Economic Conditions and Mental Health in Thailand

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Abstract

Background

There is a continual rise in the number of people suffered from mental disorder around the world. Several factors are believed to be connected to the development of mental disorders. Apart from health factors, mental disorders could also be caused by the economic and social factors associated with the patients. However, none of the existing literature has provided the analysis by taking into account all the possible causes together. This paper attempts to fill this gap in the literature by ascertaining the relationship between economic and social factors in relation to mental disorders.

Methods

Using the number of mental disorder cases in all 77 provinces in Thailand during the period 2015 to 2017, this paper uses either a fixed effects or a random effects model, depending on the results of the Hausman test, to analyse the effect of economic and social factors on the number of mental disorder cases in Thailand.

Results

Generally, we found that better economic situations, as measured by higher GPP per capita, higher employment rates and lower household debt, help reduce mental disorder rates, while social factors such as greater health service accessibility and lower technology accessibility also reduce the number of mental disorder cases. However, death and divorce rates are not consistent in their effect on mental disorder rates, their impact seeming to depend on what type of mental disorder is being considered.

Conclusions

When considering different types of disorders, we found that they could be affected by each of these factors in different ways.

Background

In recent years, mental health problems have become an important issue in many countries, with a continual rise in the number of people suffering from such disorders. In 2018, around 264 million people worldwide were suffering from depression, around 45 million from bipolar disorder, and around 50 million from dementia [1]. According to WHO, mental disorders are mental illness conditions associated with abnormal emotions and behavior, with examples being depression, schizophrenia, personality disorders, anxiety disorders, and intellectual disabilities. Such disorders have become a serious problem in Thailand. According to the Department of Mental Health [2], there was a 76.77 percent increase in the number of people suffering from mental disorders, from 1,510,279 in 2015 to 2,669,821 in 2017. This included a 30.69 percent increase in the number of people with associated symptoms mainly due to mental disorders, from 16,186 in 2015 to 21,115 in 2017. In the same period, the number of people receiving mental disorder treatment in hospital rose from 7,971 to 8,458 per day.

Figure 1 shows the increases in the numbers of different categories of mental disorder cases in Thailand. Over the 3 year period, cases of schizophrenia rose from 5,325 to 6,209; of depression from 3,119 to 3,683; suicide attempts rose from 58 to 284; and other mental disorders rose from 2,087 to 2,804 cases. Even though cases of anxiety

disorder fell from 5,598 to 5,175 between 2015 and 2017, this is considered a small fall compared to the increase in other types of mental disorders in Thailand.

Source

Department of Mental Health, Thailand [3]

Several factors are believed to be connected to the development of mental disorders, including perinatal infection, exposure to environmental hazards, patient genetics, chemical imbalances in the brain, fluctuations in sex hormones, nutrition and physical health problems. Moreover, apart from health factors, mental disorders could also be caused by the economic and social factors associated with patients. The causes of mental health problems have been discussed widely in many studies. WHO [4] states that economic and political conditions, together with living standards, are possible factors which result in mental disorders. WHO demonstrates that low- and middle-income countries tend to have lower levels of treatment for mental disorders compared to higher income ones. Kurtzleben [5] shows that unemployment and poverty are also important factors that can lead to mental illness, while Cifuentes et al. [6] found that income inequality was a factor leading to depression. Aziz and Steffens [7] indicate that social problems, such as stress, grief and loss, and other adverse situations resulting in a lack of confidence, are also causes of depression.

Several papers have found that economic factors can lead to mental disorders. Rohde et al. [8] identified that economic risk, including job insecurity, financial dissatisfaction, income volatility and expenditure instability, had a negative effect on the mental health of a group of Australian adults. In addition, Cifuentes et al. [6] established that the higher the income inequality as represented by the Gini index, the greater the number of major depressive episodes, with the effect being higher in more developed countries. Hong et al. [9] found a positive relationship between income inequality and depression in Korea. This relationship was stronger during times of economic and national crisis. Moreover, income inequality was also found to be associated with other mental problems, such as thoughts of and attempts at suicide. Messias et al. [10] and Patel et al. [11] also demonstrated that income inequality could increase the risk of mental health in the US.

Many studies have found that unemployment is another important factor influencing mental disorders. Mujanovic et al. [12] identified a negative effect of unemployment on mental health, especially in the working age group in Bosnia and Herzegovina. Several studies have also found that unemployment is the main risk to mental health [13, 14, 15, 16], while others have demonstrated that unemployment and economic conditions can lead to an increase in specific types of mental disorder [17, 18, 19]. However, Martínez-Jiménez and Vall Castelló [20] found that a deterioration in labor market conditions could reduce mental illness, as shown by the reduction in anxiolytic medicine consumption. This was maybe because when unemployed, people spent more time looking after their health.

Roberts and Golding [21] studied the effect of economic conditions on students' mental health in the UK, finding that higher personal debt and long working hours could lead to more mental disorders. Molarius et al. [22] found that employment status and economic conditions were important factors related to mental disorders in Sweden, whereas educational factors were insignificant. In addition, Silva et al. [23] showed that economic crisis and the availability of mental health treatment could result in changes in the level of mental illness. Kurtzleben [5] explains that being unemployed leads to lower household income, and thus increases stress levels within families. This in turn increases the risk of mental disorders and depression. Linn et al. [24] demonstrate that the higher the unemployment rate in Miami and Florida, the greater the level of mental health problems. Moreover, this effect was

found to be more prevalent in women than men, and amongst those with lower self-esteem than those with greater support from family and friends. Drummond et al. [25] found that only gender had a significant effect on the risk of mental disorders in Brazil, while the World Health Organization [26] showed that economic factors, including unemployment, poverty, income inequality and debt, as well as social factors, such as education and family problems, could cause mental illness. On the other hand, Joshi [27] found that lower house prices reduced people's wealth, thus increasing the number of self-reported mental health issues in the US.

With regard to studies of Thailand, most papers have conducted their analysis using survey data focusing only on specific population groups. In addition, most have mainly focused on social factors. Jiranukool et al. [28] studied the effect of individual and social factors, such as gender, relationship status, physical health, and relationships with friends and family, on mental disorders amongst Mahasarakham University students attending the psychiatric clinic. They found that gender and the relationship status of students were the main causes of depression and anxiety disorders. Phunpho [29] considered factors influencing the mental health of non-commissioned police officers in Thailand, finding that stress at work, age, location, and relationships with family members could affect the mental health of the group. Srimuang and Roomruangwong [30] analyzed the relationship between depression and marriage satisfaction at the Infertility Clinic of King Chulalongkorn Memorial Hospital and showed that those who were not satisfied with their marriage had a higher risk of depression than those with successful marriages. In addition, Pandii [31] found that family relationships, such as the parental marriage situation, the relationship between children and parents, friendships, and relationship problems among young Thais aged between 18 and 24 studying at Sisaket Technical College were factors causing depression. Several papers on Thailand have examined the effect of physical health factors on mental disorders in the country. Churuchiraporn and Sasanus [32] found that factors causing postpartum depression included post-traumatic organic psychosis and schizophrenia. Wattanapan et al. [33] studied depressive disorders amongst patients at Srinagarind Hospital, KhonKaen province, Thailand, finding no relationship between age, gender, occupation and income, and the depression conditions of patients. However, spinal cord lesion, a physical illness, was found to be the main cause of depression. Bunloet [34] states that chronic diseases can lead to depressive disorders amongst the elderly in Thailand.

There are a limited number of studies of Thailand that examine both the economic and social factors that can result in mental disorders. Sengkrewkarm [35] studied the factors affecting depression amongst the elderly in Lumlukka District in Pathumthanee Province. She found that income and physical health had significant positive effects on symptoms of depression. Kaewjanta et al. [36] examined the risk of depression among pregnant teenagers attending antenatal clinics in Northeastern Thailand and found that unemployment, economic status and social support were important factors influencing depression among the teenagers.

Overall, there remains a gap in previous studies of Thailand as they only conduct their analysis using survey data of specific groups of the population, and mainly focus on the effect of either social or physical health factors on mental disorders. Moreover, they mainly focus on just one aspect of mental disorders, either depression or suicide rates. Therefore, this study will fill this gap by examining both the economic and social factors that influence mental disorders, using provincial data for the whole country. Several types of mental disorder are considered in the paper, namely schizophrenia, depression, anxiety and attempted suicide, amongst others. Furthermore, we also check the robustness of our results across different regions in the country. The results of our study will help shed more light on this issue in Thailand and will also provide policy implications.

Methods

To examine the effect of economic and social factors on mental disorders in Thailand, we used secondary data from various sources. The number of mental disorder cases in all 77 provinces in Thailand during the period 2015 to 2017 (the most up-to-date data available) were collected from the Department of Mental Health, Thailand. The economic factor data, including economic wellbeing (proxied by Gross Provincial Product, GPP), employment, household debt and population of each province, were obtained from the National Statistical Office of Thailand. Social factors, including access to technology (proxied by internet access), health service availability (proxied by number of doctors per population), number of divorce cases and number of deaths, were also collected from the National Statistical Office of Thailand and the Department of Provincial Administration. To control for the differences in size of each province, we divided all the level data by the size of the population in each province. We combined all the types of mental disorders in question and created the All Mental Disorder Rate variable.

Table 1 presents a description of the data of the overall sample used in our regression analysis.

Table 1
Summary Statistics

Variables	No. of Observations	Mean	Standard Deviation	Minimum	Maximum
Dependent Variables					
All Mental DisorderRate	231	0.0242	0.0077	0.0039	0.0502
Schizophrenia Rate	231	0.0076	0.0027	0.0020	0.0186
Depression Rate	231	0.0044	0.0019	0.0006	0.0121
Anxiety Rate	231	0.0068	0.0028	0.0006	0.0155
Suicide Rate	231	0.0002	0.0002	0.0000	0.0011
Others Rate	231	0.0052	0.0033	0.0001	0.0199
Independent Variables					
GPP per capita	231	0.1144	0.1414	0.0235	0.7498
Employment Rate	231	0.5556	0.1458	0.3514	1.2460
Household Debt Rate	231	0.2871	0.2013	0.0181	0.8945
Divorce Rate	231	0.0017	0.0007	0.0004	0.0049
Internet Rate	231	41.8566	11.0647	21.1200	75.0200
Doctor Rate	231	0.0004	0.0002	0.0002	0.0016
Death rate	231	6085.44	5469.83	934	44223

To better understand the dataset and the possible relationship between the mental disorder rate and the factors to be analysed, we first assessed the statistical significance of the main economic and social factors displayed in Table 1. According to the descriptive statistics in all panels of Table 2, we found that both economic and social factors were related to the mental disorder rate. Table 2 shows that lower GPP per capita, higher household debt, higher internet access, and lower health service availability are significantly associated with higher levels of mental disorder at the 1 percent level.

Table 2
Mental Disorder Rate in Different Conditions

Variable:All Mental Disorder Rate			
	Observations	Mean	t-stat
Panel A: GPP per capita			
High GPP per capita	58	0.0196 (0.0008)	-5.602***
Low GPP per capita	173	0.0257 (0.0005)	
Panel B: Household Debt			
High Household Debt	58	0.0282 (0.0013)	4.802***
Low Household Debt	173	0.0228 (0.0005)	
Panel C: Internet Access			
High Internet Access	58	0.0217 (0.0009)	-2.875***
Low Internet Access	173	0.0250 (0.0006)	
Panel D: Number of Doctors			
High Number of Doctor	58	0.0219 (0.0010)	-2.626***
Low Number of Doctor	173	0.0249 (0.0006)	
Notes: Standard deviations are in parentheses. The null hypothesis being tested is whether the mean of the All Mental Disorder Rate in areas with a high level of factors, and the mean of the rate in areas with a low level of factors are the same. Areas with a high level of factors are those in the 75th percentile or higher. ***, ** and * denote levels of significance of 1%, 5%, and 10%, respectively.			

However, a simple comparison between high and low levels of economic and social factors using t-statistics is not an appropriate way to statistically analyze any causal relationship. Therefore, the following step was to use an appropriate empirical model.

The model used in this paper is as follows:

$$Mental_{it} = \alpha_i + \beta_1 GPP_{it} + \beta_2 Em_{it} + \beta_3 Debt_{it} + \beta_4 Divorce_{it} + \beta_5 Techno_{it} + \beta_6 Health_{it} + \beta_7 Death_{it} + \varepsilon_{i,t} \quad (1)$$

where α_i is the provincial specific effect; i is province i ; t is time period year t ; and $Mental_{it}$ is the ratio of the number of different categories of mental disorder patients to the total population in province i in year t . GPP_{it} is the real GPP per capita in province i in year t ; Em_{it} is the employment rate in province i in year t ; and $Debt_{it}$ is the household debt in province i in year t . The social factors comprise $Divorce_{it}$, the ratio of the number of divorce cases to the total population in province i in year t ; $Techno_{it}$, the ratio of the level of internet access to the total population in province i in year t , representing technological access in the country; $Health_{it}$, the ratio of the number of doctors in the provincial hospital to the total population in province i in year t , representing the availability of health services in the area; and $Death_{it}$, the ratio of the number of deaths to the total population in province i in year t .

Since the dataset comprises provincial data over a 3 year span, an appropriate econometric model should consider any possible specific factors in each province. Therefore, either a fixed effects or a random effects model needs to be used. We used a Hausman test to determine which model was more appropriate for each as explained in the following section.

We expected that an increase in the household debt, divorce and death rates would lead to an increase in the mental disorder rate. In contrast, an increase in economic growth, as proxied by GPP per capita and a higher employment rate, better technological development, proxied by internet access, and health service availability, proxied by the number of doctors, would result in a lower mental disorder rate.

We also studied the effect of these economic and social factors on different types of mental disorders, including schizophrenia, depression, anxiety, and suicide attempts, amongst others. Therefore, Eq. (1) was estimated again using different dependent variables, as follows:

$Schizo_{it}$, the ratio of the number of all patients with symptoms of schizophrenia, to the total population of province i in year t .

$Depress_{it}$, the ratio of the number of all patients with symptoms of depression, to the total population of province i in year t .

$Anxiety_{it}$, the ratio of the number of all patients with symptoms of anxiety, to the total population of province i in year t .

$Suicide_{it}$, the ratio of the number of all patients with mental disorders who have attempted suicide, to the total population of province i in year t .

$Others_{it}$, the ratio of the number of all patients with symptoms of other mental disorders, to the total population of province i in year t .

Results

We estimated Eq. (1) with various types of disorders and overall mental disorder rates, as reported in Table 3.

In specification (1), Table 3 shows that higher GPP per capita and lower household debt are the main economic factors which lead to a lower level of overall mental disorder cases in the country. This is as expected, since better economic conditions give people more work opportunities, greater well-being and higher income, which should lead to lower stress levels, and therefore lower mental disorder cases. Conversely, higher household debt will lead to

more stress and can therefore trigger more mental disorder cases [6, 37]. We found that the technology access variable had a significantly positive effect on mental disorder rates. This is possibly due to the fact that when people spend too much time on the internet, use it excessively for work, or become addicted to social networks, in the process receiving wrong information, or being bullied by unsolicited comments and suggestions on social media, they can suffer negative impacts. This can therefore increase their stress levels, leading to higher mental disorder rates. As for accessibility to healthcare, we found that higher access to health services will lead to lower mental disorder rates. This is in line with our expectation, as well as with previous studies [23], that more healthcare assessment will increase the opportunity for patients to take preventative measures, thus lowering mental disorder rates.

Table 3
Effect of Economic and Social Factors on Mental Disorder Rates

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	All Mental	Schizo	Depress	Anxiety	Suicide	Others
GPP _{it}	-0.034***	-0.013	0.001	-0.006	0.002	-0.012***
	(0.009)	(0.019)	(0.005)	(0.005)	(0.001)	(0.004)
Em _{it}	0.004	0.012	0.001	0.007	-0.002**	-0.001
	(0.007)	(0.014)	(0.004)	(0.004)	(0.001)	(0.003)
Debt _{it}	0.011***	-0.003	-0.001	-0.002	3.02e-04	0.004***
	(0.003)	(0.003)	(0.001)	(0.001)	(1.86e-04)	(0.001)
Divorce _{it}	1.262	-6.590**	-0.103	0.276	0.405***	0.266
	(1.543)	(2.830)	(0.706)	(0.760)	(0.155)	(0.633)
Techno _{it}	3.65e-04***	1.48e-04***	3.66e-05***	-3.35e-05***	1.62e-05***	2.55e-04***
	(4.42e-05)	(3.58e-05)	(8.94e-06)	(9.62e-06)	(1.96e-06)	(2.27e-05)
Health _{it}	-13.018***	-13.422***	0.846	-0.627	0.236	-3.069
	(3.742)	(3.905)	(0.974)	(1.048)	(0.213)	(1.642)
Death _{it}	1.92e-07	7.33e-07	-1.38e-07	8.63e-07***	-2.20e-07***	4.08e-08
	(1.56e-07)	(8.85e-07)	(2.21e-07)	(2.38e-07)	(4.84e-08)	(6.45e-08)
Observations	231	231	231	231	231	231
Method	RE	FE	FE	FE	FE	RE
R-squared	0.250	0.212	0.182	0.269	0.621	0.266
Note: All models include a constant term. Standard errors are shown in parentheses. ***and ** denote levels of significance of 1%, and 5% respectively. FE denotes Fixed Effects Model and RE denotes Random Effects Model. The R-squared values in the RE models are the overall R-squared values.						

However, not all mental disorder symptoms are the same. Some may be triggered by individual economic and social factors in different ways. Therefore, we next examine each of the mental disorder symptoms separately; the

results are shown in columns 2 to 6 in Table 3. Qualitatively, the results are similar to the overall mental disorder analysis in column 1, with a few exceptions. The employment rate becomes significant in the attempted suicide rate equation. The explanation is similar to that given previously regarding better economic conditions. When more people are employed, the overall income level of households is higher, leading to less stress and fewer suicide attempts.

With regard to social factors, the divorce rate is significant in two types of mental disorder symptoms: positive in the attempted suicide rate, but negative in the schizophrenia rate. Generally, going through a divorce can put a strain on one's stress levels, so it is therefore not surprising that this has a positive relationship with the attempted suicide rate. However, it is very interesting to find a negative relationship between the divorce and schizophrenia rates. It could be the case that when some relationships turn bad, the point of divorce is not in fact reached. If couples stay together, this can create higher tension, more stress and paranoia, which can lead to more cases of certain mental disorder symptoms, such as schizophrenia. Therefore, when people finally decide to divorce, such tension, stress and paranoia associated with the relationship disappear, so a negative effect of the divorce rate on the schizophrenia rate can be seen.

Access to technology, as proxied by internet access, shows a significant positive effect in the same way as the overall mental disorder rate in column 1, apart from the anxiety rate in column 4. Higher internet access might help people suffering from this group of mental disorders to find comfort online. They may be able to express their anxieties, write a blog, or read about other similar situations in order to help them reduce their anxiety.

The death rate of people in the provinces only shows a positive relationship with the anxiety rate, as can be expected due to the associated grievance and mourning. However, it shows a negative effect on the suicide rate. This is difficult to explain; Weir [38] suggests that "Pinpointing the reasons that suicide rates rise or fall is challenging because the causes of suicide are complex".

In summary, we find that access to technology has a significant effect on all types of mental disorders in Thailand. Generally, better economic situations, as measured by high GPP, high employment rates and lower household debt, are consistently associated with lower mental disorder rates, while health accessibility appears to lead to lower mental disorder rates. However, some social factors, such as death and divorce rates have ambiguous relationships with mental disorder rates.

To check whether the results obtained were robust across all regions of Thailand, we further divided the samples into four regions: North, Central, Northeast and South. Table 4 shows the mean values of the variables, with standard deviations in parentheses. It can be seen that the Northern region has the highest overall mental disorder rate compared to other regions in Thailand. When considering different types of mental disorder, the Northern and Northeastern regions have comparatively higher rates of schizophrenia, depression and anxiety compared to other regions. The central region appears to have lower rates of mental disorder, apart from the attempted suicide rate. The Southern region also has a lower mental disorder rate compared to the Northern and Northeastern regions. This could be explained by considering the economic factors, which show that that the Central and Southern regions of the country seem to have better economic conditions, as shown by the relatively higher Gross Provincial Product and employment rates.

Table 4
Summary Statistics by Region

Variables	North	Central	Northeast	South
Dependent Variables				
All Mental Disorder Rate	0.0281 (0.0063)	0.0221 (0.0091)	0.0250 (0.0060)	0.0219 (0.0064)
Schizophrenia Rate	0.0078 (0.0024)	0.0069 (0.0032)	0.0086 (0.0021)	0.0071 (0.0023)
Depression Rate	0.0062 (0.0018)	0.0037 (0.0019)	0.0042 (0.0013)	0.0035 (0.0014)
Anxiety Rate	0.0073 (0.0021)	0.0055 (0.0028)	0.0081 (0.0030)	0.0067 (0.0019)
Suicide Rate	0.0001 (0.0001)	0.0002 (0.0002)	0.0001 (0.0001)	0.0001 (0.0001)
Others Rate	0.0065 (0.0035)	0.0056 (0.0037)	0.0038 (0.0022)	0.0043 (0.0028)
Independent Variables				
GPP per capita	0.0506 (0.2133)	0.2231 (0.1915)	0.0394 (0.0143)	0.0968 (0.0797)
Employment Rate	0.5199 (0.0612)	0.6660 (0.1704)	0.4468 (0.0584)	0.5492 (0.1143)
Household Debt Rate	0.3075 (0.1660)	0.3056 (0.2294)	0.2142 (0.1512)	0.3320 (0.2254)
Divorce Rate	0.0016 (0.0003)	0.0022 (0.0008)	0.0014 (0.0002)	0.0013 (0.0005)
Internet Rate	38.6905 (6.8066)	48.5428 (11.1754)	34.0398 (7.2889)	44.4507 (11.2005)
Doctor Rate	0.0003 (0.0001)	0.0005 (0.0002)	0.0002 (0.0001)	0.0004 (0.0001)
Death rate	5669.216 (3228.238)	6412.923 (7780.592)	7448.5 (4333.74)	4035.429 (2639.383)
No. of observations	51	78	60	42
Notes: The mean values of the sample are shown in the table, with standard deviations in parentheses.				

Because of the variations in mental disorder rates in line with the economic and social factors shown in Table 4, we conducted the analyses again by region to check for the robustness of our results, with the results shown in Table 5. Generally, these are qualitatively similar to those of the whole-country analysis, with some exceptions. Overall, it can still be seen that better economic conditions are usually associated with lower mental disorder rates, while Gross Provincial Product continues to have a negative effect on mental disorder cases. A rise in the employment rate generally reduced the number of mental disorder cases in the Northern and Central regions of the country, as expected. However, in the Northeastern and Southern regions, an increase in employment was associated with more mental cases. This might be because an increase in employment shows that there are more people with jobs, and work can create stress. Moreover, the Northeastern region often experiences harsh and extreme weather, such as drought or extreme flooding, while the main industry in the Southern region is fishing, which is also subject to uncontrollable natural events. Therefore, work that relies on factors that are beyond people's control can lead to more stress. Regarding social factors, accessibility to healthcare continues to lead to a lower mental disorder rate. The divorce and death rates still show some mixed results, as in the aggregate analysis. Finally, access to technology generally increases the number of mental disorder cases, apart from anxiety, as was previously the case.

Table 5
Effects of Economic and Social Factors on Mental Disorder Rates by Region

Region	Independent variable	GPP	Em	Debt	Divorce	Techno	Health	Death
North (Obs = 51)	All Mental	0.041 (0.069)	-0.042** (0.020)	0.030*** (0.006)	1.563 (3.327)	4.77e-04*** (7.26e-05)	-6.007 (8.005)	7.62e-07* (4.23e-07)
	Schizo	-0.025* (0.015)	-0.007 (0.007)	0.009*** (0.001)	1.365 (0.984)	6.11e-05* (3.28e-05)	-5.328** (2.446)	3.12e-07*** (9.54e-08)
	Depress	0.044 (0.029)	-0.015** (0.007)	0.002 (0.003)	-1.299 (1.202)	1.74e-06 (1.61e-05)	5.919 (2.629)	8.70e-09 (3.00e-07)
	Anxiety	0.005 (0.018)	-0.003 (0.006)	0.001 (0.003)	0.198 (0.873)	-5.12e-05*** (1.63e-05)	-2.925 (2.922)	4.91e-07*** (1.55e-07)
	Suicide	0.014 (0.008)	-0.003 (0.002)	5.82e-04 (7.42e-04)	0.051 (0.351)	1.58e-05*** (4.71e-06)	0.719 (0.737)	-2.88e-07*** (8.75e-08)
	Others	0.031 (0.041)	-0.025** (0.012)	0.009 (0.007)	-0.934 (2.461)	4.20e-04*** (3.78e-05)	5.626 (3.681)	-1.68e-07 (3.57e-07)
Central (Obs = 78)	All Mental	-0.029 (0.025)	0.026 (0.050)	-0.007 (0.005)	-11.452 (7.252)	0.001*** (1.14e-04)	-18.529*** (2.670)	1.84e-06 (1.18e-06)
	Schizo	-0.022* (0.011)	0.031 (0.021)	-0.008*** (0.002)	-11.072* (5.641)	1.99e-04*** (5.81e-05)	-13.197*** (1.091)	1.76e-06 (1.31e-06)

Notes: All models include a constant term. Standard errors are in parentheses. The dependent variable is the depression rate. ***, ** and * denote 1%, 5%, and 10% levels of significance respectively. Using the Hausman test, either the fixed effects or random effects model are used as appropriate in each equation.

Region	Independent variable	GPP	Em	Debt	Divorce	Techno	Health	Death
	Depress	0.001 (0.002)	-0.003* (0.002)	-0.001 (0.001)	-0.558 (0.390)	2.82e-05*** (7.97e-06)	0.039 (0.332)	-8.92e-08*** (2.97e-08)
	Anxiety	-0.010*** (0.003)	-3.50e-04 (0.006)	-0.002** (0.001)	-0.658 (0.580)	-1.75e-05 (1.46e-05)	0.210 (0.364)	6.71e-07** (2.60e-07)
	Suicide	3.60e-04 (4.21e-04)	-0.001* (2.87e-04)	-4.59e-05 (1.40e-04)	-0.129** (0.063)	1.81e-05*** (2.92e-06)	0.057 (0.119)	-1.59e-08*** (4.52e-09)
	Others	0.002 (0.004)	-0.005 (0.004)	0.006** (0.003)	-1.944*** (0.748)	2.45e-04*** (3.32e-05)	-3.794*** (1.123)	-2.03e-08 (4.46e-08)
Northeast (Obs = 60)	All Mental	0.021 (0.101)	0.043** (0.021)	-0.004 (0.008)	1.524 (5.772)	4.12e-04*** (1.08e-04)	-9.107 (7.230)	-2.33e-07 (3.08e-07)
	Schizo	-0.006 (0.031)	0.009* (0.005)	0.004 (0.003)	-0.778 (2.010)	1.02e-04** (4.58e-05)	-0.912 (2.206)	-5.23e-08 (8.70e-08)
	Depress	-0.008 (0.022)	0.010** (0.005)	0.001 (0.003)	1.743* (0.999)	6.12e-05** (2.94e-05)	-4.415*** (1.646)	-1.56e-08 (6.78e-08)
	Anxiety	0.086 (0.097)	0.016*** (0.005)	-0.001 (0.003)	-0.679 (2.014)	-1.55e-05 (2.38e-05)	-12.785*** (4.305)	2.41e-07 (2.88e-07)

Notes: All models include a constant term. Standard errors are in parentheses. The dependent variable is the depression rate. ***, ** and * denote 1%, 5%, and 10% levels of significance respectively. Using the Hausman test, either the fixed effects or random effects model are used as appropriate in each equation.

Region	Independent variable	GPP	Em	Debt	Divorce	Techno	Health	Death
	Suicide	0.002 (0.001)	-3.04e-04 (2.60e-04)	-4.30e-04** (1.73e-04)	-0.089 (0.192)	1.36e-05*** (1.95e-06)	0.061 (0.210)	-1.84e-08** (7.88e-09)
	Others	0.018 (0.033)	0.002 (0.006)	-0.002 (0.003)	1.594 (2.361)	2.26e-04*** (3.99e-05)	-3.831 (3.215)	-7.86e-08 (9.55e-08)
South (Obs = 42)	All Mental	-0.078*** (0.023)	0.043*** (0.013)	0.015*** (0.004)	-3.140 (2.487)	3.03e-04*** (9.96e-05)	-2.642 (8.082)	8.38e-07** (3.91e-07)
	Schizo	-0.010 (0.008)	0.002 (0.003)	0.007*** (0.002)	-0.957 (0.750)	5.55e-05 (3.38e-05)	-2.189 (3.717)	1.26e-07 (1.32e-07)
	Depress	-0.017*** (0.005)	0.010*** (0.003)	0.002 (0.001)	-0.485 (0.565)	2.68e-05* (1.55e-05)	0.499 (1.920)	6.12e-08 (1.25e-07)
	Anxiety	-0.013 (0.010)	0.016*** (0.005)	0.001 (0.001)	-0.591 (0.852)	-3.32e-07 (2.26e-05)	-3.002 (3.134)	1.90e-07* (1.01e-07)
	Suicide	-0.002 (0.001)	0.001** (2.62e-04)	2.88e-04** (1.42e-04)	-0.020 (0.063)	7.26e-06 (2.47e-06)	0.465* (0.259)	3.12e-09 (1.05e-08)

Notes: All models include a constant term. Standard errors are in parentheses. The dependent variable is the depression rate. ***, ** and * denote 1%, 5%, and 10% levels of significance respectively. Using the Hausman test, either the fixed effects or random effects model are used as appropriate in each equation.

Region	Independent variable	GPP	Em	Debt	Divorce	Techno	Health	Death
	Others	-0.041***	0.011**	0.005	-0.547	1.99e-04*** (2.90e-05)	5.206	3.71e-07* (2.05e-07)
		(0.010)	(0.005)	(0.003)	(1.000)		(3.446)	
Notes: All models include a constant term. Standard errors are in parentheses. The dependent variable is the depression rate. ***, ** and * denote 1%, 5%, and 10% levels of significance respectively. Using the Hausman test, either the fixed effects or random effects model are used as appropriate in each equation.								

Discussions

Mental health plays a major role in people's ability to maintain good physical health. Therefore, mental disorders such as depression or anxiety can affect the ability to undertake work or other activities in everyday life. Studies on mental health disorders have mostly focused on social and health factors, ignoring the possible impacts of economic factors. Moreover, previous research has mainly focused on just one aspect of mental disorders, particularly depression, ignoring other categories of mental health disorders. Therefore, this paper fills the gap in the literature by examining the effect of both economic and social factors on different types of mental disorders. Based on data from 77 Thai provinces from 2015 to 2017, the results show significant effects of both economic and social factors on all mental disorders in the country. Generally, we found that better economic situations, as measured by higher GPP per capita, higher employment rates and lower household debt, help reduce mental disorder rates, while social factors such as greater health service accessibility and lower technology accessibility also reduce the number of mental disorder cases. However, death and divorce rates are not consistent in their effect on mental disorder rates, their impact seeming to depend on what type of mental disorder is being considered. When we checked whether the results were consistent across different regions in Thailand, we found that they were qualitatively similar to the aggregate analyses, with the exception of employment. An increase in the employment level in Northeastern and Southern regions was associated with higher mental disorder cases, which may be due to an increase in stress related to work subject to uncontrollable weather.

Conclusions

The results from the study raise some important issues and implications for policy makers in Thailand. As we found that economic factors have an important influence on different types of mental disorders in the country, and as policy makers usually aim to prevent economic instability and financial and economic risks, during times of economic downturn, they should be prepared for more cases of mental disorder. The government should increase funding to help relieve the economic burden in order to reduce the number of mental disorder cases. Moreover, as we found that social factors such as the divorce rate, access to technology and to healthcare, and the death rate can lead to higher mental disorder cases in the country, the Department of Mental Health should increase health accessibility to more people in order to prevent cases. In addition, as it was observed that access to technology (internet access) can lead to more mental disorders, it may be necessary for the Department of Mental Health to

provide guidelines on accessing the internet safely, promoting good practice when using social media, raising awareness of online bullying, and setting up a special unit that could provide online support for those affected.

Abbreviations

WHO World Health Organization

OECD Organisation for Economic Co-operation and Development

GPP Gross Provincial Product

Declarations

Ethics approval and consent to participate

Not Applicable.

Consent for publication

Not Applicable.

Availability of data and materials

The dataset in this paper is available from the corresponding author upon reasonable request.

Competing interests

The authors declare that they have no competing interests.

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None.

Authors' contributions

AL collected the data, reviewed the literature, and interpreted the analyses. TP analysed and interpreted the analyses. All authors have read and approved the manuscript.

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Figures

Figure 1

Different types of mental disorder cases in Thailand from 2015-2017. Source: Department of Mental Health, Thailand [3]