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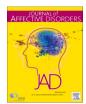
Short communication

Comparison of suicide attempts among nationally representative samples of Mexican adolescents 12 months before and after the outbreak of the Covid-19 pandemic

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ABSTRACT

Background: There is serious concern over the increase in mental health problems during the coronavirus disease 2019 (Covid-19) pandemic.
Methods: Based on data from two Mexican National Health and Nutrition Surveys conducted in 2018–2019 and 2020 ($n = 17{,}925$ and 4,913, respectively), we estimated the prevalence of suicide attempts among adolescents 10–19 years old in the previous year. We constructed a multivariate logistic regression model adjusted by sociodemographic characteristics and contextual variables for the Covid-19 pandemic.
Results: The prevalence of suicide attempts in the previous year was similar in both surveys. We found that women, youth in urban localities and individuals living in households where a family member had lost her/his job as a result of the Covid-19 contingency were more likely to attempt suicide compared to their counterparts. On the other hand, attending classes online proved to be a protective factor (aOR=0.3, 95% CI=0.1, 0.8, $p = 0.022$).
Limitations: The principal limitation of our study concerned the restricted size of our sample for the 2020 survey wave.
Conclusions: Population-level policies aimed at providing economic protection and helping youth to return to school would exert a favorable impact on the mental health and suicidal behavior of youths.

1. Introduction

On March 11, 2020, the World Health Organization (WHO) declared Covid-19 a global pandemic (World Health Organization, 2020); 22 days later, Mexico announced a national state of emergency and implemented a series of precautionary measures including home confinement. It is well known that pandemics affect mental health in proportion to the magnitude of the event and levels of population vulnerability. Covid-19 has posed unexpectedly high mental health risks for the world at large (Xiong et al., 2020), and Mexico is no exception. Suicide is a public mental health problem characterized as an unnatural and preventable death.

Suicide attempts (SAs) constitute an important risk factor for death by suicide (Rockstroh et al., 2021). They are multifactorial and have specific characteristics, for instance, women are more likely to attempt suicide than men. In Mexico, SAs have risen for both sexes in the last three national health surveys (Valdez-Santiago et al., 2021), with adolescents and young adults representing a major risk group (Hermosillo-de la Torre et al., 2021). Furthermore, SAs have trended downward with marked differences in the incidence of SAs observed between urban and rural areas (INEGI, 2019).

In light of the characteristics of this public health problem, its rising prevalence, its association with sociodemographic and psychological factors (Hermosillo-de la Torre et al., 2020; Rivera-Rivera et al., 2020)

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and its potential upsurge as a result of confinement, the aim of this report is to compare the prevalence of SAs in the Mexican adolescent population during the 12 months prior and subsequent to the implementation of Covid-19 confinement restrictions. We had no *a priori* hypothesis given the novelty of the pandemic situation. Additionally, our work sought to disaggregate estimates by sex, age and urban/rural area, and to assess the association between SAs and sociodemographic as well as psychosocial factors.

2. Methods

Based on data from the 2018–2019 National Health and Nutrition Survey (*ENSANUT*) as well as the 2020 Covid *ENSANUT* (*ENSANUT-COVID*), we estimated the prevalence of last-year SAs (LYSAs) in adolescents 10–19 years old.

2.1. Sample selection

The 2018–19 *ENSANUT* and 2020 *ENSANUT-COVID* were household surveys with a probabilistic, multi-stage sample design, representative at the national, regional and rural/urban levels ($n = 17,925$ and $4,812$, respectively) (Romero-Martínez et al., 2019; Romero-Martínez et al., 2021). The 2018–19 *ENSANUT* was also representative at the state level; this was impossible to accomplish in 2020 because of the protective measures implemented to prevent Covid-19 infection among field staff and participants, that limited sample size. In both surveys, households were randomly selected, and then an additional list of one randomly selected adolescent per household was compiled. Exclusion criteria consisted of refusing to participate and having auditive or cognitive disabilities that would render individuals unable to respond to the survey. All participants signed informed-consent forms. Our study was approved by the Institutional Review Board of the National Institute of Public Health in Mexico.

2.2. Variables of interest

Data were collected from July 2018 to June 2019 (*ENSANUT 2018,19*) and from August to November 2020 (*ENSANUT-COVID 2020*). Comparable standardized questionnaires for adolescents were administered personally, at the homes, by trained personnel.

2.2.1. Last-year suicide attempts

The term suicide attempt was defined as "any action taken by a given person that could cause them to die." (Remus, 2020) We created a dichotomous variable for LYSA occurrence based on two questions: (1) "Have you ever attempted to harm yourself or deliberately cut, intoxicated or hurt yourself in any way for the purpose of dying?" and (2) "Was this in the last 12 months?"

2.2.2 Sociodemographic variables included sex, age and type of locality (urban or rural). We generated a socioeconomic indicator grouping households into income deciles; the method used has been described elsewhere (Gutiérrez, 2013).

2.2.3 Covid-19 context indicators included the following: at least one household member had stopped receiving income because of the contingency (yes, no); at least one household member had lost his/her job because of the contingency (yes, no); household members had been forced to reduce their spending during the contingency (yes, no); school-aged household members were attending virtual classes (yes, no).

2.3. Statistical analyses

We tabulated the characteristics of participating adolescents according to whether or not they had attempted suicide, with 95% confidence intervals. Poisson regression was used to estimate the prevalence ratios of SAs. Based on logistic bivariate and multivariate models with a 5% level of significance, we estimate variables associated to last-year

suicide attempts in 10–19-year-old adolescents. The numbers have been rounded to one decimal place. Statistical analyses were performed using STATA SE 14.0 software, with estimates taking into account the probabilistic, multi-stage sample design and unequal selection probabilities.

3. Results

Table 1 depicts LYSA prevalence over 12 months as well as sample characteristics, stratifying the data according to whether the attempt took place prior to or during the survey. Prevalence estimates for were 1.8% (95% Confidence Interval, $CI = 1.6, 2.1$) prior to Covid-19 and 2.1% during the first month of the pandemic (95% $CI = 1.4, 3.1$), showing a non-significant statistical difference. Interestingly, the prevalence of SAs decreased among men in 2020 (0.3%, 95% $CI = 0.1, 0.8$) as compared to 2018–19 (1, 95% $CI = 0.7, 1.4$), but increased among women (3.8, 95% $CI = 2.4, 5.9$ in 2020, vs. 2.7, 95% $CI = 2.3, 3.2$ in 2018–19). Prevalence among youth 10–14 years old was 1.4% in both surveys (95% $CI = 1.1, 1.8$ and $0.8, 2.6$, respectively), but increased slightly among those 15–19 years old in 2020; however, confidence intervals overlapped markedly (2.3% in 2018–19 vs. 2.8% in 2020; 95% $CI = 1.9, 2.8$ and $1.4, 5.3$, respectively). The figures revealed a downward trend in SA prevalence by socioeconomic level: those at the lowest level showed the highest prevalence (2.2% in 2018–19 vs. 2.3% in 2020) and those at the highest level the lowest prevalence (1.6% vs. 1.7%, respectively). However, the corresponding confidence intervals overlapped, indicating a non-significant statistical difference. Finally, while no difference was observed in SA prevalence between youth in rural as opposed to urban areas pre-Covid-19 (1.8%), prevalence in 2020 proved higher among the latter (2.6%, 95% $CI = 1.6, 4.1$) and lower among the former (0.8%, 95% $CI = 0.4, 1.9$).

Table 2 illustrates the results of three groups of logistic regression models comparing estimates for the covariates in our analysis. Model 1 included unadjusted estimates. Model 2 was adjusted simultaneously for sociodemographic variables, and Model 3 included fully adjusted estimates for all variables. We found no evidence of major confounding variables, but registered a number of noteworthy associations, namely that women were more likely to attempt suicide than men, with other variables remaining unchanged (adjusted odds ratio, $aOR = 12.5$, 95% $CI = 4.7, 33.4$, $p < 0.001$); urban youth were 4.4 times more likely to attempt suicide than their rural counterparts (95% $CI = 1.5, 12.9$; $p = 0.008$); and SAs were more likely to occur in households where a family member had lost his/her job because of Covid-19 ($aOR = 2.8$, 95% $CI = 1.2, 6.5$, $p = 0.014$). However, they were less likely among participants who had been forced to reduce their expenses during the contingency ($aOR = 0.5$, 95% $CI = 0.3, 1.0$, $p = 0.039$) as well as in those cases where school-aged –including adolescent– members of the household were attending classes online ($aOR = 0.3$, 95% $CI = 0.1, 0.8$, $p = 0.022$).

4. Discussion

We found no significant difference in the prevalence of SAs among adolescents prior to and during the pandemic, with a pre-pandemic rate of 1.8% compared to 2.1% during the pandemic period. This is consistent with a study of 21 mostly high-income countries, which found no evidence of an increase in suicide deaths among the total population during the initial months of the Covid-19 pandemic (Pirkis et al., 2021). Mexico was one of the few upper-middle-income countries included in this study. A meta-analysis of 54 studies found a 2.68% SA rate for all age groups in community samples during the pandemic. While females, younger individuals and those in less democratic countries were more vulnerable to suicidal ideation during the pandemic, only the level of democracy was associated with actual SAs (Dubé et al., 2021).

While there may have been no overall increase in SAs among adolescents in Mexico during this period, some individuals in this age group were at greater risk than others. We observed that female adolescents (as

Table 1

Prevalence of last-year suicide attempts in adolescents by sociodemographic characteristics: Mexican National Health and Nutrition Surveys 2018–19 (n = 17,925) and 2020 (n = 4,812).

Characteristics	Suicide Attempts 2018–19			Suicide Attempts 2020					
	n	%*	95% CI	n	%*	95% CI	PR	P-Value	95% CI
Total	333	1.8	[1.6,2.1]	101	2.1	[1.4,3.1]	1.1	0.625	[0.7,1.8]
Sex									
Men	77	1.0	[0.7,1.4]	13	0.3	[0.1,0.8]	0.3	0.019	[0.1,0.8]
Women	256	2.7	[2.3,3.2]	88	3.8	[2.4,5.9]	1.4	0.220	[0.8, 2.4]
Age Group									
10–14 years	141	1.4	[1.1,1.8]	40	1.4	[0.8,2.6]	1.0	0.948	[0.5,1.9]
15–19 years	192	2.3	[1.9,2.8]	61	2.8	[1.4,5.3]	1.2	0.583	[0.6,2.4]
Socioeconomic level									
Low	139	2.2	[1.7,2.7]	36	2.3	[0.9,5.7]	1.1	0.908	[0.4,2.7]
Medium	107	1.8	[1.4,2.3]	40	2.2	[1.1,4.1]	1.2	0.553	[0.6,2.4]
High	87	1.6	[1.1,2.1]	25	1.7	[0.8,3.5]	1.1	0.819	[0.5,2.4]
Type of locality									
Rural	102	1.8	[1.4,2.4]	18	0.8	[0.4,1.9]	0.5	0.076	[0.2,1.1]
Urban	231	1.8	[1.5,2.2]	83	2.6	[1.6,4.1]	1.4	0.171	[0.9,2.3]

*Weighted percentages; CI=confidence interval; PR=prevalence ratio. The numbers have been roundend to one decimal place.

Table 2

Multivariate logistic regression models for last-year suicide attempts in 10–19-year-old adolescents: Mexican National Health and Nutrition-COVID Survey 2020.

	Descriptive Satistics for Suicide Attempts				Model 1			Model 2			Model 3		
	n	%* 95% CI	95% CI	P-Value	OR	95% CI	P-Value	aOR	95% CI	P-Value	aOR	95% CI	P-Value
Sex													
Men	13	0.3	[0.1,0.8]		1.0	reference		1.0	reference		1.0	reference	
Women	88	3.8	[2.4,5.9]	<0.001	11.5	[4.3,30.6]	<0.001	11.9	[4.5,31.6]	<0.001	12.5	[4.7,33.4]	<0.001
Age Group													
10-14 years	40	1.4	[0.8,2.6]		1.0	reference		1.0	reference		1.0	reference	
15-19 years	61	2.8	[1.4,5.3]	0.243	1.9	[0.7,5.4]	0.206	1.8	[0.7,5.1]	0.244	1.8	[0.7,5.1]	0.253
					Type of locality								
Rural	18	0.8	[0.4,1.9]		1.0	reference		1.0	reference		1.0	reference	
Urban	83	2.6	[1.6,4.1]	0.015	3.1	[1.2,7.9]	0.019	3.4	[1.3,9.0]	0.011	4.4	[1.5,12.9]	0.008
At least one household member had lost his/her job as a result of the contingency.													
No	57	1.9	[1.1,3.2]		1.0	reference					1.0	reference	
Yes	44	2.4	[1.0,5.7]	0.665	2.7	[1.1,7.1]	0.037				2.8	[1.2,6.5]	0.014
Household had been forced to reduce expenses during the contingency.													
No	72	2.0	[1.1,3.7]		1.0	reference					1.0	reference	
Yes	29	2.2	[1.6,2.9]	0.891	1.0	[0.5,1.9]	0.892				0.5	[0.3,1.0]	0.039
School-aged household members were attending virtual classes.													
No	33	4.0	[1.7,9.2]		1.0	reference					1.0	reference	
Yes	68	1.5	[1.0,2.4]	0.196	0.4	[0.1,1.1]	0.086				0.3	[0.1,0.8]	0.022

n=sample size; *weighted percentages; OR=odds ratio (crude); aOR=adjusted odds ratio; CI=confidence interval
Model 1: ORs estimated through bivariate analyses of the association between each variable and suicide attempts
Model 2: aORs for the association between each sociodemografic variable and suicide attempts (entered simultaneously)
Model 3: aORs obtained introducing all variables simultaneously

is often found in pre-pandemic studies of US youth, e.g., Lewinsohn et al., 2001, Nock et al., 2013), those residing in urban areas, and those living in households where at least one family member had lost her/his job because of the pandemic faced increased odds of a SA. However, adolescents in families whose school-aged children continued classes online (versus not attending classes) or had to reduce their spending were less likely to attempt suicide. While evidence has long documented increases in deaths from suicide during economic downturns (Haw et al., 2015; Nordt et al., 2015), the economic impact of the pandemic on adolescent SAs is particularly relevant for countries like Mexico: in 2019, 56% of Mexican workers were engaged in the informal sector without social protection (ENOE, 2019 (Instituto Nacional de Estadística Geografía e Informática. Encuesta Nacional de Ocupación y Empleo 2021)), and government assistance during the pandemic has been significantly inferior to that of other Latin American countries and those in the G20, with the level of support being even lower than during the 2009 recession (Hannan et al., 2020). In terms of schooling, in Mexico, all instruction during the pandemic has taken place online until recently, this in a country where Internet access and computers are not universally available. It is estimated that 2.8 million, or 10% of youth in

Mexico, dropped out of school during the first six months of the pandemic (https://es.statista.com/estadisticas/1196796/desercion-escolar-nivel-educativo-covid-mexico). The impact of this on the mental health of Mexican youth is likely to be substantial given that attending school has been shown to be protective of mental health Gutiérrez-García et al. (2017). Our study shows that attending online classes during the pandemic was associated with reduced odds of attempting suicide, as was reduced household spending. Both of these findings likely reflect the positive impact of enjoying a higher socio-economic status: children from more economically comfortable families were not forced to abandon school, and their families were in a position to cut spending without major adverse consequences. This is in marked contrast to poorer families whose income covered only basic expenses.

5. Strengths and limitations

This study provides unique data from two large-scale, nationally representative surveys conducted immediately prior to and during the pandemic period. To our knowledge, *ENSANUT-COVID 2020* was the only nationally representative household survey conducted in person on

the topic during the pandemic period in Latin America. However, it is important to note that, because of the 12-month recall period and the dates of fieldwork, our estimation of SAs during the pandemic period covered only the first five to eight months of the pandemic, depending on when respondents were surveyed. Therefore, if SAs truly increased during the pandemic, we would most likely have underestimated SA prevalence; this may account for the lack of statistically significant differences. On the other hand, if SAs truly decreased during the pandemic, we would most likely have overestimated SA prevalence. Additionally, our conclusions were limited by the cross-sectional survey design that yielded no evidence for establishing the causality or directionality of the associations between SAs and their correlates. Finally, measuring SAs depended on the self-reporting of a sensitive issue burdened with cultural and religious taboos. Hence, our prevalence estimates were likely to be conservative.

6. Conclusion

While there may have been no overall increase in SAs among Mexican adolescents during the first five to eight months of the pandemic, adolescents in households that lost employment and those not attending on-line classes are at risk, exacerbating the already large mental-health disparities in countries such as Mexico. Further research is needed to monitor the longer-term consequences of the pandemic and school closures for youth. Population-level policies designed to provide economic protection and allow youth to return to school would have a favorable impact on the mental health and suicidal behavior of adolescents.

Statements

Statements of ethics

The study was conducted according to the Helsinki Declaration, and was approved by the Ethics and Research Committees of the National Institute of Public Health in Mexico.

Role of the funding sources

CRediT authorship contribution statement

Rosario Valdez-Santiago: Conceptualization, Writing – original draft, Writing – review & editing. **Aremis Villalobos:** Conceptualization, Formal analysis, Methodology, Writing – original draft, Writing – review & editing. **Luz Arenas-Monreal:** Writing – original draft, Writing – review & editing. **Catalina González-Forteza:** Writing – original draft, Writing – review & editing. **Alicia Edith Hermosillo-de-la-Torre:** Writing – original draft, Writing – review & editing. **Corina Benjet:** Writing – original draft, Writing – review & editing. **Fernando A. Wagner:** Methodology, Writing – original draft, Writing – review & editing.

Declaration of Competing Interest

The authors have no conflicts of interest regarding this research study.

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