Trade off between economic development and suicide rate

Nathalia Martínez(00320858)/ David Jiménez E.
(00217160)/ Domenika Vargas (00211306)

March 16, 2024

Abstract

Suicides are a worrying issue, as around 700,000 people commit suicide annually. In this project we seek to clarify the relationship between the suicide rate and economic development in the world. To achieve this, we created our own database of suicides for the years to be analyzed, 2009 and 2012. This database was obtained from data from the World Bank and the United Nations Development Program. We used multiple regression using countries as observations to estimate the relationship between the suicide rate based on macroeconomic variables such as inflation, GNI per capita, government spending on health, unemployment rate, Gini index. , and other variables that are also related to the suicide rate, such as access to electricity and forest area. In our findings we realized that the relationship between suicides and the economic growth variables selected for the model change over the years, because the economy is dynamic. Therefore, it would be recommended for future analyzes to carry out a study that can take into account how the variables behave over time and interact with the suicide rate variable.

Introduction

According to the World Health Organization, nearly 700,000 people commit suicide annually. (WHO, 2021). However, this alarming rate, which in 2000 represented 13%, has been decreasing to such an extent that in 2009 it was 9% per thousand inhabitants. (World Bank, sf). However, it is worth questioning the causality of this event. Could it be correlated with economic growth? Although current anti-system currents affirm the positive and significant correlation between the decline in mental health and economic boom (Feldman, 1985), we must ask ourselves if this relationship really exists.

In*Associations Between the Macroeconomic Indicators and Suicide Rates in India: Two Ecological Studies*, macroeconomic variables such as GDP, trade balance, inflation and unemployment are correlated with the suicide rate. Additionally, it is found that there is a strong correlation between total medical expenditure and the suicide rate (Rajkumar et al., 2015). Ibidem, we find that the trade balance and the suicide rate are significantly associated with the suicide rate in India, which implies that given the recent economic growth in India, this is associated with the suicide rate. Therefore, a well-achieved equitable distribution through macroeconomic policies can help reduce suicide rates in the population in India.

Among the most relevant macroeconomic variables that may have an impact on the suicide rate is inflation, since it affects the daily lives of consumers and creates a feeling of instability. According to *Relationship of suicide rates with climate and economic variables in Europe during 2000-2012*Male suicides are found to be correlated with a high unemployment rate in the context of a high growth rate and inflation while having a low GDP per capita. In contrast, female suicides were negatively correlated with inflation (Fountoulakis et al., 2016). Which implies that the macroeconomic environment affects men and women differently.

Within one of the factors that affect the suicide rate, it was found that the Gini index plays a vital role. According to*Income Inequality by Gini-Coefficient on Suicide Death in Iran: A Review of National Data*Suicides are positively correlated with income distribution (Veisani et al., 2019). Ibidem, the multiple linear regression method is used and the conclusion is reached that the suicide rate occurs more in provinces with higher Gini coefficients. This is something completely intuitive, since the more people are unequal, the more they will want to commit suicide since the population is not interested in absolute terms of well-being, but rather in relative ones.

Among other factors that affect suicide are green spaces. As mentioned in *Green space and suicide mortality in Japan: An ecological study*, we see that suicides have an inversely proportional relationship with green spaces (Jiang et al., 2021). This means that the more green areas there will be the lower the suicide rate. On the other hand, access to electricity affects the suicide rate. In*Does increasing energy or electricity consumption improve quality of life in industrial nations?*We are told that per capita energy and electricity consumption is highly correlated with various quality of life indicators (Mazur, 2011). Therefore, it is interesting to explore access to electricity with its effect on improving quality of life and its impact on the suicide rate.

According to the aforementioned literature, the present study seeks to estimate the relationship between the suicide rate

cides of a country relative to macroeconomic variables, gini index, extreme poverty, GNI per capita, unemployment with others such as access to electricity, forest area and economic progress itself. In order to analyze the trade off between economic development and suicide rates in the world and to establish whether economic growth really has an impact on the suicide rate.

Methodology and Data

Methodology

The methodology of this study can be considered simple, since a multiple regression is proposed using ordinary least squares. Such that it is decided to use a log-level model of the form

$$\begin{aligned}\ln(Yes) = {} & \beta_0 + \beta_1 \text{Forest area} + \beta_2 \text{Access. electricity} + \beta_3 \text{Inflation} + \beta_4 \ln(\text{GNI per capita}) \\ & + \beta_5 \text{Gross Savings} + \beta_6 \text{Health Expenditure} \\ & + \beta_7 \text{Poverty Gap} + \beta_8 \text{Gini} + \beta_9 \ln(\text{Unemployment}),\end{aligned} \tag{1}$$

where ln(*Yes*)is the natural logarithm of the suicide rate. We must remember that the data obtained comes from a cross section (*Cross - Section*), therefore each observation represents a country at a given time. While for the model we proceed to obtain the natural logarithms of the

variables such as the suicide rate, the gross national income per capita and the unemployment rate to reduce biases, and get closer to a normal distribution, we also seek to simplify the interpretation of the coefficients.

Data

Most data comes from the World Bank, both the Global Economic Monitor (World Bank, b), as well as from the open database of the world bank (BancoMundial, a). However, for the Human Development Index, it has been obtained by the United Nations Development Program (UNDP, sf).

Additionally, some countries do not report their macroeconomic statistics, therefore, regional groups have been identified and the missing values have been replaced (*missing values*) by the regional average. In order to be able to control the business cycle, that is, when an economy is booming or in recession, we have decided to take three periods: 2008 and 2012, to be able to control the financial crisis, the boom of the oil economies due to the spring Arab.

Descriptive statistics

The dependent variables of the model are the general suicide rates, of men and of women in the years 2009 and 2012. The lowest year was 2012, where its average is lower in the three aspects while in 2009 we can observe that the The general suicide rate for men and women is higher and there is a high standard deviation for all three. Due to the dispersion of the data, it can be concluded that we will have higher suicides in other countries than in the average. The difference between 2009 and 2012 for the general suicide rate is 1,452%, so suicides worldwide decreased by

That percentage, on the other hand, in the male suicide rate there was a high decrease with a percentage of 2.26% and lastly we have the female suicide rate there is a decrease, but not as large as that of men, but it was significant. 0.725%.

Year 2009					
Variable	**N. Observations**	**mean**	**Std. Dev.**	**min**	**Max**
T. Suicides	159	10.8956	8.734895	. 7	63.3
T. Male Suicides	159	16.84906	14.70822	1.5	102.8
T. Female Suicides	159	5.125786	3.869046	0	26
Forest area	159	31.90465	23.71813	0	98.10232
Access. Electricity	159	77.31575	31.30763	1.9	100
Inflation (Cons. Prices)	159	4.116185	4.320911	-6.811161	19.24695
GNI per capita	159	11126.62	15394.38	304.97	81572.33
Gross Saving (%GDP)	159	21.54003	18,529	- 5.47927	218.7759
Gov. Health Exp (%GDP)	159	3.36239	2 315222	.1870582	11.28293
Extreme Poverty	146	3.830723	5.489339	0	20.1
Gini Index	146	38.45082	7.621423	24.8	61
Total Unemployment Rate	159	7.600389	5.396992	. 31	28,025
Male Unemployment Rate	159	7.075616	5.090174	. 125	24,461
Female Unemployment Rate	159	8.814422	6.716013	. 363	37

Table 1: Descriptive Statistics, year: 2009

Year 2012					
Variable	**N. Observations**	**Half**	**Std. Dev.**	**min**	**Max**
T. Suicides	159	9.442767	7.823548	. 6	72.4
T. Male Suicides	159	14.58742	12.78517	. 6	116
T. Female Suicides	159	4.400629	3.475402	. 3	30.1
Forest area	159	31.38093	23.29787	0	97.49058
Access. Electricity	159	84.91486	24.98881	8.4	100
Inflation (Cons. Prices)	159	5.17281	20.78732	- 3.233389	255,305
GNI per capita	159	12785.39	17223.88	279.1155	85303.59
Gross Savings (%GDP)	159	22.86871	8.368271	-3.512556	47.71465
Gov. Health Exp (%GDP)	159	3.560344	2.294975	.1206149	10.12506
Extreme Poverty	131	2.607521	6.274274	0	32.1
Gini Index	131	36.14143	6.764855	23.2	53.5
Total Unemployment Rate	159	6.706522	5.243837	. 1	28.47
Male Unemployment Rate	159	6.141026	4.736513	. 071	26,803
Female Unemployment Rate	159	7.979992	6.927859	. 178	36,442

Table 2: Descriptive Statistics, year: 2012

On the other hand, the variable of access to electricity is greater in 2012, meaning that

Access to electricity has increased due to different factors. Access to electricity in 2009 was lower by 7.6%, explaining that as time goes by, access to electricity is a little easier. In 2009, the forest area was 0.5% greater than in 2012, while its standard deviation explains that since the data are so dispersed, the forest area varies greatly from one country to another.

Meanwhile, regarding the inflation variable we notice that for the year 2009 the variable is lower than 2012, which means that the inflation variable experienced an increase of 1.05%. It should be taken into account that the standard deviation tells us that inflation varies too much between countries. On the other hand, the health spending variable has a low average compared to 2012, as it barely increased by 0.2%, while its deviation explains that health spending is not very dispersed from the average in the countries of the world, which which tells us that countries I don't know are very far from the world average budget.

When analyzing the GNI per capita variable we can take into account that for the year 2009 it is lower than the year 2012, with the GNI per capita variable experiencing an increase of1.658dollars, with a standard deviation greater than the mean, which indicates that the GNI per capita variable varies greatly from country to country. While for the gross savings variable it is seen that it experienced an increase in the average of 1.32% from 2009 to 2012, while we can observe that its standard deviation suffered a decrease from 2009 to 2012 of around 10%, which which indicates a greater tendency to save by the countries and a lower dispersion distribution of this variable for 2012.

While for the GINI index variable we can observe that between 2009 and 2012 its mean suffered a decrease of 2.31 points and the standard deviation also presented a reduction of around one point, which in general tells us that the world is less unequal in 2012. While the extreme poverty variable presents a decrease in the mean between 2009 and 2012 of around 1.2, and its standard deviation for both cases was greater than the mean, but from 2009 to 2012 it increased by more or minus 1.19; indicating a little more dispersion in the 2012 data.

For the unemployment rate variables, both the general unemployment rate and the unemployment rate for men and women, there is a decrease in 2012, so it can be intuited that in 2009 the population had a higher unemployment rate than in 2012. Likewise, it can be seen that the standard deviation of these variables is very high, so in different countries their unemployment rate will be higher than that of others. In 2012 we can see that the general unemployment rate decreased by almost 1% while for men it was 0.93% and for women it decreased 0.83%, so we see that the unemployment rate for women did not decrease in the same magnitude as the male unemployment rate.

Correlations and covariances between variables

For 2009, the female suicide variable has a correlation of -0.0157 and a covariance of -0.6 with the extreme poverty variable, which means that both will decrease at the same time, although not as strongly. Now if we analyze the suicide rate of men with gross savings we have a correlation of -0.05, with a covariance of -0.3182, both decrease in the same direction.

Then we found a positive relationship between the general suicide rate and unemployment, with a cor-

weak relationship of 0.1695 and a covariance of 0.69, which implies that both grow at the same time. When analyzing the Gini index, we see that there is a correlation of -0.186 and a covariance of -1.08, so the relationship is negative and both decrease at the same time. If we analyze it against the forest area we see that they have a correlation of 0.0983 and a covariance of 1.75, which implies that it has a positive relationship, so both grow together. Doing the analysis we have that the suicide rate of men with gross savings has a correlation of -0.07, with a covariance of -1.13, both decrease in the same direction. In 2012, the dependent variable female suicides has a correlation of -0.0192 and a covariance of -0.09 with the variable extreme poverty, which means that their relationship is negative and that both will decrease at the same time. We then found a positive relationship of the general suicide rate with unemployment, with a weak correlation of 0.0307 and a covariance of 0.115, which implies that both grow at the same time. The relationship between the general suicide rate and the Gini index is negative since it has a correlation of -0.246 and a covariance of
- 1.19 so they decrease at the same time. If we analyze it against the forest area we see that they have a correlation of 0.16 and a covariance of 2.67, which implies that it has a positive relationship with the suicide rate, so both grow together.

When carrying out correlations on the independent variables, it was verified through a bivariate analysis that they were not linearly dependent on others. Furthermore, to verify that there are no dependent variables, we performed a multicollinearity test of the control variables of the regressions applied to the regressions. This test was carried out using the vif command,*variance inflation factor*, in the results we obtained that no variable exceeded 10 of the vif, nor 1/10 of 1/vif, so there is no multicollinearity in the model.

Discussion

2009 results

A year after the international financial crisis broke out, we see that there is a positive and statistically significant coefficient (except for women) for inflation. We know that the positive change in inflation implies that an increase in inflation is associated with a 3.5% increase in the overall suicide rate. In the case of men, it implies that an increase of one inflation unit implies that the suicide rate of men increases by 4%, this relationship being statistically significant. While it is interesting to see how for women a change in inflation represents 1.7% of their suicide rate, being not statistically significant. This is probably due to the lack of planning by households when noticing higher prices, as was evident in*macroeconomy in the global economy*, people tend to be slow to respond to the stimuli of inflation, since it grows much faster than their average income (Larraín & Sachs, 2002). Therefore, it would be expected that given the uncertainty of daily life and its prices caused by inflation, the population would tend to become more depressed.

In the proportion of forest area, it is estimated that with a percentage increase in forest area (relative to total land) it is associated that the suicide rate increases between 0.5 and 0.6%, this being a significant relationship both at a general level, as for men and women. This may have to do with the fact that people have more space in green areas than in other spaces to

	(1)	(2)	(3)
Year 2009	Ln(Suicide Rate)	Ln(Suicide Rate Male)	Ln(Suicide Rate Female)
Forest area (% of land area)	0.005**	0.006**	0.006**
	(0.003)	(0.003)	(0.003)
Access to electricity (% pop)	- 0.006	- 0.005	- 0.008**
	(0.004)	(0.004)	(0.004)
Inflation, consumer prices (annual %)	0.035**	0.040***	0.017
	(0.015)	(0.015)	(0.016)
Ln(GNI per capita (constant 2015 US$))	0.051	0.054	0.010
	(0.079)	(0.080)	(0.081)
Gross savings (%GDP)	- 0.002	- 0.002	- 0.001
	(0.003)	(0.003)	(0.003)
Domestic general government health expenditure (% of GDP)	0.100***	0.104***	0.094**
	(0.036)	(0.037)	(0.037)
Poverty gap at $1.90 a day (2011 PPP) (%)	- 0.017	- 0.019	- 0.015
	(0.019)	(0.020)	(0.020)
Gini index	- 0.019**	- 0.017**	- 0.019**
	(0.008)	(0.008)	(0.008)
Ln(Unemployment, % ILO)	0.121		
	(0.077)		
Ln(Unemployment, male % ILO)		0.148**	
		(0.075)	
Ln(Unemployment, female % ILO)			0.088
			(0.077)
constant	2,124***	2,278***	2016***
	(0.742)	(0.754)	(0.760)
Observations	146	146	145
R-squared	0.209	0.244	0.144

Standard errors in parentheses
* * * p<0.01, **p<0.05, *p<0.1

Table 3: Results of equation (1) for 2009.

commit suicide, because for example it would be easier for them in those spaces to hang from a tree, jump off a cliff or do any other activity that causes them harm. In*Why Do People Hang Themselves on Trees? An Evaluation of Suicidal Hangings on Trees in Konya, Turkey, between 2001 and 2008*It is noted that of 378 suicides, 185 of these were carried out by hanging under a tree (Dogan et al., 2015). Furthermore, in *Epidemiology of asphyxiation suicides in the United States, 2005-2014*, we talk about suicides due to asphyxiation in the United States, where among the 5 places where suicides were committed were the house, park, playground, forest or natural area, or area of public use (Yau & Paschall, 2018). And although previous literature tells us that green spaces should reduce the suicide rate, we also see that new literature suggests that suicidal people do tend to seek out forest areas to isolate themselves and commit suicide.

Likewise, it is surprising to see that if there is an increase in one unit of public spending on health, the suicide rate increases between 9 and 10%, being statistically significant for the general suicide rate, that of women and that of men. . However, this variable causes noise, since more and better diagnoses can be made and people tend to become depressed when they learn that they suffer from a chronic illness. In fact, it is known that chronic diseases cause major depression that can subsequently lead to suicide (Katon & Ciechanowski, 2002). Additionally, it should be taken into account that this model does not capture the fact that the improvement in people's mental health through

of the increase in health expenses, takes time given that mental and personality disorders that unfortunately end in suicide are difficult to detect and treat.

Meanwhile, for the unemployment rate we observe that the coefficient that accompanies the control variable is positive. This relationship between the suicide rate and the unemployment rate is quite consistent with what is intuitively expected, since if the unemployment rate increases, people tend to become depressed by not finding a constant source of income and by feeling uncertainty in their daily lives. Thus, we see that if the unemployment rate increases by 1%, the suicide rate experiences an increase of between 1.7 and 1.9%. According to*Unemployment, Self-esteem, and Depression: Differences between Men and Women*, we see that unemployment leads to a greater loss of self-esteem in men that often culminates in depression, this derived from the fact of not being able to fulfill the role of providers in their family (Álvaro et al., 2019). We see then in our regression that unemployment is only statistically significant for men, this is in accordance with the literature and shows us that in societies where men fulfill the role of provider, and are in the middle of a crisis with risk of losing their job, they may be mentally affected by job instability and their inability to fulfill their role as providers within the family.

Finally, if we look at the relationship that the suicide rate has relative to the gini coefficient, where values close to 0 imply perfect equality and values at 1 greater inequality, we find that a percentage increase in inequality implies a decrease of between 1.7 and 1.9% in the suicide rate. Which is counterintuitive, it is probably related to a decrease in the pressure to achieve success experienced by the new population that adds to the inequality gap, that is, those who become poorer. Well, it is known that people with fewer resources tend to have a more precarious education, and as such, the pressure for academic and work success decreases. In*Suicide on campus and the pressure of perfection*, the idea is supported that university students who are pressured to perform perfectly in their academic area tend to commit suicide more (Scelfo, 2015). So from the point of view where happiness is based on tranquility and the lack of social pressure to succeed, suicides could be reduced or attenuated by inequality. The same explanation could equally support why with an increase in extreme poverty, the suicide rate drops between 1.5 and 1.9%.

2012 results

In 2012, in a year of prosperity for economies related to oil, an interesting change compared to 2009 is that inflation considerably reduced its influence on the suicide rate. Well, an increase in inflation would lead to an increase of between 0.05 and 0.07% in the suicide rate, and this is only statistically significant for the general suicide rate and the female suicide rate. This is perhaps due to the fact that in a period without a crisis like 2012, inflation does not affect people's lives as much, since experiencing a growing economy the effects of inflation are felt less. Women may experience a higher suicide rate with higher inflation because they are constantly exposed to prices, which can cause them stress and depression that when prices rise due to inflation they cannot afford to have essential goods or necessary.

Another variable that showed a drastic change in 2012 is unemployment. Well with an increase

	(1)	(2)	(3)
Year 2012	Ln(Suicide Rate)	Ln(Suicide Rate Male)	Ln(Suicide Rate Female)
Forest area (% of land area)	0.008***	0.009***	0.008***
	(0.003)	(0.003)	(0.003)
Access to electricity (% pop)	- 0.000	- 0.000	0.001
	(0.006)	(0.006)	(0.006)
Inflation, consumer prices (annual %)	0.005*	0.004	0.007**
	(0.003)	(0.003)	(0.003)
Ln(GNI per capita (constant 2015 US$))	0.052	0.049	0.006
	(0.077)	(0.082)	(0.081)
Gross savings (%GDP)	0.002	- 0.000	0.010
	(0.008)	(0.008)	(0.008)
Domestic general government health expenditure (% of GDP)	0.097**	0.100**	0.115***
	(0.037)	(0.040)	(0.039)
Poverty gap at $1.90 a day (2011 PPP) (%)	0.027	0.027	0.029
	(0.017)	(0.018)	(0.018)
Gini index	- 0.036***	- 0.037***	- 0.035***
	(0.010)	(0.010)	(0.010)
Ln(Unemployment, % ILO)	- 0.015		
	(0.073)		
Ln(Unemployment, male % ILO)		0.004	
		(0.073)	
Ln(Unemployment, female % ILO)			0.012
			(0.075)
constant	2,096***	2,580***	1,336*
	(0.759)	(0.808)	(0.798)
Observations	131	131	131
R-squared	0.269	0.259	0.265

Standard errors in parentheses
* * * p<0.01, **p<0.05, *p<0.1

Table 4: Results of equation (1) for 2012

of the unemployment rate, the suicide rate increases between 0.4 and 0.5% and only decreasing in the suicide rate in the general unemployment rate with 0.1%, in addition this variable is no longer statistically significant. Furthermore, we know that the number of unemployed people and its relationship with the probability of committing suicide is complex, given that it depends on the time that the individual is unemployed, so we should try to obtain the average time of unemployment by country. , to be able to control this parameter.

We can also observe that government spending on health does not present a significant change. The latter is due to the fact that despite whether an economy is in crisis or periods of prosperity, the government has to continue spending a similar amount each year, since people continue to need various medical treatments for their afflictions, and it is It continues to present a positive relationship with the suicide rate due to the causes previously mentioned.

The Gini Index variable does not show changes in a contrintuitive relationship and a negative sign. However, it does show changes in its magnitude because in 2012 we appreciated that if there is an increase of one unit in the Gini Index, the suicide rate will decrease between 3.5 and 3.7%.

A variable that has presented interesting changes is Gross Savings, as it tells us that with an increase in Gross Savings we have an increase in the suicide rate between 0.1 and 0.2%. Although it is not statistically significant, it is interesting to analyze its reason, this could be due to the

fact that we are not in an economy in crisis. Human beings tend to think that when things are calm they will continue to stay that way. So in a quiet year, and where the economy grows, people no longer think about the adversities of the future, but rather about living in the present. So having to save would mean giving up a little bit of current happiness, which could lead to discontent in my current life and which could lead to an increase in the suicide rate.

In 2012, a small change is observed in the forest area, which is still statistically significant for the model. We see that on average an increase in forest area will give us an increase in the suicide rate of between 0.08 and 0.09%, which is not an abruptly significant change. But in addition to what was detailed above, it is also likely that it is because people, being alone within large park areas, tend to have more suicidal thoughts and more privacy to carry them out. Such is the case of Aokigahara, the suicide forest in Japan, famous for the multiple suicides that were committed within the place (BBC, BBC).

Conclusions

In the analysis it is observed that the regressions currently made make up a specific point of the economy today, which are like specific photographs of the economy. Well, they only let us see what is happening at that moment, leaving aside the rest of the panorama. The current tools used in the model make the economy look static, when in reality it is dynamic. To reach a more accurate conclusion about the relationship between economic growth and the suicide rate, we need to have more photographs in succession, or a complete video of the economy that allows us to appreciate the panorama in the most complete way possible. Therefore, other techniques such as panel data analysis would be needed to further explore how these variables behave over time, and in this way understand their relationship.

The observations were made up of countries, and due to the great dispersion of the samples and the wide variance between the data, we conclude that using the OLS method is not exactly the best method to analyze this relationship. Other tools that consider the problem of heteroscedasticity and solve it must be taken into account. Well, you can have it by presenting observations that are very different from each other. Another strategy to evaluate the relationship between economic growth and suicide rates could be to analyze each country over time with a regression of suicide rates as a function of macroeconomic variables, taking each year as an observation, after which make a comparison between all countries in the world.

References

Álvaro, JL, Garrido, A., Pereira, CR, Torres, AR, & Barros, SC (2019). Unemployment, self-esteem, and depression: Differences between men and women.The Spanish journal of psychology ,22 .

World Bank. Open database.

World Bank. Global economic monitor (gem) | databank.

BancoMundial (sf). Suicide mortality rate (per 100,000 inhabitants) | data.

BBC. This is Aokigahara, the suicide forest in Japan where YouTuber Logan Paul recorded his controversial video in which a corpse appears.BBC News World .

Dogan, K.H., Demirci, S., & Deniz, I. (2015). Why Do People Hang Themselves on Trees? An Evaluation of Suicidal Hangings on Trees in Konya, Turkey, between 2001 and 2008.Journal of Forensic Sciences , 60 , S87–S92.

Feldman, S. (1985). Mental illness and the economy.Bulletin of the Pan American Sanitary Office (OSP);98(3),Mar. 1985 .

Fountoulakis, K.N., Chatzikosta, I., Pastiadis, P., Kawohl, W., Kerkhof, T., Danileviciute, V., Gonda, X., Rihmer, Z., Forsman, J., Grady, A., Hyphantis, T., Dieset, I., Soendergaard, S., Pompili, M., & Bech, P. (2016). Relationship of suicide rates with climate and economic variables in Europe during 2000–2012. Annals of General Psychiatry ,fifteen (1), 19.

Jiang, W., Stickley, A., & Ueda, M. (2021). Green space and suicide mortality in Japan: An ecological study.Social Science & Medicine ,282 , 114137.

Katon, W. & Ciechanowski, P. (2002). Impact of major depression on chronic medical illness.Journal of Psychosomatic Research ,53 (4), 859–863.

Larraín, F. & Sachs, JD (2002).macroeconomy in the global economy (3rd ed.). Pearson Education. Google-Books-ID: DbBQpI7W0ssC.

Mazur, A. (2011). Does increasing energy or electricity consumption improve quality of life in industrial nations?Energy Policy ,39 (5), 2568–2572.

UNDP (sf). Human development index.

Rajkumar, A.P., Senthilkumar, P., Gayathri, K., Shyamsundar, G., & Jacob, K.S. (2015). Associations between the macroeconomic indicators and suicide rates in india: Two ecological studies.Indian Journal of Psychological Medicine ,37 (3), 277–281.

Scelfo, J. (2015). Suicide on campus and the pressure of perfection.New York .

Veisani, Y., Delphisheh, A., Valizadeh, R., & Kikhavani, S. (2019). Income inequality by gini-coefficient on Suicide death in Iran: A review of national data.Iranian Journal of Public Health ,48 (8), 1512–1517.

WHO (2021). Suicide.

Yau, R.K. & Paschall, M.J. (2018). Epidemiology of asphyxiation suicides in the United States, 2005–2014.Injury Epidemiology ,5 (eleven.