

Suicide and Covid-19 in Mexico: an update to 2021

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Abstract

Objective. To update prior studies on the impact of Covid-19 on suicide in Mexico. **Materials and methods.** We used interrupted time-series analysis to model the national trend in monthly suicides before Covid-19 (January 1, 2010, to March 31, 2020), comparing the expected number of suicides with the observed number for the remainder of the period (April 1, 2020, to December 31, 2021). **Results.** We observed a 5% increase in suicides, driven by suicides among the younger females ages <44 years and among older males ages 45+. **Conclusion.** Since in Mexico the impact of Covid-19 on suicide depended on sex and age, tailored public health strategies may be needed to confront the problem.

Keywords: suicide; Covid-19; epidemiology; Mexico

Resumen

Objetivo. Actualizar estudios previos sobre el impacto del Covid-19 en el suicidio en México. **Material y métodos.** Se utilizaron análisis de series temporales interrumpidas para modelar la tendencia nacional de los suicidios mensuales antes de la Covid-19 (del 1 de enero de 2010 al 31 de marzo de 2020), comparando el número esperado de suicidios con el número observado para el resto del periodo (del 1 de abril de 2020 al 31 de diciembre de 2021). **Resultados.** Se observó un aumento de 5% en los suicidios, impulsado por los suicidios entre las mujeres más jóvenes de <44 años y entre los hombres mayores de 45 años. **Conclusión.** Dado que en México el impacto del Covid-19 en el suicidio depende del sexo y la edad, se sugieren estrategias de salud pública específicas para enfrentar el problema.

Palabras clave: suicidio; Covid-19; epidemiología; México

The Covid-19 pandemic impacted heavily in Mexico with over 331 000 deaths at the end of December 2022.¹ Since the beginning of the pandemic, there was an emphasis on the likelihood of mental health effects of Covid-19 on depression, anxiety² and alcohol use,³ and there was concern that a rise in suicides would be seen.⁴ Nevertheless, a study based on data from 33 countries including 12 sites with data for area(s)-within-the-country, concluded that "In most countries / areas-within-countries we studied, suicide

frequencies were no higher than expected based on previous trends during the first 9-15 months of the pandemic". But results did vary in some countries by sex and age groups.⁵

The results of the effects of the pandemic on suicide in Mexico from 2016-2020 (nine months into the pandemic) were included in Pirkis and colleagues⁵ and suggested that a small decrease of 7% in suicide in the country was apparent, but the elderly (>=60 years) had an increase of 27% in suicides. Further reports using a

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longer time series (2010-2020) in Mexico showed that suicide increased by a small amount (3%). Nonetheless, the impact of Covid-19 on suicides was heterogeneous as suicide remained stable in 19 states, increased in seven states, and decreased in six states.⁶ The pandemic affected especially Mexico City, with an increase in the rate ratio (RR) of 2.07 during the first nine months of the pandemic, higher among older women (RR=3.33).⁷ The goal of this report is to update prior studies on the impact of Covid-19 on suicide in Mexico, covering now 21 months into the pandemic (April 2020-December 2021) and paying attention to possible differential effects by sex and age groups.

Materials and methods

Data sources

We sourced monthly suicide counts from the cause of death records, by dates of registry, held by the *Instituto Nacional de Estadística y Geografía* (INEGI)⁸ that included the period from January 1, 2010, to December 31, 2021. Suicides were identified by the ICD-10 codes X60- X84. Our analysis used publicly available data without any individual identifiers.

The Ethical Committee of the National Institute of Psychiatry cleared this work for ethical approval (CEI/M/118/2021).

Statistical analyses for suicide trends

We plotted trends over time for the entire country along with a moving average filter (averaged over the prior two months, the current month and the following two months).⁹ We used time-series analysis with adjustments for time trends and seasonality to model the trends in monthly suicides from January 1, 2010, to March 31, 2020, before Covid-19. This prepandemic model was then used to forecast what the trend in suicides for the next 21 months into the Covid-19 period (April 1, 2020, to December 31, 2021) would have been had the pandemic not happened. This calculation of the expected number of suicides based on the prior trend was compared with the observed number of suicides during the pandemic period by calculating a RR and its 95% confidence interval (95%CI). Models were fitted using Poisson regression and accounted for possible overdispersion using a scale parameter set to the model's chi-square value divided by the residual degrees of freedom. We modeled the effect of time as a non-linear predictor. Non-linear time trends were estimated by selecting the best fitting model from a series of fractional

polynomial models. Seasonality was accounted for with Fourier terms (pairs of sine and cosine functions).¹⁰

Results

During the preCovid period (123 months) there were a monthly mean number of 519 suicides, while during the Covid period (21 months) this number was 687 suicides. The monthly mean number of suicides were higher during the Covid period across all sex (male/female) and 3 age groups (<25 years; 25-44 years; 45 plus years).¹¹

Figure 1 shows visually the increasing trend in the number of suicides during the last decade (2010-2021), very much apparent for the total population and main groups. Also, this figure shows the seasonality of suicide in Mexico, and the months with high (peaking around May and August) and low numbers of suicides (around January and February), a pattern that did not change much during the pandemic. Figures by sex and age (six groups) are presented in additional material.¹²

In figure 2 we show the total number of observed suicides during the 21 months into the pandemic (April 2020-December 2021, 14 437 suicides for the total population), the expected number of suicides according to our time series model (13 759) and the RR of 1.05 (14 437 / 13 759) for the total population with its 95%CI (1.03,1.07). According to this model, there was a small increase (5%) in suicides during the 19 months of the pandemic for the total population. There were some differences in the impact of Covid depending on sex and age groups. The highest impact was seen among younger females (<25 years old) with an increase in suicides (RR=1.20 [95%CI: 1.13,1.27]) and the lowest RR was seen among males 25-44 years old with a significant reduction of 5% in suicides. Females 25-44 years old and males 45+ years old also had an increase in suicides during the period (RR=1.08 [95%CI: 1.01,1.15] and RR=1.15 [95%CI: 1.11,1.19], respectively).

Discussion

We observed a 5% increase in the number of suicides. This increase was not homogenous but was driven by an increase in suicides among younger females ages <25 (20% increase), among adult females ages 25-44 years old (8% increase) and among older males ages 45+ (15% increase). On the other hand, males ages 25-44 years old showed a reduction of 5% in the number of suicides.

The 5% increase is very close to our prior report showing an increase of 3% for the first nine months of the pandemic,⁶ suggesting stability of the negative effects of the pandemic on suicide in Mexico. It also

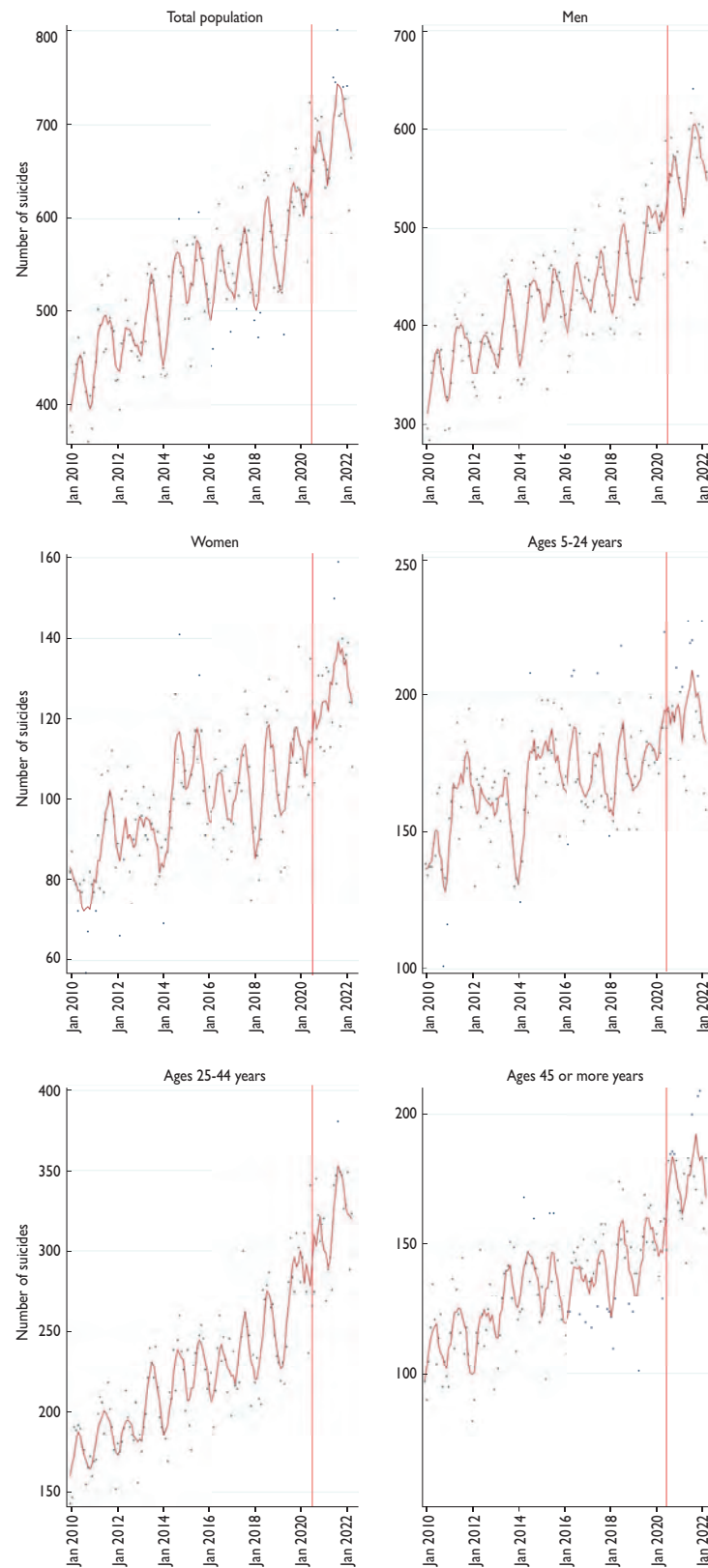


FIGURE 1. TIME SERIES PLOT OF MONTHLY SUICIDES IN MEXICO, 2010-2021

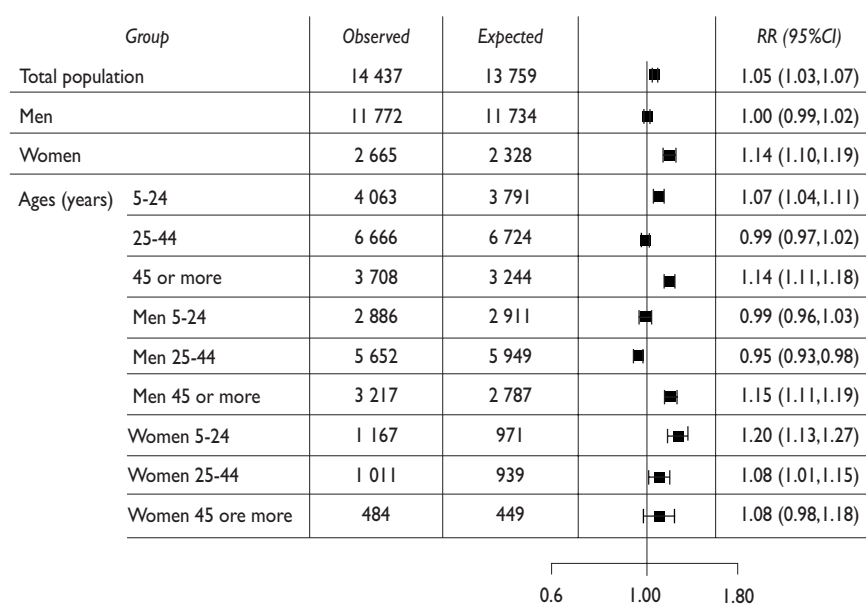


FIGURE 2. OBSERVED AND EXPECTED NUMBER OF SUICIDES, RATE RATIOS (RR) AND 95% CONFIDENCE INTERVAL (95%CI). MEXICO, 2010-2021

mirrors prior findings as the impact of Covid on suicide is not uniform but may depend on basic sex and age groups⁵ this may, somehow, be related to socioeconomic disadvantages in societies.¹³ *Ex post facto* explanations for this differential effect have been presented in the literature, such as psychological sequelae of the pandemic lockdowns,¹⁴ increase in mental disorders,¹⁵ decrease in service use,¹⁶ increase in precursors of suicide,¹⁷ and rise in unemployment.¹⁸

Reasons for the differential impact by age and sex needed to be addressed with adequate epidemiological methodology, beyond simple time-series as presented here that are, nevertheless, a necessary first step in our inquiries. In Mexico, special attention must be placed to explain the negative impact of Covid-19 among young women.

Limitations

As mentioned before,⁶ our data on suicide is limited by the current stage of the health system statistics in Mexico, and improvements in the quality of death certificates in the country during the period may have had an impact on the results. While we used modern techniques for time series, the results may be confounded by other events unrelated to the pandemic and, thus, our results must be interpreted cautiously. This report delves into a longer period of the pandemic and confirms prior results based

on the short-term effects until 2020. It is still possible that longer periods well into the year 2022 may affect our results, so continuous monitoring is still necessary.

Conclusion

The Covid-19 pandemic impacted negatively suicide mortality in Mexico, albeit by a small amount. Since this impact depended on sex and age, tailored public health strategies may be needed to confront the problem.

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