

# Cross-Border Migration and Its Influence on Mental Health Dynamics in Thailand: An Empirical Analysis of Provincial Data

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## Abstract

While previous research has examined the impact of cross-border migrants on economic development and other social issues, limited studies have focused on the potential effects of migrants on the mental health of the native population. This paper investigates the impact of cross-border migrants on the mental health of natives in Thailand, considering various mental health disorders. This study analyzes 77 provincial data sets from 2016 to 2021 using a spatial panel autoregressive model. The findings suggest that the presence of migrants did not have an adverse influence on the mental health of the native population at a 5% significance level. Notably, there is a reduction in the prevalence of substance abuse disorders associated with the presence of migrants at the 5% significance level. Additionally, unemployment, education, public health services, technological infrastructure, health risk behavior, and age are significant contributors to the mental health of natives at a 5% significance level. The study underscores the need for a comprehensive approach to developing effective mental health policies and initiatives that address these multiple contributors.

## Keywords

COVID-19; cross-border migrants; foreign workers; mental disorder; mental health

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## Introduction

Cross-border migrants play a significant role in Thailand's economic development, as they form a large part of the country's labor force, particularly in agriculture, manufacturing, and construction. In response to the economic opportunities, such as the wage differentials between Thailand and its neighboring countries and labor shortages in some sectors, migrants have been attracted to the region (Harkin, 2019). The number of migrants in Thailand has increased, from just over 1.3 million in 2012 to nearly 2.4 million in 2021, representing more than a 107% increase, although with a drop of about 655,000 in the number during the years 2020–2021 due to COVID-19 migration restrictions.

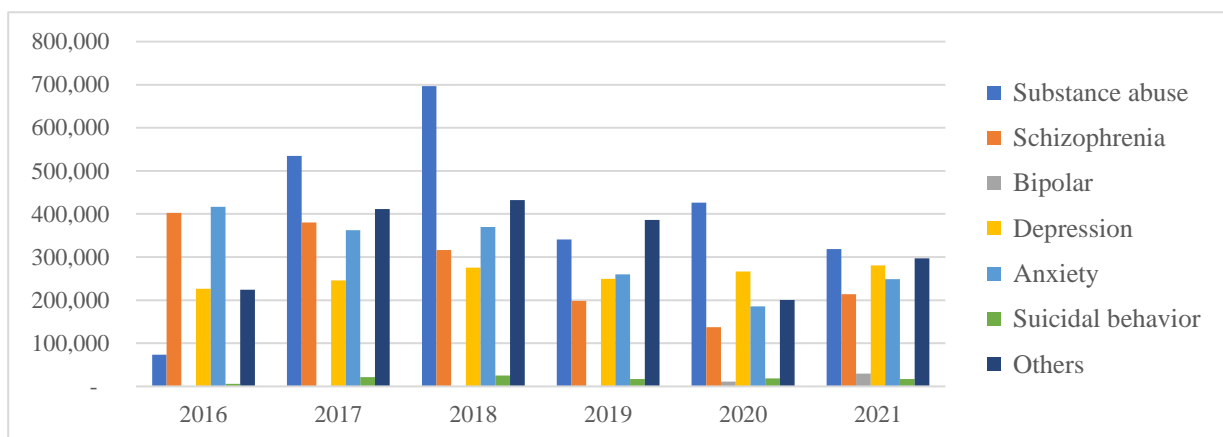
Besides their economic contribution, migrants can have various other effects on the societies they move into (Borjas, 2013), such as cultural, political, and social ones. Among these, the impact of migrants on health issues in the receiving country is an important topic that has gained attention over time, especially given the context of increased migration mobility and the recent global COVID-19 pandemic. There is a sizable body of literature that studied the impacts of migrants on physical health issues among the population of the receiving country (e.g., Castelli & Sulis, 2017; Tomas et al., 2013). Though, the impact of migrants on the mental health problems of natives is scarce, with most, in fact, related to migrants' mental health (Gkiouleka et al., 2018; Levecque & Rossem, 2014; Pinsuwan & Khemakhunasai, 2009; Rechel et al., 2013; among others). However, the arrival of migrants can change social and economic conditions, which may impact the mental health of the native population (Daynes, 2016; Gushulak et al., 2009; Kristiansen et al., 2007; Shetty, 2019).

Their arrival can potentially impact the mental health of native individuals because they may be perceived as a threat to their jobs and economic status. This can lead to anxiety, fear, and hostility, which can have negative impacts on mental health. The arrival of migrants may also lead to xenophobia and discrimination towards the migrant population, creating hostility and a hostile environment, which can negatively impact the mental health of both migrants and natives (see Amuedo-Dorantes & Puttitanun (2011); Brader et al. (2008); Espana-Najera & Vera (2020), among others). Moreover, many migrants in Thailand earn significantly less than the minimum wage in many sectors (International Labor Organization [ILO], 2016; International Organization for Migration [IOM], 2018) and face challenges such as language barriers, discrimination, and limited access to education and job opportunities, which can make it difficult for them to improve their economic situation and quality of life. Therefore, this can increase their risk of drug use and involvement in crime (Akbulut-Yuksel et al., 2022; Ivert & Magnusson, 2020), causing natives to feel unsafe and potentially leading to the development of mental health disorders such as anxiety, depression, and other symptoms.

Mental health is a growing concern in Thailand, with an increasing number of people turning to mental health services in recent years. The number of mental health disorder patients has been increasing, with a rise from about 1.3 million in 2016 to slightly more than 1.4 million in 2021 – with a sharp increase during the period 2016–2018, followed by a drop in 2019–2020. Considering different types of mental health conditions, as shown in Figure 1, the leading mental health disorder is that related to substance abuse, followed by other disorders, anxiety, schizophrenia, depression, suicidal behavior, depression, and bipolar, each representing 23.94, 19.54, 18.46, 16.51, 15.48, 1.06, and 0.41% of the overall number of mental health patients in the country. See the Department of Mental Health (Thailand) (2022) for details on other mental health disorders. The data show that there was an increasing trend in the number of mental

health patients related to substance abuse, depression, bipolar disorder, and suicidal behavior, but with a falling trend in anxiety and schizophrenia.

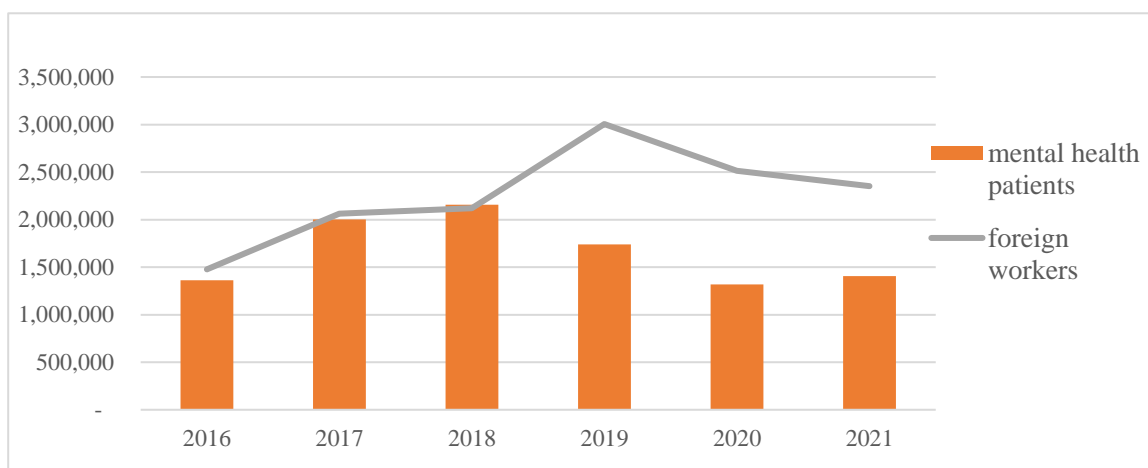
**Figure 1:** Number of Patients With Different Mental Health Disorders From 2016 to 2021



Note: ThaiHealthStat (2022)

The graph in Figure 2 shows the number of migrants in Thailand and the number of native mental health disorder patients to observe patterns in the relationship between the two statistics. It is shown that there may be a positive relationship between them, as indicated by the increase in mental health patients in line with the number of migrants in 2016–2018, followed by a fall in both numbers during the years 2020–2021.

**Figure 2:** Number of Migrants and Mental Health Patients in Thailand From 2016 to 2021



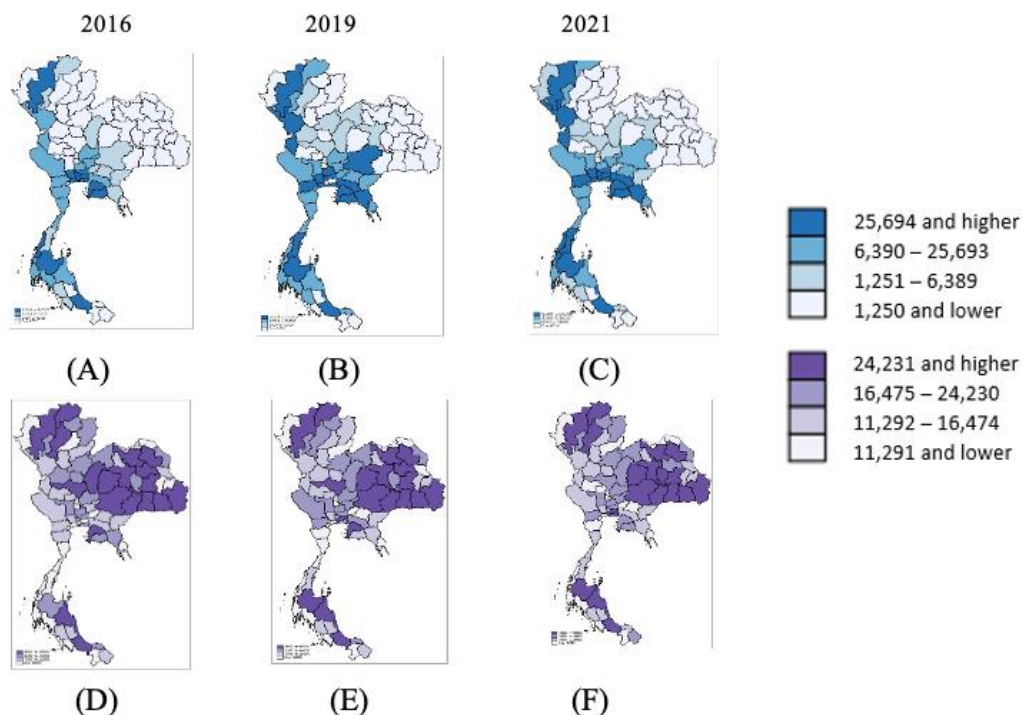
Note: ThaiHealthStat (2022) and National Statistical Office (NSO) (2022)

In a more in-depth examination of the provincial-level data of the two statistics, Figure 3 shows heat maps of the number of migrants in 2016, 2019, and 2021 (in Panels A, B, & C, respectively) and the overall number of mental health patients in the same years (in Panels D, E, & F) by Thai province. Panels A to C show a rise in migrants, especially in the northern, eastern, and southern regions, since 2016. This trend appears to coincide with Panels D to F, which show increasing trends in the number of mental health disorder patients in the northern and southern parts of Thailand. During the period 2016 to 2019 (Panels A & B), Figure 3 also shows that there was a rise in migrants, including in the central region (Bangkok, Nakhon Pathom, Samut Sakhon, Nonthaburi, Samut Prakarn, Chon Buri, Rayong, and Chanthaburi); the southern region (Phuket, Surat Thani and Chomphon, Songkra); the northern region (Chiang Mai, Tak and

Chiang Rai); and the northeastern region (Nakhon Ratchasima, Leay and Khon Kaen). This trend was in line with the increase in the number of mental health disorder patients (Panels D & E) in the central region (Bangkok, Nonthaburi, Samut Prakarn, Chachoengsao, Chon Buri, Ratchaburi, Kanchanaburi, Nakorn Pathom, and Lobburi); the southern region (Surat Thani, Songkla, Phuket, Phang-nga, Chom Phon, Trang and Krabi); and the northeastern region (Ubon Ratchathani, Khon Kaen, Chaiyaphum, Surin and Nakhon Ratchasima).

In 2021, the number of migrants fell compared to 2019 (Panels B & C). This was the case in most of the regions, including the central (Nakorn Pathom, Bangkok, Nonthaburi, Pathom Thani, Samut Prakarn, Samut Sakhon, Chon Buri, Chanthaburi, and Rayong); southern (Surat Thani, Phuket, Songkla, Trang, Krabi, and Nakhon Si Thammarat); northern (Tak, Lumpoon, Phetchabun, Lumpiang, Nakorn Sawan and Kamphaeng Phet) and northeastern (Nakhon Ratchasima, Leoy, Khon Kaen, Udon Thani, Nongkai, Surin, Ubon Ratchathani, Nakorn Panom and Kalasin). This change was in parallel with the movement of the mental health issue in the country, which also fell in 2021 (Panels E & F), specifically in the central region (Pathum Thani, Saraburi, Phetchaburi, Samut Songkram, Samut Prakarn, Rayong, Chachoengsao and Chon Buri); the southern (Phatthalung, Yala, Nakorn Si Thammarat and Narathiwat); and northeastern (Ubon Ratchathani, Nakorn Ratchasima, Srisaket, Burirum, Kalasin and Nong Khai).

**Figure 3:** Heat Maps of the Number of Migrants (Panels A–C) and the Number of Mental Health Patients (Panels D–F) in Thailand From 2016 to 2021



Note: ThaiHealthStat (2022) and National Statistical Office (NSO) (2022)

Therefore, the situation in Thailand suggests that there is a possible relationship between migrants and mental health issues in the population, which highlights the importance of examining the effect of migrants on natives' mental health in the country. However, other factors, such as social and economic conditions, might play a role. Therefore, it is necessary to thoroughly analyze the relationship between migrants and mental health disorders in the native

population using appropriate statistical methods and controlling for other factors that might influence the onset of mental health disorders to understand whether migrants can lead to such disorders.

Achieving a better understanding of the effect of migrants on mental health disorders among native Thai people is vital in many aspects. For example, it can inform the public, migration, and health authorities when designing policies related to migrants and public health. By understanding the potential impact, policymakers and healthcare providers can work to mitigate related tensions and promote social cohesion among natives and migrants. Moreover, it is crucial from the human rights perspective that all individuals should have the right to access decent healthcare services, regardless of their immigration status. Most related studies, including studies in Thailand, focus primarily on the mental health of migrants and have not adequately addressed the mental health of the native population in the destination country (Chen, 2011; Fuster et al., 2020; Gkiouleka et al., 2018; Hasan et al., 2021; Levecque & Rossem, 2014; Lu et al., 2012; Rechel et al., 2013; Vonneilich et al., 2021) In Thailand, some studies have been conducted on the mental health of the Thai population, but they are descriptive and rely on survey analysis and interviews in specific areas or provinces, rather than nationwide (Kongplanon, 2014; Kunnu & Pasunon, 2015; Pinsuwan & Khemakhunasai, 2009; Soontayatron, 2015; Thongpan, 2022). Due to the gap in the literature, this paper aims to be the first to systematically examine whether cross-border migrants impact the mental health of the native population in Thailand. The study investigates the impact on overall mental health disorders and specific types, using provincial-level data from all 77 provinces. Adding to the previous literature, which has only given descriptive explanations, this study uses an appropriate statistical method to control other factors that might influence the aggregate prevalence of mental health disorders in each province.

## Literature review

### Concepts of factors influencing mental health

The presence of migrants can lead to mental health issues among people in the receiving countries. Changes in social, cultural, environmental, and economic circumstances may impact the well-being of the native population. Factors such as language barriers and social discrimination can lead to conflicts between migrants and natives, with the latter perceiving migrants as threats to employment and economic stability. This perception can result in anxiety, fear, and hostility towards migrants, affecting the mental health of both groups (Daynes, 2016; Gushulak et al., 2009; Herold et al., 2023; Kristiansen et al., 2007; Kunnu & Pasunon, 2015).

Research by Sander (2007), the European Centre for Disease Prevention and Control (ECDC) (2009), Virupaksha et al. (2014), and Hossin (2020) indicated that foreign workers, often on low incomes and experience a low quality of life, may engage in riskier health behaviors, including poor nutrition and substance addiction. These behaviors can lead to social problems such as crime, sexual harassment, and physical abuse, reinforcing negative views of migrants among natives. This negative perception can contribute to anxiety, depression, and security concerns, ultimately resulting in mental health disorders. Additionally, the transmission of infectious diseases from migrants' home countries can cause stress among natives regarding physical health issues (e.g., Castelli & Sulis, 2017; Tomas et al., 2013).

Furthermore, mental health among natives is influenced not only by the migrants but also by various other factors. Personal or demographic elements, including genetics, gender, and age, can be associated with mental illnesses. Instability in hormone levels, genetic disorders, and brain malfunctions can contribute to conditions such as depression, schizophrenia, anxiety, and bipolar disorder. Age and gender, considered demographic factors, play a role in specific mental health issues, such as postpartum depression in women, anxiety in working individuals, and drug and alcohol addiction in older people (World Health Organization & Calouste Gulbenkian Foundation, 2014). Social factors are also significant contributors to mental illness. Tensions in the social environment, such as social discrimination, bullying, substance abuse, and the risk of crime, elevate the likelihood of mental health problems. Access to better healthcare services, technological infrastructure facilitating faster communication, greater access to health information and online communities, public utilities, and a sufficient level of education that enhances people's opportunities to access income sources, necessary goods, and services, as well as develop critical thinking and coping skills, can contribute to an improved standard of living and life conditions, and reducing the potential risk of mental health problems (Sukmak, 2018). Economic factors, such as higher economic growth and income levels and low unemployment and poverty rates, are associated with a lower risk of mental illness. Better economic conditions lead to higher incomes, more opportunities to access basic human needs, and improved quality of life, reducing mental health risks.

Moreover, a positive economic condition enables governments to invest more in public health and provide additional healthcare services, further mitigating the risk of mental health problems (Sukumnoed et al., 2002; Sukmak, 2018; World Health Organization & Calouste Gulbenkian Foundation, 2014). Furthermore, there are possible other circumstances that can influence people's mental health, including economic crises and health pandemics, such as the COVID-19 pandemic. These situations introduce unique stresses, encompassing concerns about illness, economic uncertainties, and alterations in social interactions. Consequently, these external factors may affect individuals' mental well-being.

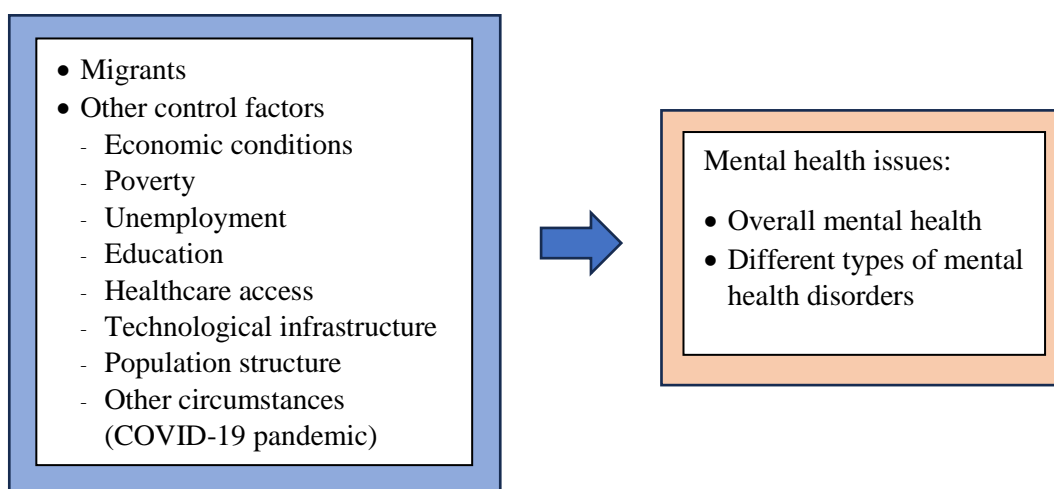
## **Impact of migration on mental health literature**

Numerous studies emphasize the mental health implications of migration, predominantly focusing on migrants themselves. Levecque and Rossem (2014), analyzing survey data from 20 European countries, revealed that migration is linked to depressive disorders among EU and non-EU migrants, with higher risks for older people, males, and those facing social discrimination. Gkiouleka et al. (2018) and Vonneilich et al. (2021) observed increased depression symptoms among migrants in European countries, with higher prevalence in females, older people, and during economic downturns. Similar trends were noted by Reus-Pons et al. (2018) in Western and Southern Europe, Chen (2011), and Lu et al. (2012) in China. Pinsuwan and Khemakhunasai (2009) found that Thai migrants in Malaysia experienced stress and anxiety due to social discrimination, unfamiliar environments, and hostility from natives. Similarly, Farwin et al. (2023) observed increased mental health issues in migrants in Singapore, associated with challenging social environments and substandard living conditions causing stress and mental problems. Through a literature review, Rechel et al. (2013) and Hasan et al. (2021) concluded that migration could contribute to mental health issues in migrants, such as depression and anxiety. The risk is notably higher among those with low income, low education levels, and limited access to healthcare systems. Various studies, including Li et al. (2006), Lu et al. (2012), Fuster et al. (2020), and Devkota et al. (2021), consistently emphasize the heightened risk of depression and anxiety in migrants with lower income and education levels, as well as limited healthcare access.

Studies in Thailand, such as Kunnu and Pasunon (2015), identified language barriers and perceived job threats from migrants as contributors to native mental health challenges. Thongpan (2022) analyzed Thai migration data, highlighting increased mental health risks for migrants and Thai workers due to conflicts and social discrimination. While other Thai studies explore migrant’s societal and cultural impacts (Kongplanon, 2015; Soontayatron, 2015) and the quality of life of migrants in Thailand (Namsanguan & Hora, 2019), they do not address mental health.

In summary, studies on the effect of migrants on natives’ mental health are limited. Studies in many countries, including Thailand, have concentrated on migrants’ mental health, leaving a gap in understanding the effects on the native population. These studies often utilize descriptive analyses and region-specific interviews, neglecting a nationwide perspective on natives. Moreover, most studies have focused on particular symptoms, such as depression or stress. To date, no quantitative studies have analyzed the impact of migrants on the mental health of natives using empirical data from all the provinces in Thailand. Therefore, this paper aims to be the first to fill the gaps in the previous literature by studying the effect of migrants on natives’ mental health in Thailand using provincial-level data. This highlights the impact of migrants on the mental health of Thai natives, moving beyond a narrow focus on migrants and descriptive analyses or specific observations. Different types of mental health disorders are considered, as will be explained later. Following the concepts of the factors influencing mental health in the literature, the analysis in this paper will follow the conceptual framework shown in Figure 4 below:

**Figure 4:** Conceptual Framework



## Methodology and data

To investigate the impact of migrants on overall mental health disorders, as well as different types of disorders in the native population, the following model specification was used:

$$Y_{i,t} = \alpha_i + \beta_1 migrant_{i,t} + \beta_2 GPP_{i,t} + \beta_3 unem_{i,t} + \beta_4 pov_{i,t} + \beta_5 edu_{i,t} + \beta_6 doc_{i,t} + \beta_7 tech_{i,t} + \beta_8 drug_{i,t} + \beta_9 gender_{i,t} + \beta_{10} age_{i,t} + \beta_{11} covid_t + \beta_{12} covid_t * migrant_{i,t} + \varepsilon_{i,t} \quad (1)$$

Where  $\alpha_i$  is the individual province's specific effect used to control variables that might influence the prevalence of mental health disorders in the native population.

$Y_{i,t}$  is the proportion of native patients suffering different mental health disorders, including:

*psychhealth<sub>i,t</sub>*: the proportion of overall mental health patients to the population in province  $i$  in year  $t$ ,

*substance<sub>i,t</sub>*: the proportion of substance abuse disorder patients to the population in province  $i$  in year  $t$ ,

*suicide<sub>i,t</sub>*: the proportion of patients with mental health issues related to suicide or suicidal behavior to the population in province  $i$  in year  $t$ ,

*schizo<sub>i,t</sub>*: the proportion of schizophrenia patients to the population in province  $i$  in year  $t$ ,

*bipolar<sub>i,t</sub>*: the proportion of bipolar disorder patients to the population in province  $i$  in year  $t$ ,

*depress<sub>i,t</sub>*: the proportion of depression disorder patients to the population in province  $i$  in year  $t$ ,

*anxiety<sub>i,t</sub>*: the proportion of anxiety disorder patients to the population in province  $i$  in year  $t$ , and

*others<sub>i,t</sub>*: the proportion of other types of mental health disorder patients to the population in province  $i$  in year  $t$ .

*migrant<sub>i,t</sub>* is the proportion of foreign workers to the population in province  $i$  in year  $t$ .

Previous research suggests that a surge in migrants may lead to increased anxiety, fear, hostility, and a negative social environment. This could potentially escalate mental health disorders among the native population stemming from changes in social, cultural, environmental, and economic circumstances. Language barriers and social discrimination between migrants and natives may contribute to an adverse impact on the mental health of natives (Daynes, 2016; Gushulak et al., 2009; Kristiansen et al., 2007). Moreover, foreign workers may encounter challenges such as a lower quality of life and engage in riskier health behaviors, including inadequate nutrition and substance abuse. These factors contribute to social problems and reinforce negative perceptions of migrants among natives, fostering anxiety, depression, and an increased prevalence of mental health disorders (ECDC, 2009; Hossin, 2020; Virupaksha et al., 2014). Therefore, we expected  $\beta_1 > 0$ .

Based on previous literature (Sukumnoed et al., 2002; Sukmak, 2018; World Health Organization & Calouste Gulbenkian Foundation, 2014), other factors can affect mental health disorders – our analysis controls for these factors where we separate them into economic, social, and population structure variables.

### **Economic control variables consist of:**

*GPP<sub>i,t</sub>*: the actual gross provincial product per capita used to represent economic conditions in province  $i$  in year  $t$ . A better condition can lead to improved economic opportunities, which in turn result in a better standard of living, better access to healthcare, an increased sense of control, and therefore, a reduction in the risk of mental health problems (Gkiouleka et al., 2018; Sukumnoed et al., 2002). Thus, we expected  $\beta_2 < 0$ .



$unem_{i,t}$ : the proportion of unemployed persons to the population in province  $i$  in year  $t$ . This variable is another control for economic opportunities in a province. A high unemployment rate signifies lower economic opportunities and public health access due to lower income, which can lead to more stress and a higher prevalence of mental health illness (Sukkunnoed et al., 2002; Sukmak, 2018). Therefore, we expected  $\beta_3 > 0$ .

$pov_{i,t}$ : the proportion of the population under the poverty line to the overall population in province  $i$  in year  $t$ . A high level signifies poorer economic opportunities and a lower quality of life, thus increasing the risk of mental health issues (World Health Organization & Calouste Gulbenkian Foundation, 2014). Therefore, we expected  $\beta_4 > 0$ .

### **Social control variables consist of:**

$edu_{i,t}$ : the average years of education of the population in province  $i$  in year  $t$ . A higher education level can provide better economic opportunities and help people develop critical thinking, problem-solving, and coping skills, which can help them handle stress and reduce the risk of mental health problems (Chen, 2011; Hasan et al., 2021; Lu et al., 2012; Rechel et al., 2013; Sukmak, 2018). Thus, we expected  $\beta_5 < 0$ .

$doc_{i,t}$ : the proportion of the number of doctors to the population in province  $i$  in year  $t$ . An increase in this proportion may suggest that the province has better public health services with more healthcare personnel, which can help prevent the onset of mental health issues (Sukkunnoed et al., 2002; Sukmak, 2018). We expected  $\beta_6 < 0$ . However, these data do not differentiate between primary care physicians and psychiatrists.

$tech_{i,t}$ : the proportion of the number of technological devices in households to the population in province  $i$  in year  $t$ , showing the technical infrastructure in the province. An increase in this proportion could indicate a higher level of access to technology, which can lead to a better quality of life, greater access to health information and mental health services, and support from the online community, thus reducing mental health risks (Sukkunnoed et al., 2002; Sukmak, 2018). Therefore,  $\beta_7 < 0$  was expected.

$drug_{i,t}$ : the proportion of drug crime cases to the population in province  $i$  in year  $t$ . This variable represents the risk associated with the social environment that can influence mental disorders. Other control variables, such as alcohol consumption, alcohol, and smoking addicts, were considered. However, due to the unavailability of the data in the study period, drug crime cases are used in this analysis. An increase in this proportion shows a higher risk of being exposed to drugs and illegal substances, creating an opportunity for an increase in substance abuse disorders and other types of mental health disorders (Sukmak, 2018). Therefore, we expected  $\beta_8 > 0$ .

### **Population structure control variables and other circumstances control variables consist of:**

$gender_{i,t}$ : the proportion of the male population to the overall population in province  $i$  in year  $t$ . This ratio can discern which gender is more susceptible to different types of mental health disorders (World Health Organization & Calouste Gulbenkian Foundation, 2014). Thus,  $\beta_9$  can be either negative or positive, as different genders may exhibit varying susceptibilities to different types of mental disorders.

$age_{i,t}$ : the proportion of older people (over 60) to the population in province  $i$  in year  $t$ . This ratio can discern whether older people are more susceptible to different types of mental health disorders (World Health Organization & Calouste Gulbenkian Foundation, 2014).  $\beta_{10}$  can take either a negative or a positive value, as older individuals may exhibit varying susceptibilities to different types of mental disorders compared to younger people.

$covid_t$ : the dummy variable takes the value of 1 during the pandemic period of 2020–2021 and 0 otherwise. This variable controls for other circumstances that can affect the mental health of the natives. The pandemic has brought unprecedented stress and uncertainty concerning health, economic stability, and social disruption. The fear of illness can contribute to heightened stress levels, hence increasing mental health disorders. Moreover, during the COVID-19 pandemic, Thailand has implemented social distancing and quarantine measures, potentially leading to increased feelings of loneliness and isolation, which are risk factors for mental health issues. Therefore, we expected  $\beta_{11} > 0$ .

$covid_t * migrant_{i,t}$ : the interaction term between  $covid_t$  and  $migrant_{i,t}$ . If there are concerns about the health status of migrants, particularly related to the spread of COVID-19, it could contribute to more stress and fear among natives related to migrants during the COVID-19 pandemic. Thus, we expected  $\beta_{12} > 0$ .

$\varepsilon_{i,t}$  : an error term.

The number of mental health patients in each province can be geographically influenced by neighboring observations, known as spatial correlation, which refers to the tendency of observations near each other to be more similar than those farther apart. In our case, individuals may be more likely to experience mental health issues if they live in an area with high levels of poverty or environmental stressors. These factors may, therefore, affect the mental health of individuals in the neighboring areas, leading to spatial autocorrelation. Therefore, this study uses the spatial panel autoregressive model (SAR) to provide more accurate estimates of the relationship between migrants and the proportion of patients with mental health issues. The SAR model is designed to handle panel data and can offer improved accuracy compared to models that neglect spatial dependencies (LeSage, 2008). The weight matrix ( $\rho W_{ij} y_j$ ) is included in the model to account for the effect of spatial correlation from province  $j$  ( $y_j$ ), which could be transmitted to nearby province  $i$ .  $\rho$  is the coefficient of  $W$ , showing the effect of spatial correlation from province  $j$  which can be transmitted to nearby province  $i$ , and  $W_{ij}$  is the weight matrix variable, which has a value of 1 if province  $j$  is near to province  $i$ , and 0 otherwise. The fixed and random-effect spatial panel autoregressive models are considered based on the Hausman test. The data employed in the model has successfully passed both multicollinearity and panel unit root tests.

This study uses provincial-level data from the period 2016 to 2021, with the data on the number of different types of mental health disorders by province collected from the Department of Mental Health (Thailand). We collected data on the number of migrants in different provinces, data on other economic and social factors that can influence the number of mental health patients, comprising gross provincial product (GPP), unemployment rate, education level, healthcare services, technological infrastructure, crime, and other population were collected from the Thai National Statistical Office website (<https://www.nso.go.th/nsoweb/officialStatistics>).

To control for the size of each province, we divided all the level data with the number of people in each province. Details of each variable and the data source are available in Table A1 in the Appendix. A summary of the statistics of the variables used in the study is shown in Table 1.

**Table 1:** Summary Statistics of the Variables

Variable	Observations	Mean	Standard Deviation	Minimum	Maximum
psychhealth	462	0.026	0.010	0.000	0.086
substance	462	0.006	0.006	0.000	0.068
suicide	462	0.0003	0.0002	0.000	0.001
schizo	462	0.005	0.003	0.000	0.017
bipolar	462	0.0001	0.0004	0.000	0.005
depress	462	0.004	0.002	0.000	0.011
anxiety	462	0.005	0.002	0.000	0.014
others	462	0.005	0.003	0.000	0.020
<b>Control Variables</b>					
migrant	462	0.032	0.055	0.0002	0.409
GPP	462	0.118	0.145	0.024	0.734
unem	462	0.007	0.006	0.000	0.075
pov	462	9.377	8.118	0.000	46.540
edu	462	8.248	0.933	5.560	11.260
tech	462	0.062	0.038	0.009	0.252
doc	462	0.0004	0.0002	0.0005	0.002
drug	462	0.003	0.002	0.000	0.012
male	462	0.484	0.017	0.403	0.504
age	462	0.166	0.032	0.098	0.255
covid	462	0.333	0.472	0.000	1.000
covid*migrant	462	0.011	0.036	0.000	0.407

## Empirical results and discussion

As can be seen in Table 2, Column 1, which shows the results of the overall mental health patients, migrants do not significantly impact natives' mental health when measured by the number of overall patients per population in each Thai province. When considering the effect of migrants on different types of mental disorders, the results indicate that a rise in their number only appears to be associated with a lower level of substance abuse disorder patients (Column 2). In particular, a one percentage point increase in the number of migrants per population corresponds to a 0.013 percentage point decrease in the prevalence of substance abuse disorder patients. This result diverges from the existing literature. Typically, an increase in migrants is expected to elevate the occurrence of mental health disorders, as suggested by prior research (ECDC, 2009; Hossin, 2020; Kunnu & Pasunon, 2015; Virupaksha et al., 2014). However, the unexpected negative effect of a rise in migrants on substance abuse disorders in Thailand could be attributed to the enforcement of the measures aimed at preventing and suppressing drug-related activities in workplaces of 2000 and 2015 issued by the Department of Labor Protection and Welfare, the new Thai drug law of 2021 (Act Promulgating the Narcotics Code, 2021) which combined the previous related Thai drug laws (Emergency Decree on Prevention Against

Abuse Using of Volatile Substances, 1990; Narcotics Act, 1979; Narcotics Control Act, 1976; Psychotropic Substances Act, 2016), coupled with immigrant enforcement of drug using in the workplace. These measures may result in more significant restrictions and efforts to control drug problems within the country. With more migrants in an area, the enforcement authorities might be more vigilant and conduct periodic inspections of work camp sites for violations of relevant immigration activities. Therefore, they would be able to prevent the consumption of illegal drugs and other substances, thus helping to reduce the number of people who might suffer from substance abuse.

Moreover, as Thongpan (2022) and Namsanguan and Hora (2019) found, migrant workers in Thailand typically live together in groups, such as in migrant dormitories and work camps. They may face social discrimination from the native population. Because of the reduced social interaction with them, this may reduce the likelihood of drug consumption in both migrant and native groups. This phenomenon may also explain why migrants do not significantly affect the prevalence of other types of mental health disorders (namely, suicidal behavior, schizophrenia, bipolar disorder, depression, anxiety, and different types of mental health disorders) in natives. Less social interaction between migrants and natives may limit the influence that migrants have on the mental health of the native population.

Economic factors do not have a significant impact on the number of mental health patients in Thailand, apart from unemployment in relation to depression disorder (Column 6). A higher unemployment rate significantly relates to an increase in the number of depression disorder patients. This result is expected, as unemployment can cause stress when people cannot provide for themselves and their families. They may experience feelings of hopelessness and helplessness, leading to depression. Moreover, being unemployed can lead to social isolation, which can exacerbate depression. Previous studies with similar results include Sukkumnoed et al. (2002) and Sukmak (2018).

As for social and population structure factors, higher education levels can reduce the likelihood of suffering from mental health disorders in general (Column 1), specifically schizophrenia, depression disorder, and anxiety disorder (Columns 4, 6, & 7, respectively). This result is as expected and in line with other empirical literature such as Chen (2011), Lu et al. (2012), Rechel et al. (2013), and Hasan et al. (2021). A higher level of education can increase job opportunities, enabling access to higher-paid and more stable jobs, which will reduce the financial stress that might lead to many mental health disorders. Higher education can help people develop critical thinking, problem-solving, and coping skills, which will help them handle stress, thus leading to fewer cases of mental health disorders. For public health services, it is associated with a reduction in the number of schizophrenia patients per population (Column 4). This result is expected as an increase in public health personnel can help with the prevention programs, provide more support to individuals, and may contribute to reducing such numbers. However, surprisingly, an increase in public health services is associated with a rise in the number of anxiety disorders per population (Column 7).

While this result is not as expected, the measure used to assess public health services in this study is the number of doctors per capita in each province. However, since this measure does not differentiate between primary care physicians and psychiatrists, an increase in the number of doctors may be primarily driven by adding primary care physicians rather than psychiatrists. Such an increase may indicate that the area has a greater demand for physical healthcare due to various diseases and health conditions; therefore, its population may experience stress related to their health conditions and diseases, which could potentially lead to an increase in the prevalence of anxiety disorders. In terms of technological infrastructure, an increase in

technical devices is associated with a rise in the proportion of overall mental health patients and patients with schizophrenia (Columns 1 & 4, respectively). This might be due to several factors. Technology can lead to social isolation, which is a known risk factor for schizophrenia and other mental health disorders, and it can increase the risk of cyberbullying, contributing to stress, particularly among young people (See Hunt et al., 2018); Lin et al., 2016); Schizophrenia Working Group of the Psychiatric Genomics Consortium, 2014; among others). It can also disrupt sleep patterns, which can also contribute to stress. Regarding drug crime cases, as expected and similar to previous studies such as Sukmak (2018), an increase in such crime is connected to more patients with overall mental health disorders, substance abuse disorder, suicidal tendencies, and anxiety (Columns 1, 2, 3, & 7, respectively) (See Borges et al. (2017), among others).

In terms of the population structure in each area, it is shown that areas with a higher male population have a lower number of other types of mental health disorders (Column 8). Literature and clinical studies have made the same findings (Gkiouleka et al., 2018; McLean et al., 2011; Vonneilich et al., 2021). The reasons may be biological and/or cultural factors; this needs further attention. The same applies to age, as the results show that areas with an older population have a lower number of cases of anxiety disorders and other types of mental health disorders (Columns 7 & 8, respectively), but on the other hand, more overall mental health disorders, suicide attempts, bipolar disorders, and depression disorders (Columns 1, 3, 5, & 6). Other studies showing that age is one of the factors influencing mental health disorders are Lu et al. (2012), Gkiouleka et al. (2018), and Vonneilich et al. (2021).

For the control variable of other circumstances, the result shows that the interaction term between covid and migrant variables (covid\*migrant) is statistically insignificant in all regressions. This indicates that the impact of migrants on the mental health of natives remains unchanged during the COVID-19 pandemic. Nevertheless, the covid dummy variable exhibits a positively significant effect on the prevalence of bipolar disorder and anxiety in Columns 5 and 7. This could be attributed to the COVID-19 pandemic period, which may generate fears of getting sick, stress, and alterations in social interactions, thereby increasing the risk of mental illness. Finally, the significance of the weight matrix (W) coefficient in most regressions shown in Table 2 suggests that geographic factors influence the proportion of mental health disorder patients in each province. Therefore, it is appropriate to use the specific effect spatial autoregressive model.

**Table 2:** Effect of Migrants on the Mental Health of the Native Population in Thailand

Variables	psychhealth (1)	substance (2)	suicide (3)	schizo (4)	bipolar (5)	depress (6)	anxiety (7)	others (8)
<b>Migrant</b>	<b>-0.006 (0.013)</b>	<b>-0.013* (0.007)</b>	<b>7.43e-05 (1.81e-04)</b>	<b>-7.50e-04 (0.002)</b>	<b>-6.90e-05 (8.45e-04)</b>	<b>0.001 (0.002)</b>	<b>0.002 (0.003)</b>	<b>0.001 (0.004)</b>
<b>GPP</b>	-8.73e-05 (0.006)	0.016 (0.018)	1.02e-04 (9.48e-05)	-2.82e-04 (0.001)	6.47e-04 (0.001)	-8.45e-04 (0.001)	-9.98e-04 (0.004)	0.001 (0.005)
<b>unem</b>	0.118 (0.074)	0.097 (0.059)	4.91e-04 (8.88e-04)	-0.010 (0.016)	-0.008 (0.007)	0.020** (0.010)	0.014 (0.012)	0.020 (0.016)
<b>pov</b>	2.76e-05 (7.36e-05)	4.31e-05 (6.98e-05)	5.61e-09 (9.57e-07)	1.31e-05 (1.35e-05)	-1.23e-06 (4.01e-06)	7.84e-06 (1.11e-05)	1.11e-05 (1.50e-05)	-2.31e-05 (1.91e-05)
<b>edu</b>	-0.003*** (0.001)	-0.001 (0.001)	-1.51e-05 (1.10e-05)	-4.79e-04*** (1.50e-04)	3.95e-05 (5.35e-05)	-4.20e-04*** (1.28e-04)	-5.49e-04*** (1.90e-04)	-1.54e-04 (2.51e-04)
<b>doc</b>	0.441 (3.281)	5.548 (4.068)	-0.022 (0.046)	-1.842*** (0.545)	-0.293 (0.235)	-0.570 (0.531)	1.560* (0.847)	1.373 (1.138)
<b>tech</b>	0.028* (0.017)	-0.011 (0.021)	6.30e-05 (2.25e-04)	0.017*** (0.004)	0.001 (0.001)	0.002 (0.003)	0.005 (0.004)	-0.006 (0.006)
<b>drug</b>	0.394* (0.215)	0.354* (0.190)	0.008*** (0.003)	0.031 (0.043)	-0.020 (0.021)	0.016 (0.031)	0.065* (0.040)	0.023 (0.052)
<b>gender</b>	0.039 (0.043)	-0.181 (0.218)	-3.03e-04 (6.89e-04)	0.013 (0.017)	0.025 (0.022)	-0.007 (0.008)	-0.042 (0.045)	-0.115* (0.061)
<b>age</b>	0.039* (0.022)	0.051 (0.033)	7.67e-04** (3.08e-04)	-7.34e-04 (0.004)	0.006*** (0.002)	0.018*** (0.004)	-0.062*** (0.009)	-0.022** (0.010)
<b>covid</b>	-0.002 (0.002)	-0.002 (0.001)	2.18e-06 (1.35e-05)	-5.75e-04 (2.60e-04)	4.94e-04*** (7.41e-05)	-1.46e-04 (1.56e-04)	6.63e-04** (2.64e-04)	-2.32e-04 (3.35e-04)
<b>covid*migrant</b>	0.004 (0.016)	0.003 (0.011)	-3.57e-04 (3.79e-04)	-3.88e-04 (0.004)	4.51e-04 (6.57e-04)	1.37e-04 (0.002)	-0.002 (0.002)	0.006 (0.003)
<b>W</b>	0.552*** (0.041)	0.334*** (0.050)	0.750*** (0.032)	0.675*** (0.036)	-0.061 (0.080)	0.296*** (0.058)	0.459*** (0.050)	0.727*** (0.033)
<b>Observations</b>	462	462	462	462	462	462	462	462
<b>Number of id</b>	77	77	77	77	77	77	77	77
<b>R-sq</b>	0.3135	0.1090	0.1309	0.5001	0.4301	0.3976	0.6495	0.3423
<b>Hausman test statistic</b>	17.99	-4.22	11.07	14.14	17.22	1.38	-82.40	-9.18
<b>Model</b>	RE	FE	RE	RE	FE	RE	FE	FE

Note:  $\beta$  coefficients are reported along with the standard errors in parentheses. \*, \*\*, and \*\*\* signify 10%, 5%, and 1% levels of significance, respectively.

In summary, the arrival of migrants in Thailand does not lead to an increase in mental health disorders in the native population. Furthermore, our findings suggest that an increase in migrants in a particular area is associated with a reduction in substance abuse disorder per population. This might be due to increased law enforcement and enhanced drug monitoring when there are more migrants.

## Conclusion and suggestions

This research has examined the potential effect of migrants on natives' mental health disorders in Thailand, both diseases in general and specific types. Using provincial-level data, our study highlights the complex relationship between migrants and mental health outcomes among the native population. The results indicate that migrants do not have a significant impact on the overall mental health of natives, mental health issues related to suicidal behavior, schizophrenia, bipolar, depression, anxiety, and other types of mental health disorders in Thailand. However, its effect on substance abuse disorder is negatively significant. A rise in the number of migrants per population is associated with a lower number of substance abuse disorder patients in Thailand. This might be due to a strengthening of law enforcement related to drug activities since the year 2000 and enhanced drug monitoring when there are more migrants. The study also finds that unemployment, education, public health service, technological infrastructure, health risk behavior, gender, and age do have significant impacts on mental health outcomes in Thailand.

Prior research, both globally and within the context of Thailand, predominantly concentrates on the mental health impact of migration on migrants themselves, with limited attention to its effects on native populations. This study contributes novel insights by explicitly examining the impact of an increase in migrants on the mental health of natives – an aspect rarely explored in existing literature. Furthermore, it extends beyond the conventional survey-based methods used in Thai studies, incorporating empirical analyses at the provincial level. Unlike prior research confined to case studies and descriptive observations, our study adopts a comprehensive approach, shedding light on the broader mental health landscape of entire countries based on empirical data at the provincial level in Thailand. Overall, our findings suggest that the presence of migrants in Thailand does not lead to adverse mental health outcomes in the native population. Remarkably, an increase in the number of migrants has been associated with a reduction in the prevalence of substance abuse.

Therefore, policies aimed at managing and regulating drug abuse, such as the Act Promulgating the Narcotics Code (2021), could be effective. It is also important to continue implementing and strengthening such policies with support from the Department of Disease Control, the Department of Mental Health, and the Department of Labor Protection and Welfare to ensure the continued reduction in substance abuse. Reducing the unemployment problem in the country through the National Economic and Social Development Plan could also have an effect apart from solving economic issues, as it was found in this study that reducing unemployment can lower the risk of depression disorder. The government should also consider the development of education and technological infrastructure and provide sufficient funds to reduce inequality in accessing these, as our results show that these factors can reduce mental health disorders. However, at the same time, an increase in technology access can lead to social isolation and cyberbullying, which can, in turn, lead to more mental health disorders. The government should, therefore, prioritize providing adequate mental health human resources

and mental healthcare systems, as well as taking measures to protect against the potential risks of technology.

In conclusion, policymakers must gain a more profound understanding of the underlying mechanisms in developing effective policies that address the impact of migration on mental health and promote the well-being of both the native population and migrants.

Nevertheless, given the constraints in obtaining data on illegal migrants in Thailand, additional research inclusive of this demographic is imperative for a comprehensive understanding of the impacts of migration on mental health. Furthermore, the available data on the mental health of native patients lacks information on those who do not utilize mental healthcare services. This limitation underscores the importance of careful consideration in future research, especially when comprehensive data becomes available in the Thai health data system.

## Statements and declarations

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# Appendix

**Table A1: Variables Used in the Study**

Variable	Symbol	Calculation Detail
Number of migrants	migrant	The proportion of migrants to the population in the province
<b>Mental Health Issues</b>		
Number of total patients with mental health issues	psychohealth	The proportion of patients with mental health issues in the population in the province.
Number of patients with mental health issues related to drug addiction	addict	The proportion of patients with mental health issues related to drug addiction in the population in the province. (ICD-10: F10–F19)
Number of patients with mental health issues related to suicide	suicide	The proportion of patients with mental health issues related to suicide in the population in the province. (ICD-10: X60–X84)
Number of patients with schizophrenia	schizo	The proportion of patients with schizophrenia in the population in the province. (ICD-10: F20)
Number of patients with bipolar	bipolar	The proportion of patients with bipolar disorder in the population in the province. (ICD-10: F31)
Number of patients with depression	depress	The proportion of patients with depression to the population in the province. (ICD-10: F32, F33, F341, F38, F39)
Number of patients with anxiety	anxiety	The proportion of patients with anxiety in the population in the province. (ICD-10: F40–F48)
Number of patients with other mental health issues	psyothers	Number of patients with other mental health issues in the population in the province. (ICD-10: F04–F07, F09, F50–F69, F80, F82–F83, F88–F89, F91–F99 except F638 and F988)
<b>Control variables</b>		
Economic condition	GPP	Actual gross provincial product per capita
Unemployment	unem	The proportion of unemployed persons to the population in the province
Poverty	pov	The proportion of poor people to the population in the province
Education	edu	Average years of education of the population in the province
Health services	doc	Proportion of number of doctors to population in the province
Technological infrastructure	tech	The proportion of the number of technological devices in households to the population in the province
Risky health behaviour	drug	The proportion of drug crime cases in the province to the population in the province
Gender	male	The proportion of males to the population in the province
Old population	old	Proportion of population over the age of 60 to population in the province
COVID-19	covid	The dummy variable took the value of 1 during the years 2020 and 2021
COVID-19*migrant	covid*migrant	An interaction term between COVID-19 and the proportion of migrants to the population in the province