention, http://www.suicideprevention.ca/building-suicide-safer-communities/; 2012 [accessed 04.09.12].

[39] Goodenow C, Szalacha L, Westheimer K. School support groups, other school factors, and the safety of sexual minority adolescents. Psychol Schools 2006;43:573–89.

[40] Suicide. Toronto, Canada: Kids Help Phone; 2012.