COVID's Decadence: Unemployment & Suicide

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Abstract- COVID-19 introduced a modern normlessness, collapsing social support structures required for encouragement during rapid changes such as social distancing, job loss and psychological distress. The purpose of this research is to determine if there is a significant relationship between unemployment and suicide and to examine whether this association is affected by the COVID-19 pandemic. We conducted a regression analysis to analyze the variances in the number of unemployment and suicides from 1999–2018 in the U.S. Results of the simple linear regression indicated that there is a significant relationship exists between unemployment and suicides, ($F(1, 18) = 59.58$, $p<.001$, $R^2=.768$), concluding that higher unemployment rates will increase the number of suicides. Preventing suicide calls for immediate action accompanied by mitigation initiatives and exposure to mental health treatments to ensure that individuals with diminished or unforeseen income have access to appropriate resources.

Keywords: COVID-19, psychological degeneracy, suicide, unemployment

I. Introduction

The long- term effects of the coronavirus response on mental health and mortality are still unclear, given the immediate and ongoing need to prevent and contain the virus. As communities remain quarantined and socially distant, unemployment continues to increase, causing greater financial hardship for both families and individuals [1]. In this context, suicide is likely to become an increasing concern as the pandemic continues to prevail across the globe with unknown long-term effects on individuals, mental health as well as the economy. Preventing suicide requires urgent considerations where early intervention and crisis treatment can mitigate or eliminate suicides or other adverse mental health outcomes [2]. As such, understanding the correlation between unemployment and suicide could help mental health professionals and states develop strategic interventions designed to stimulate the economy, increase suicide awareness and implement dynamic prevention programs that can effectively reduce suicidal behaviors.

1.1 Purpose

There are rising concerns that the COVID-19 pandemic could increase suicide rates due to the combination of economic hardship, isolation, limitation to mental health care, and increased levels of fear and anxiety [3]. This research examines the suicide and the unemployment rates in the U.S. from 1999-2018. This study hopes to add to this existing field of knowledge by analyzing more recent data from the last two decades to confirm a correlation between unemployment and suicide. The relationship between these two variables is somewhat understood. However, further analysis will evaluate the relationship and examine whether this association is affected by the COVID-19 pandemic, adding to the current knowledge field by reexamining this relationship.

1.2. Literature Review

Durkheim [4] hypothesized that cycles of substantial economic or social transition could contribute to anomic suicide due to lack of social inclusion as citizens' material and social circumstances decline below their prior living standards [4], [5]. Many who experience anomie due to a lack of social integration experience alienation from society since they no longer associate the standards and values, they idealize expressed in society, resulting in a loss of identity, lack of belonging and the absence of meaningful attachments to others. Furthermore, the state of anomie does not allow individuals to design objectives for one-self, culminating in an abnormal state of unhappiness that cannot be corrected, which ultimately leads to suicide [6]. Sociologically this suggests that strong social ties help individuals and societies endure periods of change or unrest in society. COVID-19 introduced a modern normlessness, collapsing social support structures required for encouragement during rapid changes such as social distancing, job loss and psychological distress. The pandemic produced social alienation because of a weakening of the bonds that connect people to make a functioning community, contributing to social exclusion and depression, which may contribute to a condition of social derangement and psychological degeneracy.

Hamermesh and Soss [7] used economic theory to demonstrate how decreased economic activity produced a proportionate increase in suicide rates within the United States. Their model claimed that a person commits suicide when their life utility reaches zero, where the life utility function is defined by perpetual income and age. The researchers theorized that prolonged hopelessness decreases an individual's utility of living. They concluded that suicide rates were lower among higher-income groups and developed sociological and microeconomic suicide models that presented important links between unemployment and suicide [7]. Centered on such theory, unemployment induces income loss and degradation of living conditions, promoting psychological degeneracy, which could effectively increase the rate of suicides related to the COVID-19 pandemic.

Suicide is not solely caused by psychological factors but involves broader social and economic variables. Unemployment

is an important social problem, culminating in suicide and expressed in multiple systemic works of literature. Ferretti & Coluccia [8] poised trends in suicide rates are influenced by countries' social, economic and political characteristics. Milner et al. [9] examined the possible associations between suicide rates and social variables, concluding that higher rates of male and female suicide were correlated with greater involvement of women in the labor force, unemployment, and the proportion of people over 65. Jaen-Varas et al. [10] linked higher suicide rates among unemployed adolescents, where unemployment and social deprivation are important social determinants of teen suicide. These findings suggest a favorable association between the unemployment and suicide socioeconomic variables among varying demographic and socioeconomic groups. With such a wide variety of social and economic variables linked to suicide rates, suicide can be assumed to be an effective predictor of a country's overall quality of life.

Furthermore, economic crises have been correlated with increases in suicides, such as the Great Depression, the Russian crisis in 1990 and the Asian economic crisis in 1991 [11]. In the recent Global Financial Crisis (GFC) of 2008, suicide rates increased by 4.2% in 27 European countries and 6.4% in American countries [12]. The Severe Acute Respiratory Syndrome (SARS) epidemic of 2003 was associated with an increased risk of completed suicide in elder females [13]. Moreover, a decline in mental health with higher depression and anxiety rates was recorded during the Great Recession, where the trend was more pervasive in demographic groups facing unstable employment or financial hardship [14]. Forbes & Krueger's [14] further poised economic crises place distress on individuals, impairs their mental health and quality of life, culminating in suicide. In this context, economic development is also a significant aspect that affects suicide rates in countries worldwide, where suicide rates decline with economic expansion and increase with recessions. Accordingly, epidemiological suicide evidence from previous economic recessions and depressions could help predict the possible economic impacts of COVID-19 on suicide rates.

II. Methodology

The goal of this simple linear regression analysis is to examine the relationship between unemployment and suicide. This analysis seeks to determine whether the number of suicides depends on the number of people unemployed. The suicide rate is the response variable (*y)* and the unemployment rate is the predictor (*x*). Using simple linear regression, we evaluate the linear relationship between the two continuous variables to predict the number of annual suicides based on the number of unemployed individuals. More specifically, we seek to (1) understand the direction and magnitude of any relationship; (2) determine how much of the variation in the Suicide variable is explained by unemployment; (3) determine if the linear regression between unemployment and suicide statistically significant and (4) predict the values of the suicide and unemployment variables. Using this criterion, we seek to answer the following research question (RQ1): *Is there a statistically significant relationship between unemployment and suicide rates?*

H_0: A statistically significant relationship does not exist between unemployment and suicide rates.

H_1: A statistically significant relationship exists between unemployment and suicide rates.

2.1 Least Squares Regression

The least-squares linear regression is a technique for forecasting the value of the dependent variable *Y* (Suicide) depending on the value of the independent variable *X* (unemployment). The linear, least-square fitting technique is the easiest and most widely used type of linear regression, which offers a solution to determining the best straight line fit across a set of points [15]. The variable we are predicting is called the criterion, labeled suicide (*y*). The predictor variable is labeled unemployment and used as the basis of our prediction. In simple linear regression, *Y* (Suicide) predictions, when plotted as a function of *X* (Unemployment), form a straight line. The regression coefficient estimated with a linear regression equation is $y = \beta_0 + \beta_1 x$ used to predict the value of *y* for a given *x*. This line will then be used to analyze how the response variable reacts when the predictor variable changes and forecast or predict a response. Furthermore, the least square approach attempts to construct a straight line that minimizes the sum of the squares of errors produced by the related equations' effects, such as square residuals arising from discrepancies between the observable value and the predicted value based on that model [16]. The least-squares method will generate a line of best fit that will help explain the potential relationship between the unemployment and suicide variables. By using the least square method, we will develop a regression equation and predict the behavior of the dependent variable, suicide.

2.2 Data Sources

3.2.1 Unemployment Data. The unemployment data used in this study was obtained from the Bureau of Labor and Statistics (BLS), Labor Force Statistics, Current Population Survey (CPS) [17] for the United States (U.S.) from 1999–2018. Seasonally adjusted data on the labor force, unemployment, and other demographic and labor force characteristics is extrapolated and tabulated into the CPS. Using the age-adjusted data for men and women between 18–64 years of age, the model was then forced to sum the national seasonally adjusted employment and unemployment estimates from the CPS. We then summed the annual civilian labor force, calculated the unemployment rate as the unemployed percent of the civilian labor force and extracted and combined the unemployment data from 1999 to 2018 (Table 1). The data showed that both sexes' job rate decreased; however, the decline was steeper for men (5.3 percentage points) than women (2.5 percentage points). The annual employment-to-population ratio dropped from 64.3 percent to 60.4 percent over the period from 1999 to 2018.

Table 1

Unemployment & Suicide Data

Year	Unemployment[a]	Suicide[b]	Year	Unemployment	Suicide
1999	1509411	29199	2009	1594020	36909
2000	1554150	29350	2010	1582018	38364
2001	1555538	30621	2011	1593576	39518
2002	1552961	31655	2012	1624037	40600
2003	1562851	31484	2013	1645471	41149
2004	1581593	32439	2014	1672790	42826
2005	1610732	32637	2015	1701640	44193
2006	1640806	33300	2016	1734069	44965
2007	1664201	34598	2017	1756511	47173
2008	1658134	36035	2018	1784712	48344

Note: a. Unemployment Data: compiled from Current Population Survey (CPS), LNS16000000
b. Suicide Data: extracted from CDC Wonder, MCD - ICD-10 113 Cause List

2.2.2 Suicide Data The Suicide Data (Table 1) was obtained from the Centers for Disease Control and Prevention, National Center for Health Statistics. Multiple Cause of Death 1999-2018 on CDC WONDER Online Database released in 2020. Data is compiled from 57 vital statistics jurisdictions through the Vital Statistics Cooperative Program [18]. The age-adjusted suicide rates are based on deaths by suicide per 100,000 population for men and women ages 18-64. This analysis highlights suicide rates between 1999 and 2018.

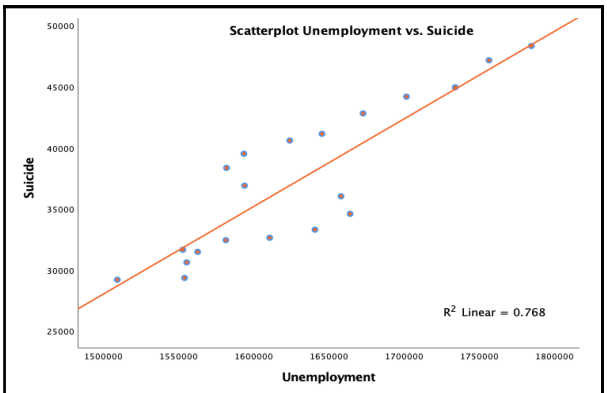
Suicide ranked as the tenth leading cause of death in the United States alone, taking the lives of more than 48,000 individuals [2]. Furthermore, suicide was the second leading cause of death for individuals aged 10-34 and the fourth leading cause of death for individuals between 35-54. The age-adjusted suicide rate increased by 35% from 10.5 per 100,000 normal U.S. population in 1999 to 14.2 in 2018. The estimated annual percentage growth in the national suicide rate rose from nearly 1% per annum from 1999 to 2006 to 2% each year from 2006 to 2018. The age-adjusted suicide rate among females increased 55 percent from 4.0 in 1999 to 6.2 in 2018, while males increased 28 percent from 17.8 to 22.8. Male suicide rates were higher than female over the same period.

III. Analysis

Using the U.S. age-adjusted unemployment and suicide rates from 1999-2018, we seek to determine whether the number of annual suicides depends on the number of unemployed individuals. Before carrying out the analysis, we investigate the relationship between the unemployment and suicide variables by producing a scatterplot (Figure 1) and calculating the correlation coefficient in SPSS.

Figure 1

Unemployment vs. Suicide Correlation



		Unemployment	Suicide
Unemployment	Pearson Correlation	1	.876**
	Sig. (2-tailed)		.000
	N	20	20
Suicide	Pearson Correlation	.876**	1
	Sig. (2-tailed)	.000	
	N	20	20

Note: **. Correlation is significant at the 0.01 level (2-tailed).

The scatter plot (Figure 1) shows the relationship between the variables unemployment and suicide is positive; that is, larger values of the independent variable (unemployment) are associated with larger values of the dependent variable (suicide). It appears we could *fit* a line through these data points. As such, linearity is established by visual inspection of the scatterplot.

3.1 Direction & Magnitude

A Pearson correlation (Figure 1) coefficient is computed in SPSS to measure the linear relationships' strength and direction between the stated pairs. The Pearson correlation results indicate a positive relationship between the two variables, where an increase in unemployment is strongly correlated with an increase in suicide (r=.876, n=20, p<.001). From the significance test p-value (p = 0.001< α =.05), we have strong evidence to conclude a significant positive linear correlation (r =.876) between the variables, where increased unemployment is associated with increased suicides. Conclusively, there is a strong, linear positive correlation between unemployment and suicide.

3.2 Regression

We begin the regression analysis by defining the independent variable x, unemployment, and the dependent variable y, suicide. The value of $\hat{y}$ is used to estimate the value of y, the simple linear regression equation is:

$\hat{y} = \beta_0 + \beta_1 x$

where:

$\hat{y}$ = predicted value of y variable for a selected x value.
β_0 = the *y-intercept*
β_1 = slope
x = any selected value of the independent variable

In the population, the *y*-intercept is denoted as β_0, and the slope is denoted as β_1. The purpose of this regression analysis is to calculate the values of β_0 and β_1, to generate a linear equation that accurately represents and fits the data. A simple regression analysis was carried out on the data in SPSS; the results are summarized in Table 2.

Table 2

Regression Model Summary

Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.876[a]	.768	.755	2998.510	.768	59.582	1	18	.000

Note: a. Predictors: (Constant), Unemployment
b. Dependent Variable: Suicide

Analysis of Variance (ANOVA)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	535701568.721	1	535701568.721	59.582	.000[b]
	Residual	161839146.229	18	8991063.679		
	Total	697540714.950	19			

Note: a. Dependent Variable: Suicide
b. Predictors: (Constant), Unemployment

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
		B	Std. Error	Beta			Lower Bound	Upper Bound
1	(Constant)	-79650.200	15161.811		-5.253	.000	-111503.982	-47796.417
	Unemployment	.072	.009	.876	7.719	.000	.052	.091

Note: a. Dependent Variable: Suicide

Residuals Statistics[a]

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	28687.28	48446.92	37267.95	5309.879	20
Residual	-5199.286	4789.800	.000	2918.536	20
Std. Predicted Value	-1.616	2.105	.000	1.000	20
Std. Residual	-1.734	1.597	.000	.973	20

Note: a. Dependent Variable: Suicide

3.2.1 Variation The coefficient of determination, R^2 (Table 2), measures the proportion of the total variation in the dependent variable explained by the independent variable, computed as the square of the correlation coefficient [16]. The coefficient of determination for the independent variable unemployment (R^2=.768) indicates that 76.8% of the variation in suicide can be explained by the model containing only unemployment. This is relatively high, indicating predictions from the regression equation are fairly reliable [19]. It also means that 23.2% of the variation is still unexplained; therefore, the addition of different independent variables could improve the model's fit. It is noted that R^2 does not reveal information about the causal relationship between the independent and dependent variables, nor does it indicate the correctness of the regression model.

3.2.2 Test of Significance First, we use the *F*-test to verify if there is a linear association between the Unemployment and Suicide variables using an α= 0.05. The ANOVA (Table 2) shows that the regression model is statistically significant, $F(1, 18) = 59.58$, $p < .0001$. It is statistically significant because the *p-value* ($p=.0001 < \alpha=.05$) is less than the 5% significance level. The individual predictor was examined further and indicated that unemployment ($t = 7.719$, $p < .001$) is a significant predictor in the model. These results indicate that the model is a substantial predictor of Suicides. We conclude that a significant linear relationship exists between the unemployment and suicide variables.

3.3 Least Squares

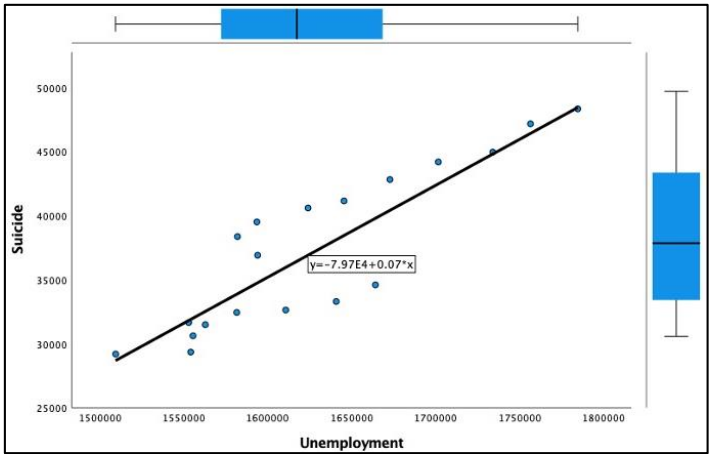
From the Coefficients in Table 2, we develop the Least Squares regression equation:

$\hat{y}$ = *-79650.19+ .072(unemployment)*

The least-squares equation is drawn on the scatter plot in Chart 1, which depicts a direct relationship between unemployment and suicide.

Chart 1

Scatterplot Least Squares Equation Unemployment vs. Suicide



The *y*-intercept is -79650.19 (where the trend line crosses the vertical axis); when $x = 0$, the predicted value of *y* is -79650.19. The slope coefficient for unemployment (β_1=0.072) suggests the relationship between unemployment and suicide is positive, where a one-unit increase in unemployment increases the predicted Suicide score by .072.

3.4 Hypothesis Test for Regression Slope

We evaluate the regression equation using a hypothesis test to see if the regression line's slope differs from zero. The evaluation concentrates on the line's slope at the regression equation's point of intersection ($Y = \beta_0 + \beta_1 * X_1$). The gradient ($\beta$)is tested for significance; if there is no relationship, the gradient of line β_1 would be zero (H_0: β_1= 0), resulting in the same number of suicides predicted every year. In other words, the independent variable unemployment will not add value in improving our estimate of the Suicide rate. However, if there is a significant linear relationship between suicide and unemployment, the slope will *not* equal zero (H_1: $\beta_1 \neq 0$). We select a level of significance of α=.05 and conduct the simple linear regression in SPSS; the coefficients are summarized in Table 2.

The *p-value* ($p=.001 < \alpha=.05$) against unemployment indicates significant evidence suggesting that the gradient is *not* zero. As such, we reject the null hypothesis, concluding the slope of the line is greater than zero and, therefore, positive, where the unemployment helps to predict suicide. Finally, the 95% confidence interval for β_1 (0.052, 0.091) does not contain zero;

In terms of this, we are able to infer that the discrepancy is statistically significant since the spectrum contains no variance. Concluding there is evidence of a linear relationship between unemployment and suicide. We conclude that a significant linear relationship exists between the two variables where a higher unemployment rate will result in an increased number of Suicides.

3.5 Prediction

The following equation represents the simple linear regression model, which can be used to predict suicides. To make predictions, we insert the amount of unemployment into the equation and solve for total suicides.

Total Suicide = – 79650.19 + .072(*unemployment*)

For example, to predict the number of suicides for an average annual number of unemployed individuals, we would substitute the value of the average annual unemployment rate into the regression equation:

Total Suicide = – 79650.19 + .072(*1,628,961*) = 37,267.94

Using the model, we can predict that having an average unemployment rate of 1,628,961 leads to a predicted total suicide rate of 37,268. This predicted value of total suicide is also referred to as the expected or predicted mean suicide rate.

We use SPSS' LMATRIX syntax to make predictions using the regression equation. We predict and develop confidence intervals for:

L1. One unit outside of the range of the data when *unemployment* =1,784,713

L2. Average annual *unemployment rate* = 1,628,961

The results are summarized in Table 3.

Table 3

Predictions & Confidence Intervals

Contrast Results (K Matrix)[a]

Contrast			Dependent Variable Suicide
L1	Contrast Estimate		48446.996
	Hypothesized Value		0
	Difference (Estimate - Hypothesized)		48446.996
	Std. Error		1595.942
	Sig.		.000
	95% Confidence Interval for Difference	Lower Bound	45094.045
		Upper Bound	51799.946
L2	Contrast Estimate		37267.946
	Hypothesized Value		0
	Difference (Estimate - Hypothesized)		37267.946
	Std. Error		670.487
	Sig.		.000
	95% Confidence Interval for Difference	Lower Bound	35859.305
		Upper Bound	38676.588

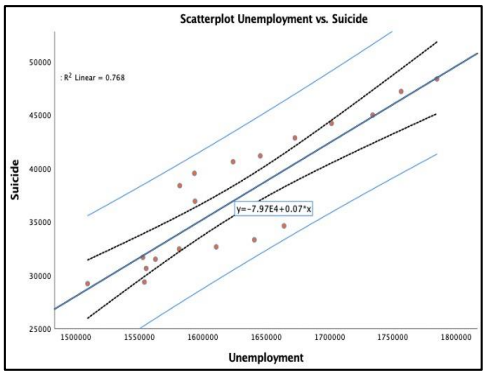
Note: a. Based on the user-specified contrast coefficients (L') matrix number 1
b. L1. One unit outside of the range of the data when *Unemployment* = 1

The predicted suicide rate for L1: *One unit outside of the range of the data = 48,446*. The standard error of *1595.942* relates to a measure of the variability (uncertainty) of the prediction. We use the 95% confidence intervals (CI) for describing the variability in the predictions. 95% confidence intervals range from a lower bound of *45094.04* to an upper bound of *51799.946*. We conclude that the mean predicted suicide rate for one unit outside of the data range is *48446.996*, 95% CI (45094.04 to 51799.946). As such, we can be 95% confident that the true mean of the total suicide rate is between 45094.04 to 51799.94.

Similarly, the predicted suicide rate for L2, *Average annual unemployment rate* = 37267.946. The standard error of 670.487 relates to a minor variability (uncertainty) of the prediction. Using the 95% CI to describe the mean prediction variability, we conclude that the mean predicted suicide rate for the Average annual unemployment is 37267.94, 95% CI (45094.04 to 51799.94). We are 95% confident that the total suicide rate's true mean is between 35859.305 to 38676.588. Based on the prediction equation above, the following scatterplot (Figure 2) is obtained for observed versus predicted values:

Figure 2

Observed Versus Predicted Values

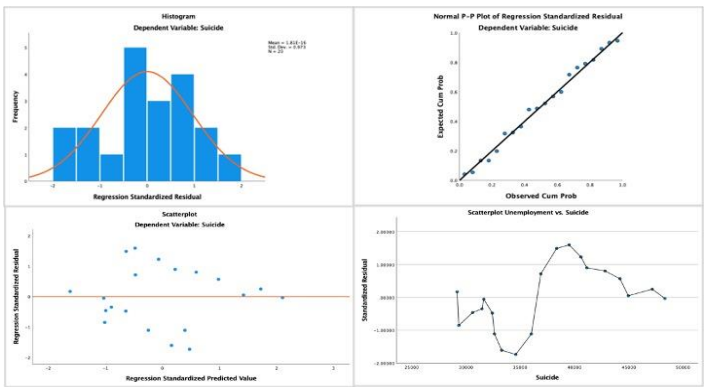


3.6 Assumptions

3.6.1 Normality Reviewing the histogram (Figure 3)., the sample size (n=20) from a normal distribution, plotted out as a histogram. The histogram appears bell-shaped, with a peak in the middle and fairly symmetrical, indicating the assumption of normality has been met. The P-P plot contrasts the data set's empiric cumulative distribution function with the given theoretical cumulative distribution function. The Normal PP Plot of Regression is approximately linear, confirming that the residual variables are normally distributed.

Figure 3

Assumptions



3.6.2 Homoscedasticity & Linearity We review the assumption of equal error variances by inspecting a plot of the unstandardized or standardized residuals against the predicted values or standardized predicted values (Figure 3). We conclude that the relationship between the response variable and predictors is zero. The residuals are distributed uniformly about zero, suggesting that the model's projections are accurate on average rather than systematically disproportionate. As such, we conclude that the assumption of homoscedasticity is met. Additionally, the regression implies that the residuals have a normal distribution where the degree of dispersion is uniform for all fitted values. There is no discernable pattern to the plot; therefore, we conclude that the linearity assumption is reasonable.

3.6.3 Multicollinearity A variance inflation factor (VIF) (Table 4) value greater than ten or a tolerance smaller than 0.1 may indicate an issue with multicollinearity [16]. Among the independent variable, all the VIF values are smaller than 2.5; therefore, the correlation matrix does not contain any large correlation coefficients that indicate multicollinearity (*Tolerance* = 1.000, *VIF* = 1.000).

Table 4

Variance Inflation Factor (VIF)

Coefficients[a]

Model		Collinearity Statistics	
		Tolerance	VIF
1	Unemployment	1.000	1.000

Note: a. Dependent Variable: Suicide

I. Results

RQ1*: Is there a statistically significant relationship between unemployment and suicide rates?*

A simple linear regression was conducted to explore the association between unemployment and suicide. The scatterplot showed a strong positive linear relationship between the two, which was confirmed by Pearson's correlation coefficient of $r(0.876)$. From the significance test p-value ($p = 0.001 < \alpha = .05$), we conclude there is a strong, positive correlation between unemployment and suicide, which was statistically significant (r=.876, n=20, p<.0001).

A simple linear regression was carried out to test if unemployment significantly predicted suicides. The results of the regression showed that model is significant, $F(1, 18) = 59.58$, $p < .001$, R^2 =76.8. It is found that unemployment significantly predicted suicides ($\beta_1 = .072$, $t(7.719)$, p<.001). The coefficient of determination shows 76.8% of the variation in suicide can be explained by the model containing only unemployment. The final predictive model is:

Total Suicide = -79650.19+ .072(*unemployment*).

The scatterplot of standardized predicted values versus standardized residuals showed that the data met the homogeneity assumption of variance and linearity and the residuals were approximately normally distributed. These results further suggest that the model is a substantial predictor of Suicides and there is a significant linear relationship between the Unemployment and Suicide variables. Taken together, we conclude that a significant relationship exists between the two variables where a higher Unemployment rate will result in an increased number of Suicides.

IV. Discussion

As communities remain quarantined and socially distant, unemployment will continue to increase, causing greater financial hardship for families and individuals [1]. Social distancing increases isolation, which weakens the bonds that connect individuals to make a functioning community. This contributes to social exclusion, which, if left unchecked, will lead to relational degradation and potentially self-harm [4], [5], [20]. Social isolation and depression have been correlated with multiple mental health disorders, and the findings of several tests have detected significant links between social isolation and suicide [20]. In this context, preventing suicide needs urgent consideration. Robust social policies and funding are required to ensure adequate support services are available in communities with reduced or unexpected income loss due to the pandemic. Over the coming months, mental health facilities need the capabilities to treat and monitor individuals experiencing psychiatric degeneracy, heightened trauma related to isolation, unemployment, or suicidal behaviors. Emergency efforts need adequate financing and thought leadership, where legislators should recognize subsidized expenditure tools to include increased budgetary planning to assist public health and communities in the aftermath of the COVID-19 crises.

The prevention of suicidal attempts and related deaths involves dynamic interventions [3], including public awareness, primary care, and access to mental health treatments. Where possible, immediate investments should be made towards mental health treatments and evidence-based prevention programs. In terms of suicide prevention/interventions, a multilevel systems approach could be beneficial. Primary intervention strategies and resources deter suicide attempts, minimize risk factors, and encourage protective features associated with ending suicide. Programs should provide instructional materials for suicide prevention and leverage dynamic digital marketing strategies such as social networking, text messages and behavior-based advertising to raise awareness and provide information on crisis assistance. Secondary programs should emphasize mitigating the immediate detrimental influence, treatment, or consequences of suicide actions. Additionally, programs could also offer crisis therapy to households recovering from a family member's death. Tertiary prevention programs should incorporate long-term initiatives that deal with the repercussions and after-effects of suicide, including outpatient support groups, counseling and therapy. Programs should offer ongoing treatment to suicide survivors (various support groups) and increased integration of services and resources, such as improving systematic intelligence and data collection to understand better the causation and links that provoke suicide events.

Technology-based solutions can offer powerful new tools in the battle against suicide. Technology programs should contain integrated virtual treatment options, telehealth practices, and dynamic reporting within areas vulnerable to suicide. Strategies that leverage telepsychiatry could be used to increase

access to mental health in underserved populations or areas where they may not be readily available [21].

Additionally, data analysis and predictive modeling are required to guide resources towards the population(s) experiencing the greatest distress [12]. Leveraging rapid and real-time data could help identify and mitigate suicides in high-risk geographic areas.

Although these approaches may appear novel, concepts such as integrated geospatial research, exigency tracking, and real-time reporting may lead to significant advances in detecting and intervening in suicidal activity. The degree of penetration of these programs, based on early demographic modeling, is more likely to impact populations, particularly indigenous, urban and low-income communities [9], [22], [23]. Blending dynamic care and programs from individual-level assertive aftercare, psychosocial and public health initiatives to target high-risk demographics can enhance awareness and increase the visibility and efficacy of suicide prevention and intervention programs.

V. Conclusion

Results of the simple linear regression reveal a significant relationship exists between unemployment and suicides, ($F(1, 18) = 59.58$, $p<.001$, $R^2=.768$), concluding that unemployment is a substantial predictor of Suicides, where a higher unemployment rate will result in an increased number of suicides. The inextricable correlation between unemployment and suicide suggests the lack of wages and a worsening of living standards fosters psychological degeneration, which increases the number of suicides connected with the COVID-19 pandemic. Given significant indications of the psychosocial impacts of pervasive unemployment, we recognize the COVID-19's effect on suicide rates is far from predetermined.

Identifying suicidal risk behaviors early and delivering successful, timely strategies are essential to reduce suicide within communities. Suicide is preventable; therefore early, and concerted actions such as multilevel system approaches, early intervention, crisis-treatments, subsidized funding, and technology-based solutions can prevent or eliminate a suicide or other self-harm/mental health-related event. Recognizing the connection between unemployment and suicide will help create proactive strategies to improve the economy, raise suicide awareness, and introduce complex preventive initiatives that will successfully mitigate suicidal behaviors.

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