Evidence of Seclusion's Effect on Suicide: Implications of COVID-19 Economic Interventions and Relocation

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Premise

If states are ranked by their suicide rates, there is almost a one-to-one, negative relationship with the states' population densities (**Table 1**). Plotting the historic suicide rates overpopulation density, we notice an overly consistent relationship between the two variables (**Plot 1**). In March 2021, *JAMA* published an unanticipated observation: suicide rates dropped 5.6% in 2020, amid the COVID-19 pandemic. Given the mass exodus of people from urban to rural environments, this poster measures what proportion of the decrease in suicide is attributable to the 2020 pandemic relocation that repopulated areas most at risk for suicide mortality.

Table 1 - States Ranked by Pop. Density and Suicide Rates

Rank	State	Rate	State	Density
1	Alaska	27.2	Alaska	1.30
2	Wyoming	26.8	Wyoming	6.03
3	Montana	26.3	Montana	7.16
4	New Mexico	24	North Dakota	10.98
5	Idaho	21.7	South Dakota	11.42
6	Utah	21	New Mexico	17.16
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45	Connecticut	10.7	Delaware	488.49
46	Illinois	10.6	Maryland	619.80
47	Massachusetts	9.5	Connecticut	738.63
48	Maryland	9.2	Massachusetts	873.31
49	New Jersey	8.8	Rhode Island	1,021.69
50	New York	8.4	New Jersey	1,216.27
51	DC	5.1	DC	11,166.72

Plot 1 -State Suicide Rates by Population Density

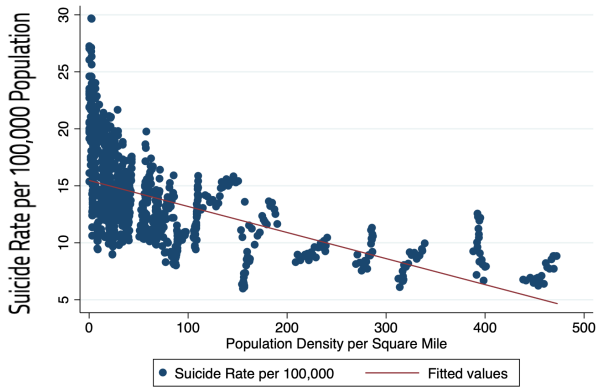

Figure 1 - Regression Equations

$$s_{it} = \beta_0 + \beta_d d_{it} + \beta_u u_{it} + \beta_\sigma \sigma_{it} + \beta_v v_{it} + \epsilon_{it}$$
$$s_{it} = \beta_0 + \beta_d d_{it} + \beta_u u_{it} + \beta_\sigma \sigma_{it} + \beta_v v_{it} + \lambda_t + \epsilon_{it}$$
$$s_{it} = \beta_0 + \beta_d d_{it} + \beta_u u_{it} + \beta_\sigma \sigma_{it} + \beta_v v_{it} + \lambda_t + \gamma_i + \epsilon_{it}$$
$$s_{it} = \beta_0 + \beta_d d_{it} + \beta_u u_{it} + \beta_\sigma \sigma_{it} + \beta_v v_{it} + \lambda_t + \gamma_i + \delta_i T + \epsilon_{it}$$

Control variables: i and t index state and year. s is the suicide rate defined by the number of suicides per 100,000 persons and d is population density defined by the number of residents per square mile in each state. u is a vector of lifetime utility variables that includes age and income. σ is a shock vector that includes the unemployment, health insurance, and marriage rates. v is a vector of demographics that includes the percent of the population that is non-Latino white, the percent of the population that is male, and the number of gallons of ethanol purchased per adult resident. λ_t is a year-specific effect, γ_i is a state-specific effect, δ_i is a state-specific time trend effect, T is a linear time trend, and ϵ_{it} is an error term.

Analysis

Implementing similar methods as Anderson et al. (2014) and Thornton (2010), the analysis employs four regression equations to determine whether the suicide rate at the state level is consistently affected by the population density for various combinations of control variables (**Figure 1**). Since the effect estimates are directionally stable and within each others' 95% confidence intervals at $P < .05$, the estimate for suicide is reported from the most rigorous model with all the control variables: -0.77, (95% CI: -1.52 — -0.01). Since both the dependent and independent variables are logged, their coefficients are elasticities and a 1% increase in the population density decreases the suicide rate by 0.77%. Additionally, the control variables show that unemployment also had a consistent effect on the suicide rate (0.10, CI: 0.01 — 0.18), suggesting government interventions that reduced the unemployment rate also contributed to the reduction of suicide amid COVID-19. With an estimated decrease in urban centers by approximately 2 million Americans (0.6% of the population), at least 10% of the decrease in suicide was attributable to relocation during the pandemic.

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