

It is illegal to post this copyrighted PDF on any website. Impact of Pandemic on Suicide: Excess Suicides in Taiwan During the 1918–1920 Influenza Pandemic

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Since the first cases of coronavirus disease 2019 (COVID-19) were reported in China between the end of 2019 and early 2020, the infection has spread rapidly across the globe. Close to a million people have died. National governments have responded to the COVID-19 pandemic by introducing a series of measures to control its spread. These measures include stay-at-home orders (lockdown), school and business closures, and health service reconfiguration. The measures have had widespread secondary effects such as rises in unemployment, financial difficulties, social isolation, domestic violence, and difficulties accessing health services. There are concerns that these effects, together with consequences of the disease itself (eg, increases in mortality, fear of the disease) may have a profound impact on population mental health and suicide risk.^{1,2} However, few studies have investigated the impact on suicide of previous epidemics. There is a suggestion that suicides rose in the US during the 1918–1920 influenza pandemic³ and among older people in Hong Kong during the 2003 severe acute respiratory syndrome epidemic.⁴

During the 1918–1920 influenza pandemic, Taiwan experienced 2 waves of infection during October–December 1918, when an estimated 770,000 people (22.4% of the population) were infected, and December 1919–March 1920 (148,000 cases; 4.3% of the population).⁵ In response, the Japanese Colonial Government implemented policies such

as closing schools and theaters and prohibiting religious activities. People were advised to keep physically distant from individuals with influenza. The restaurant and transportation industries were severely affected. In view of current concerns about the impact of the COVID-19 pandemic on suicide, we investigated changes in suicide rates in Taiwan at the time of the 1918–1920 influenza pandemic.

Methods

We extracted monthly mortality data for suicide and pneumonia in Taiwan (1910–1920) from the annual Statistical Reports of Taiwan Governor-General Office. Digitalized images of these reports were available online (<http://tcsd.lib.ntu.edu.tw/>). As there was no evidence for extra-Poisson variation, we used Poisson regression to estimate the suicide rate ratio (RR) for each month during and shortly after the pandemic (October 1918–December 1920), relative to that expected based on the pre-pandemic trend between January 1910 and September 1918, using log-transformed population as the offset. A similar approach has been used in previous studies examining the impact on suicide of global financial crisis⁶ and pesticide bans.^{7,8} Underlying linear trends were controlled for by including a month variable (ie, month 1 to month 132) in the model; seasonality was controlled for by including dummy variables for calendar month.

Results

On average, 585 people died of pneumonia per month in Taiwan in January 1910–September 1918 before the influenza pandemic. There was a marked increase in pneumonia deaths during the influenza pandemic, with 2 peaks: November 1918 (6,155 deaths; rate = 179.2 per 100,000 population) and January 1920 (7,429 deaths; 214.2 per 100,000) (Figure 1A). Monthly suicide deaths fluctuated between 1910–1920, with a median of 57.5 (range, 31–88) suicides and a rate of 1.69 (range, 0.95–2.76) per 100,000.

Suicide rates were no higher than expected during the first wave of infection (Figure 1B, Supplementary Table 1). During the second wave, there were increases in suicide of 33% (RR = 1.33; 95% confidence interval [CI], 1.00–1.77) and 35% (RR = 1.35; 95% CI, 1.05–1.75) in the second (January 1920) and fourth (March 1920) months of this wave, corresponding to an excess 14 (95% CI, 0–25) and 19 (95% CI, 3–31) suicides, respectively.

Discussion

The 1918–1920 influenza pandemic was associated with a small and short-lived increase in suicide in Taiwan. The number of excess suicide deaths was substantially lower

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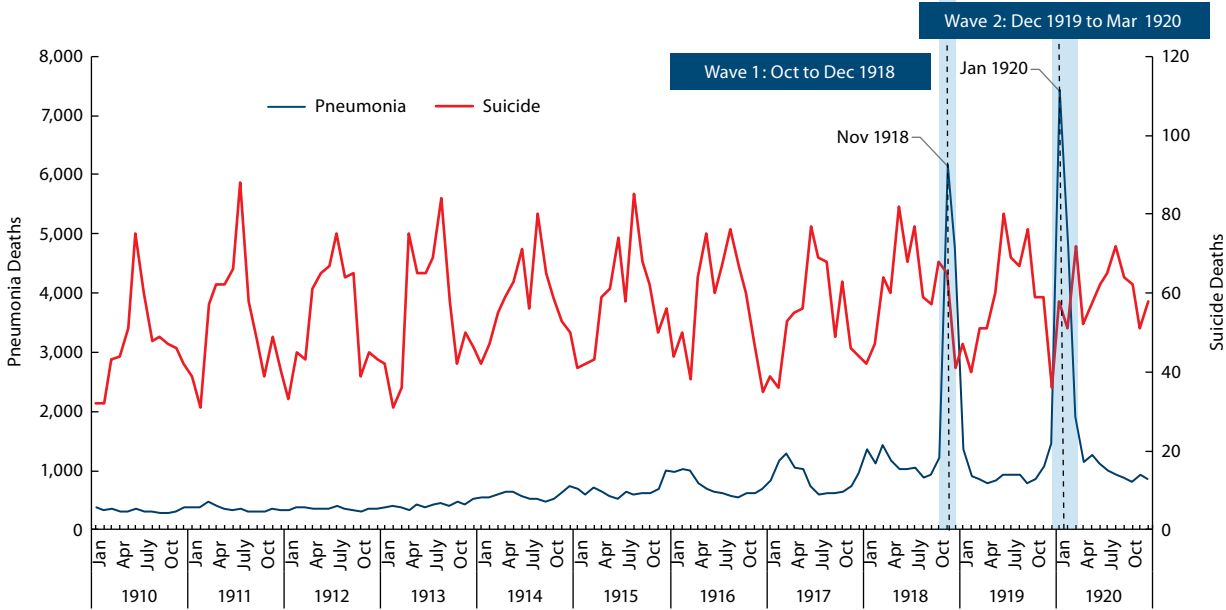
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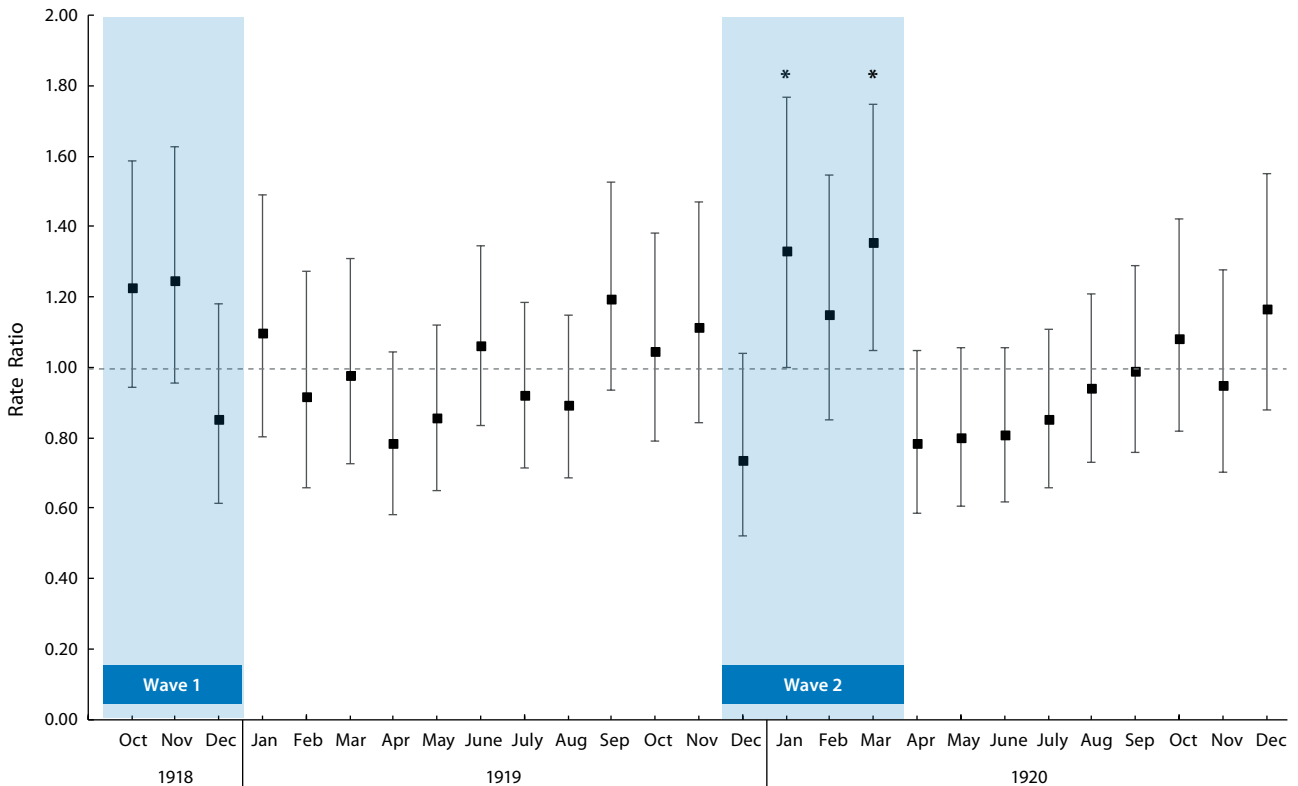
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Figure 1. Monthly (A) Numbers of Suicide and Pneumonia Deaths in Taiwan From 1910–1920 and (B) Suicide Rate Ratios During and Shortly After the 1918–1920 Influenza Pandemic (Wave 1: October–December 1918; Wave 2: December 1919–March 1920) Relative to Those Expected Based on Pre-Pandemic Trend From January 1910–September 1918

A. Suicide and pneumonia deaths



B. Suicide rate ratios and 95% CIs^a



^aRate ratios were adjusted for time trend and calendar month. *P < .05.

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than the number of influenza deaths. This short-lived rise in suicide is consistent with that seen in the US in 1918–1920.³ A number of factors may have contributed to the increase in suicide deaths; these include fear related to the high transmission and fatality rates, and the fear may have been more intense in the second wave of infection due to people's experience of the first wave. Other possible contributing factors include social isolation resulting from the epidemic control measures and the economic impact of the pandemic. Furthermore, it has been suggested that influenza infection and/or the associated immune response might directly increase vulnerability to mood disorders and suicide.⁹

While the socioeconomic and technological (eg, communication technology) environments in which the 1918–1920 influenza pandemic occurred were very different from those of the present day, the findings may nevertheless have implications for suicide prevention during the COVID-19 pandemic. The short-lived (and small) rise in suicide deaths in 1918–1920 is reassuring, but the socioeconomic consequences of the current pandemic may be more challenging, particularly if the pandemic is long lasting and requires longer-term control measures.¹ Equally, impacts may be mitigated by the extent to which improvements in communication technology and online help available in many countries allow people to maintain social connectedness and receive health care while remaining physically distant.^{10–12} If the rise in suicide deaths seen in 1918–1920 was due to direct biological effects of the virus on the brain, these may too be a concern in the current COVID-19 pandemic as there is evidence of neuropsychiatric effects of coronavirus infection.¹³

Given the absence of clear evidence of the likely impact of the pandemic on population mental health and suicide risk, it is critical to closely monitor these outcomes and conduct timely research to ensure that policy makers make the best decisions to optimize population health.¹⁴

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Editor's Note: We encourage authors to submit papers for consideration as a part of our Focus on Suicide section. Please contact Philippe Courtet, MD, PhD, at pcourtet@psychiatrist.com.

See supplementary material for this brief report at PSYCHIATRIST.COM.



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Supplementary Material

Article Title: Impact of Pandemic on Suicide: Excess Suicides in Taiwan During the 1918–1920 Influenza Pandemic

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List of Supplementary Material for the Brief Report

1. [Table 1](#) Monthly Suicide Rate Ratio During and Shortly After the 1918-1920 Influenza Pandemic in Taiwan Relative to That Expected Based on Pre-Pandemic Trend Between January 1910 and September 1918

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Impact of pandemic on suicide: excess suicides in Taiwan during the 1918-1920 influenza pandemic

Supplementary Table 1. Monthly suicide rate ratio during and shortly after the 1918-1920 influenza pandemic in Taiwan (October 1918 - December 1920; wave 1^a: October-December 1918; wave 2^b: December 1919 - March 1920) relative to that expected based on pre-pandemic trend between January 1910 and September 1918.

Year	Month	RR	95% CI		p value
1918	Oct ^a	1.224	0.943	1.588	0.13
	Nov ^a	1.245	0.954	1.626	0.11
	Dec ^a	0.852	0.615	1.181	0.34
1919	Jan	1.095	0.804	1.490	0.57
	Feb	0.914	0.657	1.272	0.59
	Mar	0.974	0.725	1.307	0.86
	Apr	0.781	0.583	1.045	0.10
	May	0.854	0.651	1.119	0.25
	June	1.060	0.835	1.344	0.63
	July	0.920	0.714	1.186	0.52
	Aug	0.889	0.688	1.150	0.37
	Sep	1.193	0.933	1.525	0.16
	Oct	1.044	0.790	1.379	0.76
	Nov	1.112	0.841	1.470	0.46
	Dec ^b	0.736	0.520	1.041	0.08
1920	Jan ^b	1.329	1.000	1.765	0.050
	Feb ^b	1.146	0.850	1.546	0.37
	Mar ^b	1.352	1.046	1.748	0.021
	Apr	0.783	0.585	1.047	0.10
	May	0.798	0.604	1.054	0.11
	June	0.808	0.618	1.056	0.12
	July	0.853	0.656	1.108	0.23
	Aug	0.940	0.731	1.208	0.63
	Sep	0.988	0.757	1.290	0.93
	Oct	1.079	0.820	1.421	0.59
	Nov	0.945	0.701	1.275	0.71
	Dec	1.166	0.877	1.551	0.29

Note: RR: rate ratio. CI: confidence interval. RRs were adjusted for time trend and calendar month. Months with statistically significant RRs (p value < 0.05) are shown in bold. The two waves of infection are shaded in blue.