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Adolescent Suicide Rates Between 1990 and 2009: Analysis of Age Group 15–19 Years Worldwide

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A B S T R A C T

Purpose: The aim of the current analysis is to analyze suicide rates in adolescents aged 15–19 years in decades between 1990 and 2009 worldwide.
Methods: Suicide data were obtained from the World Health Organization Mortality Database and population data from the World Bank Data set. In total, 81 countries or territories, having data at least for 5 years in 1990–1999 and in 2000–2009, were included in the analysis. Additional analysis for regional trends with 57 countries was performed.
Results: Over the decades considered, analysis showed a declining trend in the overall suicide rate for males from 10.30 to 9.51 per 100,000 ($p = .076$), and for females from 4.39 to 4.18 ($p = .472$). The average suicide rate showed a significant decline for both genders in Europe, dropping from 13.13 to 10.93 ($p = .001$) in males and from 3.88 to 3.34 in females ($p = .038$). There was a significant increase in South American countries for males, from 7.36 to 11.47 ($p = .016$), and a close to significant rise for females, from 5.59 to 7.98 ($p = .053$). Although other world regions did not show significant trends, there were several significant changes at country level.
Conclusions: Reasons behind the decrease in Western countries could potentially be related to the overall improvements in global health; the possible contribution of suicide prevention activities remains unclear. Increases in several South American countries might be related to economic recession and its impact on adolescents from diverse cultural backgrounds, and partly also to improvements in mortality registration.

IMPLICATIONS AND CONTRIBUTION

Analysis of the WHO Mortality Database showed that there has been a significant increase in adolescent, aged 15-19 years, suicide rates in South America, however, suicide rates have dropped significantly in Europe.

Suicide is a rare event in children aged 10–14 years, whereas its frequency increases remarkably through teenage years. Suicide is a leading cause of death in teenagers and therefore an important public health issue [1]. In 2004, suicide was the leading cause of death in young females aged 15–19 years and third most common cause of death for males in the same age group [1]. Monitoring of suicide mortality in young people over time helps to inform health policy and planning. In addition, it is crucial for evaluating suicide prevention activities, mental health interventions, and more generally changes in the health care system.

Previous analysis of suicide rates in age group 15–19 year olds in the mid 1960s showed an increase for young males from 10.3 per 100,000 in 1965–1979 to 13.8 in 1990–1999 in non-European countries and from 5.5 to 7.1 in European countries [2]. Young girls showed a minor decline from 4.1 to 3.6 in non-European countries and from 3.7 to 3.3 in European countries [2]. However, time trends were presented only for limited number of non-European countries (n = 8). In addition, the analysis included 18 European countries but did not include those of eastern Europe, which instead showed the highest rates in the available data from World Health Organization (WHO) Mortality database in 2004.

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Recent analysis of age group 10–14 year olds showed the highest rates for boys in the former Soviet Union republics (with the highest rates in Kazakhstan and Russia), while rates for both genders showed increases in several South American countries, especially in Guyana and Suriname [3]. These two countries also presented the highest rates in the Americas for the age groups 15–24 years and 10–19 years [4]. Although the WHO world suicide report did include a wide number of countries, it did not analyze separately the age group 15–19 years [5].

Considering rapid social and economic changes worldwide, combined with efforts of countries that have developed suicide prevention activities targeting teenagers, it is crucial to observe recent trends in that age group. Therefore, the aim of the present study was to analyze suicide rates in adolescents aged 15–19 years worldwide in last two decades 1990–1999 and 2000–2009.

Methods

Suicide numbers for youth aged 15–19 years by gender were obtained from the WHO Mortality Database (last updated November 2014). International Classification of Diseases (ICD) codes were used to extract suicide data (ICD-8 and ICD-9 codes E950-E959, ICD-10 codes X60-X84). Most countries changed from ICD-9 to ICD-10 between mid 1990s and early 2000s. Singapore and Greece are still using ICD-9. Switzerland and Denmark changed from ICD-8 to ICD-10 in 1990s.

Considering that population data were available only for a limited number of countries from the WHO Mortality Database, the population numbers for the same age group by gender were obtained from the World Bank data set.

Countries with suicide data for at least 5 years per decade (1990–1999 and 2000–2009) were included and average rates for last two decades 1990–1999 and 2000–2009 were calculated. In total, 81 countries or territories had satisfactory data for the analysis (Table 1 includes the list of countries). In total, 48 countries had data for all years, seven had 1 year missing, 10 had 2 years missing, four had 3 years missing, eight had 4 years missing, and four had between 5 and 10 years missing.

Additional trend analysis for different regions was conducted including countries where all years were available, in addition, countries where one random year was missing it was substituted with the average. Countries where >1 year in a row was missing were excluded. Suicide rates for the trend analysis by regions were calculated for total region (therefore more populated countries have stronger power rather than average rates where size of the country is weighted).

In total, 57 countries were included to the regional trend analysis as follows:

- South America (n = 9): Argentina, Brazil, Chile, Colombia, Ecuador, Guyana, Peru, and Venezuela.
- Central America and Caribbean (n = 9): Belize, Costa Rica, Dominican Republic, El Salvador, Guatemala, Mexico, Nicaragua, Puerto Rico, Trinidad, and Tobago.
- Northern America (n = 2): Canada and USA.
- Western Europe including British Isles: Austria, France, Germany, Ireland, Luxembourg, the Netherlands, Switzerland, and United Kingdom.
- Northern Europe (n = 5): Denmark, Finland, Iceland, Norway, and Sweden.
- Eastern Europe (n = 7): Czech Republic, Estonia, Hungary, Latvia, Lithuania, Russian Federation, and Ukraine.
- Southern and southeastern Europe (n = 9): Bulgaria, Croatia, Greece, The Former Yugoslavian republic of Macedonia, Malta, Republic of Moldova, Romania, Slovenia, and Spain.
- East Asia (n = 4): Hong Kong Special Administrative Region of the People's Republic of China (SAR), Japan, Republic of Korea, and Singapore.
- Central Asia (n = 3): Armenia, Kazakhstan, and Kyrgyzstan.
- Australasia (n = 2): Australia and New Zealand.

Poisson regression was applied when comparing the two decades; risk ratios with 95% confidence interval were calculated. Average suicide rates for the world and for specific regions are presented and compared using paired sample *t* test. The analysis was performed with IBM SPSS version 22.0 (IBM, Chicago, IL). For additional analysis of suicide trends joinpoint regression was chosen. The joinpoint regression enables to identify the best-fitting points where a statistically significant change in trend occurred and to calculate annual percentage change(s). Annual percentage change with 95% confidence interval are presented. The analysis was performed with the Joinpoint Regression Program version 4.2.0.1 (http://surveillance.cancer.gov/joinpoint/).

Results

Average suicide rates of youth aged 15–19 years in 81 countries have shown a decline for both genders. For males, a declining trend in the average rate per decade from 10.30 to 9.51 per 100,000 was close to significance level of .05 ($t = 1.80$, degrees of freedom [df] = 80, $p = .076$), whereas it remained at the same level for young females—From 4.39 to 4.18 per 100,000—($t = .72$, df = 80, $p = .473$). Significant changes were detected in a number of countries (Table 1).

America

The average suicide rates for youth in South American countries (n = 11) showed a significant increase for males, from 7.36 to 11.47 ($t = -2.90$, df = 10, $p = .016$); the increase was close to the significance level in females, raising from 5.53 to 7.89 ($t = -2.20$, df = 10, $p = .053$). For seven of 11 countries, the rate increased significantly both for males and females in six of 11 countries. However, there was a significant decline in Venezuela for young males. In the past decade (2000–2009), Guyana and Suriname have had the highest rates for young females, and Guyana had the fourth highest rate for young males. Time trend analysis of the South American region incorporated data from eight countries. However, considering that the most populated country Brazil, and other more heavily populated countries such as Columbia and Venezuela, had lower rates compared with smaller less populated countries, they have diluted the higher rates of smaller countries. This notwithstanding, rates show a significant increase for males until 2001 (Figure 1, Table 2) and for females until 2003 (Figure 2), remaining at the same level for young males and with a decline for females (Table 2).

For central America and Caribbean (n = 14) no significant changes were observed, with young males showing a rate of 5.68 per 100,000 in 1990s and 5.66 in 2000s ($t = .018$, df = 13, $p = .983$), while young females dropped from 4.62 to 3.67 ($t = .95$,