Stress, Depression, Public Stigma, and Their Associated Factors Among University Students in Thailand After the COVID-19 Pandemic

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Abstract

University students have been faced with challenges, including COVID-19 public stigma, which results in increased stress and depression. Few studies have assessed stress, depression, and public stigma of COVID-19 after the pandemic. This paper investigated stress, depression, and public stigma of COVID-19 among Thai University students. A cross-sectional study was conducted using an online questionnaire to assess stress, depression, and public stigma resulting from COVID-19 among Thai university students between 15 and 30 August 2022. The questionnaire was developed by the Department of Mental Health, Ministry of Public Health, Thailand. Public stigma was measured by the COVID-19 public stigma scale. The effects of public COVID-19 stigma on stress and depression were analyzed using multivariable multi-level logistic regression. A total of 2,422 students completed the questionnaire. After multivariable analysis adjustment, students who experienced COVID-19 public stigma showed increased stress (AOR = 1.53; 95% CI [1.27–1.84]) and depression levels (AOR = 1.34; 95% CI [1.01–1.79]). Those who lived with high-risk COVID-19 individuals showed significant risk factors for stress, depression, and public stigma of COVID-19, while income presented the reverse effect. Those vaccinated with over two doses showed significantly reduced chances of depression. The COVID-19 public stigma plays a vital role in stress and depression levels among Thai university students. To mitigate stress and depression, an evaluation of public stigma is needed even after the pandemic. Further cohort studies are required to verify long-term results.

Keywords

COVID-19 public stigma; depression; mental health; stress; Thailand

Introduction

During the last decade, mental health issues have increased by 13% globally (Moitra et al., 2023). The problem has been exacerbated by COVID-19, which was declared a pandemic by the World Health Organization in 2020 (Burki, 2020; Khan et al., 2022; Mahase, 2020). A meta-analysis revealed that psychological distress, stress, and depression prevalence increased by 50%, 36.5%, and 28% during the COVID-19 pandemic, respectively (Nochaiwong, Ruengorn, Thavorn, et al., 2021). These problems were commonly found among infected people (Bo et al., 2021), health professionals (Lai et al., 2020), and the general public (Luo et al., 2020). Mental health problems were also prevalent among college students in Thailand (Ma et al., 2020; Wongpakaran et al., 2021). It is well known that social and economic factors cause deterioration in mental health and pose a severe threat to the general populace, which is the global economy already weakened by the COVID-19 pandemic (Marazziti et al., 2021). Furthermore, the public stigma of COVID-19 also shows high prevalence (Yuan et al., 2022) and may play a role in increasing stress and depression.

People infected with COVID-19 experience severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) and are also subjected to public stigmatization (Kaufman et al., 2020; Nochaiwong, Ruengorn, Awiphan, et al., 2021). From a health viewpoint, public stigmatization is the process of labeling, stereotyping, and then discriminating against people with a particular disease (Grover et al., 2020). Stigma and discrimination cause mental stress, physical harm, and loss of jobs and educational opportunities for involved populations. They also pose a severe threat to the control of epidemics and the recovery and development of the economy and society (Bagcchi, 2020; Li et al., 2019; Sun et al., 2019).

Several studies conducted during the early days of the pandemic indicated the prevalence of stigma at 37% in participants from low- and middle-income countries, higher than from high-income countries (27%). Still, the difference was not statistically significant (Yuan et al., 2022). In Lebanon, over half of the sample population had moderate to severe stigma discrimination (62%) (Haddad et al., 2021), while a study in China found that 31.8% of the participants endorsed stigmatization toward people infected with COVID-19 (Zhang et al., 2021). In Thailand, 24.2% of the COVID-19-related public stigma toward the general population was at low or minimal levels, with 35.5% at moderate and 40.3% at high levels (Ruengorn et al., 2022). Stigma, discrimination, and violence were most strongly associated with psychological distress and depressive symptoms (Janoušková et al., 2024).

In October 2022, the Government of Thailand announced that COVID-19 would be treated as a common disease and eased compulsory mask measures by re-opening on-site university learning. However, at that time, university students faced social, financial management, academic achievement challenges, and COVID-19 public stigma (Maser et al., 2019), which increased stress. Stress events are among the most potent factors that trigger or induce depressive episodes in humans (Fuchs & Flügge, 2004).

As mentioned above, we therefore hypothesized that COVID-19 stigma may be associated with stress and also depression. However, few studies have evaluated COVID-19 public stigma, stress, and depression and its related factors among Thai university students in the post-COVID-19 era. Thus, this study aimed to first assess COVID-19 public stigma, stress, and depression prevalence among Thai university students after easing COVID-19 restriction measures. Second, we investigated factors associated with stress, depression, and COVID-19

stigma among Thai university students after easing COVID-19 restriction measures. The
findings of this study will emphasize the COVID-19 public stigma, stress, and depression
problem in universities in Thailand and its associated factors, which are beneficial to
policymakers who are involved in universities to prevent and control mental health problems
in Thai university students.

Research methodology

This cross-sectional study was conducted between 15 and 30 August 2022, with data collected
through an online questionnaire using Google Forms.

Study samples and data collection

The study population consisted of 162,387 students enrolled in the academic year 2021
pursuing bachelor's, master's, and doctoral degrees from six universities across Thailand,
representing the Central, Northern, Southern, and Northeastern regions.

Sample size

The simple one-stage cluster sampling formula was used to calculate the sample size to
estimate mean values of stress and depression in a large population (Levy PS, Lemeshow S.,
2023)

The STATA command (.*sample 3, count*) was used to randomly sample three student numbers
from 162,387 students. Therefore, the total number of samples required for the survey was
123,236, but only 2,422 university students completed and returned the questionnaire.

The questionnaire was submitted as an anonymous online form (Google Form), with
information communicated to the respondents (anonymous questionnaire) through the most
popular social networks in Thailand (Line and Facebook) and the university network website.
The coordinators of the four regional university networks comprising the central, northern,
southern, and northeastern areas were contacted.

Before answering the questionnaire, the students were screened according to the following
criteria: those aged 18 and over who retained student status in the university registration
system, returned to regular university classroom-based systems, communicated in Thai, and
were willing to participate in the research. Qualified respondents were asked to read the
information sheet and click on the informed consent form in the Google Form.

After consenting to participate in the research, the online questionnaire automatically
appeared. The respondents completed the survey and could opt out at any time. The
respondents answered all the questions as specified. If respondents did not answer all the
questions, they could not submit their answers to the system. Answering questions in this
research did not affect their studies, daily life, or work, and they received any eligible
privileges from the university.

All information was stored confidentially in the Google Form system and not disclosed to the public. Data were only used to conduct the research, and only eligible researchers were given a password to access the data. The data will be kept for one year. After the study, all data were deleted from the Google Form system and all storage devices. Finally, a total of 2,422 university students completed and returned the questionnaire.

Research instrument

The research instrument was a questionnaire consisting of three parts as follows:

Part 1: Demographic data

There were ten closed-ended and fill-in-the-blank questions consisting of gender, age, religion, university, income, education level, province of residence, housing, number of family members, living with high-risk COVID-19 individuals, medical history of vaccination against COVID-19 and length of illness with COVID-19. The high-risk COVID-19 individuals were defined by the World Health Organization as older people over 60 years of age, pregnant women who are more than 20 weeks pregnant, people with congenital diseases such as diabetics, kidney disease patients, people taking immunosuppressive drugs, people infected with HIV.

Part 2: Mental health status

The stress and depression test of the Department of Mental Health (2016). This test had four sections consisting of:

Section 1: Stress assessment questionnaire (ST5) comprises five questions with a four-level Likert scale measurement consisting of 0 (*rarely*), 1 (*occasionally*), 2 (*frequently*), and 3 (*most frequently*). The Cronbach's alpha (α) was 0.81. The total score was between 0 and 15, and the criteria used to interpret the results were as follows:

> 0–4 points indicate no level of stress causing problems. The students were able to deal with stresses that arise in daily life and adapt to different situations appropriately.
> 5–7 points indicate suspicion of a stressful or unresolved issue that takes time to adjust or resolve.
> 8–15 points suggest a high level of stress that may have a negative effect on health.

Stress was categorized into binary variables as no stress (0–4 points) and having stress (5–15 points).

Section 2: Depressive Assessment Questionnaire (9Q) or Patient Health Questionnaire (PHQ-9) consisting of nine questions with a four-level Likert scale measurement composed of 0 (*never*), 1 (*sometime*s [1–7 days]), 2 (*frequently* [more than 7 days]), and 3 (*every day*). Cronbach's α was 0.89. The total score was between 0 and 27 points, and the criteria used to interpret the results were as follows:

> 0–7 points mean normal or relatively mild symptoms
> 7–12 points mean low-level depression
> 13–18 points mean medium-level depression

19–27 points mean severe level depression

Depression was categorized as a binary variable with *no/low depression* (0–12 points) and *having depression* (13–27 points).

The ST5 and PHQ-9 are standard validated and applicable tools for evaluating stress and depression, and they are available in the Mental Health Department, Ministry of Public Health, Thailand (Department of Mental Health, 2016).

Part 3: COVID-19 Public Stigma Questionnaire (10 Q) was developed by Nochaiwong, Ruengorn, Awiphan, et al. (2021) with internal consistency Cronbach's α 0.85, 95% CI [0.84–0.86], and test-retest reproducibility (intraclass correlation 0.94, 95% CI [0.86–0.96]) was used. Questions were implemented as a five-level Likert scale measurement as 1 (*strongly disagree*), 2 (*disagree*), 3 (*neutral*), 4 (*agree*), and 5 (*strongly agree*). The criteria used to interpret the results were as follows:

 0–18 points = None/Low
 19–25 points = Medium
 26–50 points = High

The COVID-19 public stigma was categorized into binary variables: *none/low COVID-19 public stigma* (0–18 points) and *having COVID-19 public stigma* (19–50 points).

The COVID-19 Public Stigma Questionnaire is practical and suitable for measuring stigma toward COVID-19 and has been developed and used in Thailand (Nochaiwong, Ruengorn, Awiphan et al., 2021).

Statistical analysis

Definite facts were stated as figures and proportions, while continuous data were summarized as means with standard deviations or medians with ranges (minimum: maximum) when continuous variables showed non-normal distribution.

Stress and depression were reported as mean and 95% confidence interval (CI). The associations between stress, depression, various demographic variables, and public COVID-19 stigma were examined using multi-level logistic regression, with university and grade as random effects in the model. The magnitude of the effect was stated as crude odds ratio (OR) and adjusted odds ratio (AOR) at a 95% CI. Summed scores of stress, depression, and public COVID-19 stigma were categorized as binary variables and treated separately in a regression model as an outcome. Stress was categorized into binary variables as *no stress* (0–4 points) and *having stress* (5–15 points); *no/low depression* (0–12 points) and *having depression* (13–27 points); *none/low COVID-19 public stigma* (0–18 points) and *having COVID-19 public stigma* (19–50 points). Using backward elimination, significant features in the univariate analysis were employed as candidate variables in the initial multivariable analysis model. Statistical significance was set at *p* value < .05. All examinations were conducted using Stata version 15.

Results

Demographic features

A total of 2,422 students completed the questionnaire via Google Forms. Most students who answered the questionnaire were female (84.19%) with an average age of 20, a bachelor's degree (94.72%), from southern universities (59.37%), living with a roommate (53.14%), living in a university dormitory (59.37%) and income of 6,001–9,000 baht/month (35.38%). Results showed that 21.59% were infected with COVID-19, while 7.10% lived in high-risk infection groups. Most students were vaccinated (99.05%), over 98% had more than two shots, and 63.71% reported experiencing public stigma about COVID-19, with 72.34% reporting stress and 10.24% depression (Table 1).

Table 1: Demographics, Stress, Depression, and COVID-19 Public Stigma Among Thai University Students

Variable	Stress (%)		Depression (%)		COVID-19 Public Stigma (%)	
	Yes	**No**	**Yes**	**No**	**Yes**	**No**
Prevalence (total)	1,752 (72.34)	670 (27.66)	248 (10.24)	2,174 (89.76)	1,543 (63.71)	879 (36.29)
Age, median (min, max)	20 (18,51)	20 (17,50)	20 (18,29)	20 (17,51)	20 (17,50)	20 (18,50)
Sex						
Male	409 (69.56)	179 (30.44)	52 (8.84)	536 (91.16)	380 (64.63)	208 (35.37)
Female	1,343 (73.23)	491 (26.77)	196 (10.69)	1,638 (89.31)	1,163 (63.41)	671 (36.59)
Ever infected with COVID-19						
Yes	378 (72.28)	145 (27.72)	53 (10.13)	470 (89.87)	285 (54.49)	238 (45.51)
No	1,374 (72.35)	525 (27.65)	195 (10.27)	1,704 (89.73)	1,258 (66.25)	641 (33.75)
COVID-19 public stigma						
Yes	1,163 (75.37)	380 (24.63)	172 (11.15)	1,371 (88.85)	-	-
No	589 (67.01)	290 (32.99)	76 (8.65)	803 (91.35)	-	-
Lived with high-risk COVID-19 group						
Yes	137 (79.65)	35 (20.35)	32 (18.60)	140 (81.40)	120 (69.77)	52 (30.23)
No	1,615 (71.78)	635 (28.22)	216 (9.60)	2,034 (90.4)	1,423 (63.24)	827 (36.76)
University						
Northern (Chiang Mai)	331 (76.09)	104 (23.91)	46 (10.57)	389 (89.43)	298 (68.51)	137 (31.49)
North-east	130 (82.28)	28 (17.72)	20 (12.66)	138 (87.34)	93 (58.86)	65 (41.14)
Central (Bangkok)	114 (87.69)	16 (12.31)	21 (16.15)	109 (83.85)	67 (51.54)	63 (48.46)
Northern (Lampang)	148 (80.87)	35 (19.13)	27 (14.75)	156 (85.25)	111 (60.66)	72 (39.34)
Southern (Nakhon Si Thammarat)	972 (67.59)	466 (32.41)	128 (8.90)	1,310 (91.10)	917 (63.77)	521 (36.23)

Variable	Stress (%)		Depression (%)		COVID-19 Public Stigma (%)	
	Yes	No	Yes	No	Yes	No
North-east (Loei)	57 (73.08)	21 (26.92)	6 (7.69)	72 (92.31)	57 (73.08)	21 (26.92)
Degree						
Bachelor	1,679 (73.19)	615 (26.81)	246 (10.72)	2,048 (89.28)	1,456 (63.47)	838 (36.53)
Master	58 (59.79)	39 (40.21)	2 (2.06)	95 (97.94)	63 (64.95)	34 (35.05)
Doctoral	15 (48.39)	16 (51.61)	0	31 (100)	24 (77.42)	7 (22.58)
Housing						
In university	785 (69.96)	337 (30.04)	109 (9.71)	1,013 (90.29)	716 (63.81)	406 (36.19)
Out of university	632 (74.70)	214 (25.30)	93 (10.99)	753 (89.01)	530 (62.65)	316 (37.35)
House	335 (73.79)	119 (26.21)	46 (10.13)	408 (89.87)	297 (65.42)	157 (34.58)
Member						
1	395 (75.38)	129 (24.62)	54 (10.31)	470 (89.69)	317 (60.50)	207 (39.50)
1–3	919 (71.41)	368 (28.59)	142 (11.03)	1,145 (88.97)	826 (64.18)	461 (35.82)
> 3	438 (71.69)	173 (28.31)	52 (8.51)	559 (91.49)	400 (65.47)	211 (34.53)
Monthly income (baht)*						
< 3,000	142 (78.45)	39 (21.55)	18 (9.94)	163 (90.06)	119 (65.75)	62 (34.25)
3,001–6,000	525 (75)	175 (25)	74 (10.57)	626 (89.43)	451 (64.43)	249 (35.57)
6,001–9,000	631 (73.63)	226 (26.37)	93 (10.85)	764 (89.15)	551 (64.29)	306 (35.71)
9,001–12,000	318 (69.89)	137 (30.11)	52 (11.43)	403 (88.57)	286 (62.86)	169 (37.14)
> 12,000	136 (59.39)	93 (40.61)	11 (4.80)	218 (95.20)	136 (59.39)	93 (40.61)
Vaccination						
Yes	1,738 (72.45)	661 (27.55)	245 (10.21)	2,154 (89.79)	1,527 (63.65)	872 (36.35)
No	14 (60.87)	9 (39.13)	3 (13.04)	20 (86.9)	16 (69.57)	77 (30.43)
Number of vaccine shots						
None	14 (60.87)	9 (39.13)	3 (13.04)	20 (86.96)	16 (69.57)	7 (30.43)
1	16 (66.67)	8 (33.33)	3 (12.50)	21 (87.50)	14 (58.33)	10 (41.67)
2	860 (72.94)	319 (27.06)	137 (11.62)	1,042 (88.38)	751 (63.70)	428 (36.30)
3	775 (73.32)	282 (26.68)	95 (8.99)	962 (91.01)	675 (63.86)	382 (36.14)
4	87 (62.59)	52 (37.41)	10 (7.19)	129 (92.81)	87 (62.59)	52 (37.41)

Note: *35 THB ≈ 1 USD

Female students who were never infected with COVID-19, had a public stigma, lived with high-risk COVID-19 groups, studied at central university, had a bachelor's, lived outside the university, lived alone, had an income of < 3,000 baht, had vaccination and more than two shots showed higher proportion of reporting stress.

For depression, students who lived with 1–3 roommates, had an income of more than 12,000 baht, had no vaccination, and had four shots showed a higher proportion of reporting depression. Male students who were never infected with COVID-19 lived with high-risk COVID-19 groups, studied in northeastern universities, doctoral, lived at home, lived with more than three roommates, had income of 3,001–6,000 baht and had no vaccination showed a higher proportion of reporting COVID-19 public stigma.

Prevalence of stress among university students was 87.69% in Central (Bangkok), 82.28% in North-east (Khon Kaen), 80.07 in Nothern (Lampang), 76.09% in Northern (Chiang Mai), 73.08% in North-east (Loei), and 67.59% in Southern (Nakhon Si Thammarat) of Thailand. The stress mean score was 6.08 (95% CI [5.93–6.24]).

Prevalence of depression was 16.15% in Central (Bangkok), 14.75% in Northern (Lampang), 12.66% in North-east (Khon Kaen), 10.57% in Northern (Chiang Mai), 8.90% in Southern (Nakhon Si Thammarat), and 7.69% in North-east (Loei) of Thailand. The depression mean score was 5.82 (95% CI [5.63–6.02]).

Prevalence of public COVID-19 stigma was 73.08% in North-east (Loei), 68.51% in Northern (Chiang Mai), 63.77% in Southern (Nakhon Si Thammarat), 60.66% in Northern (Lampang), 58.86% in North-east (Khon Kaen), and 51.54% in Central (Bangkok). The mean score of public COVID-19 stigma was 23.15 (95% CI [22.76–23.54])

The prevalence of stress, depression, and COVID-19 public stigma by grade and university location was also reported in Figures 1, 2, and 3, respectively.

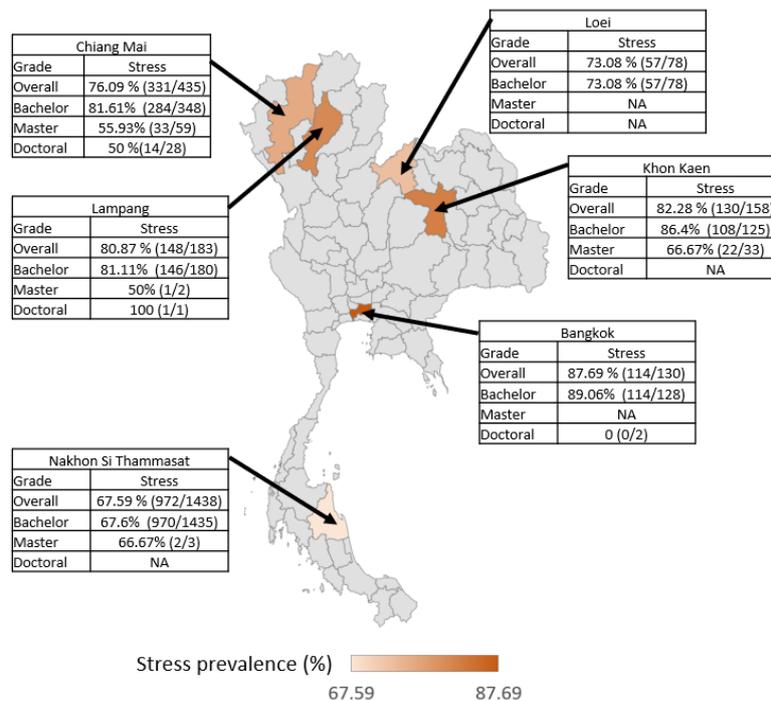**Figure 1:** Stress Prevalence in Universities Located by Province

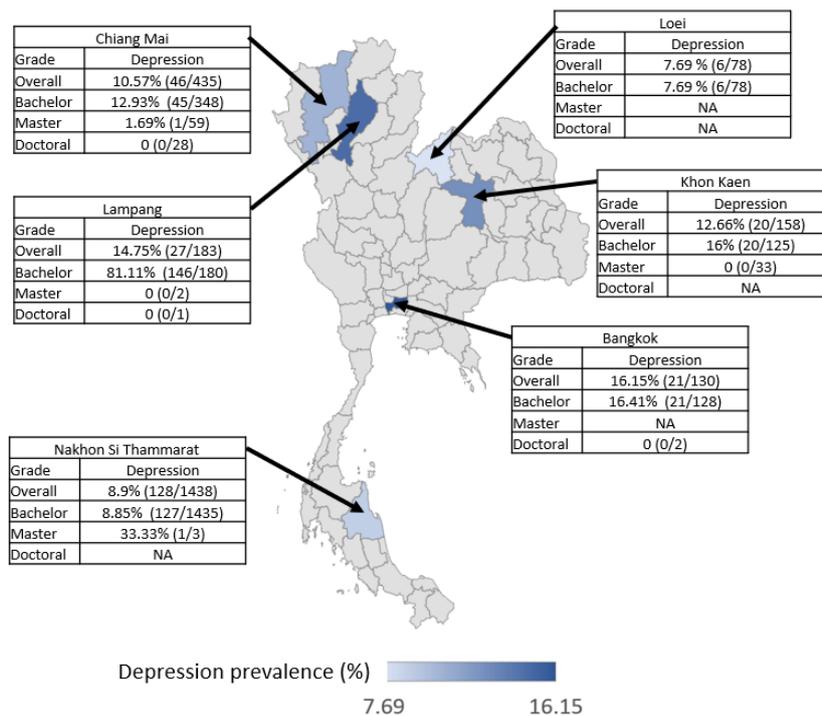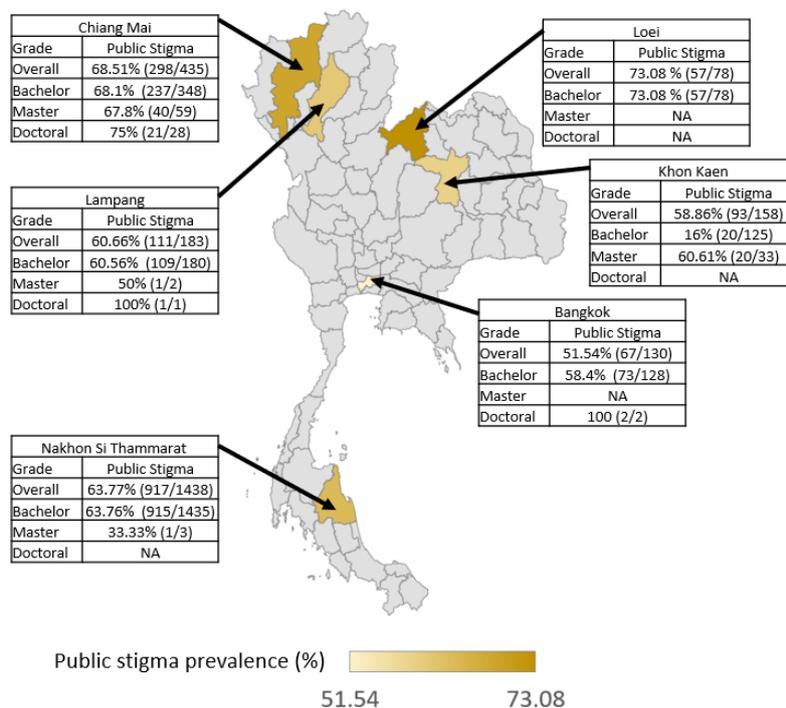**Figure 2:** Depression Prevalence in Universities Located by Province

Chiang Mai	
Grade	Depression
Overall	10.57% (46/435)
Bachelor	12.93% (45/348)
Master	1.69% (1/59)
Doctoral	0 (0/28)

Lampang	
Grade	Depression
Overall	14.75% (27/183)
Bachelor	81.11% (146/180)
Master	0 (0/2)
Doctoral	0 (0/1)

Loei	
Grade	Depression
Overall	7.69 % (6/78)
Bachelor	7.69 % (6/78)
Master	NA
Doctoral	NA

Khon Kaen	
Grade	Depression
Overall	12.66% (20/158)
Bachelor	16% (20/125)
Master	0 (0/33)
Doctoral	NA

Bangkok	
Grade	Depression
Overall	16.15% (21/130)
Bachelor	16.41% (21/128)
Master	NA
Doctoral	0 (0/2)

Nakhon Si Thammarat	
Grade	Depression
Overall	8.9% (128/1438)
Bachelor	8.85% (127/1435)
Master	33.33% (1/3)
Doctoral	NA

Depression prevalence (%)
7.69   16.15

Figure 3: COVID-19 Public Stigma Prevalence in Universities Located by Province

Chiang Mai	
Grade	Public Stigma
Overall	68.51% (298/435)
Bachelor	68.1% (237/348)
Master	67.8% (40/59)
Doctoral	75% (21/28)

Lampang	
Grade	Public Stigma
Overall	60.66% (111/183)
Bachelor	60.56% (109/180)
Master	50% (1/2)
Doctoral	100% (1/1)

Loei	
Grade	Public Stigma
Overall	73.08 % (57/78)
Bachelor	73.08 % (57/78)
Master	NA
Doctoral	NA

Khon Kaen	
Grade	Public Stigma
Overall	58.86% (93/158)
Bachelor	16% (20/125)
Master	60.61% (20/33)
Doctoral	NA

Bangkok	
Grade	Public Stigma
Overall	51.54% (67/130)
Bachelor	58.4% (73/128)
Master	NA
Doctoral	100 (2/2)

Nakhon Si Thammarat	
Grade	Public Stigma
Overall	63.77% (917/1438)
Bachelor	63.76% (915/1435)
Master	33.33% (1/3)
Doctoral	NA

Public stigma prevalence (%)
51.54   73.08

Factors associated with stress, depression, and COVID-19 public stigma

Factors affecting stress and depression are shown in Table 2. Univariate analysis of the factors affecting stress showed that age was statistically significantly associated with decreased risk

of stress. Students who had a public stigma, lived with high-risk COVID-19 people, and had income lower than 12,000 baht/month had a statistically significant increased risk of stress.

Table 2: Factors Associated with Stress and Depression

Variable	Stress		Depression	
	Odds Ratio (95% CI)	Adjusted Odds Ratio (95% CI)	Odds Ratio (95% CI)	Adjusted Odds Ratio (95% CI)
Age	0.94 (0.9–0.97)	0.94 (0.91–0.98)	0.89 (0.82–0.96)	0.90 (0.83–0.97)
Sex				
Male	0.81 (0.66–1)	0.8 (0.65–0.99)	0.8 (0.58–1.11)	0.81 (0.58–1.12)
Female	1	1	1	1
Ever infected with COVID-19				
Yes	1.02 (0.82–1.27)	-	1 (0.72–1.38)	-
No	1		1	
COVID-19 public stigma				
Yes	1.58 (1.31–1.9)	1.53 (1.27–1.84)	1.37 (1.03–1.82)	1.34 (1.01–1.79)
No	1	1	1	1
Lived with high-risk COVID-19 people				
Yes	1.66 (1.13–2.46)	1.63 (1.1–2.41)	2.31 (1.52–3.51)	2.28 (1.5–3.46)
No	1	1	1	1
Housing				
In university	1		1	
Out of university	1.08 (0.87–1.34)	-	1.05 (0.77–1.43)	-
House	1.13 (0.87–1.49)	-	1.02 (0.69–1.51)	-
Member				
1	1		1	
1–3	0.91 (0.71–1.16)	-	1.14 (0.81–1.6)	-
> 3	1.04 (0.78–1.38)	-	0.92 (0.61–1.4)	-
Monthly income (baht)*				
< 3,000	2.54 (1.54–4.2)	2.22 (1.34–3.66)	2.17 (0.97–4.89)	-
3,001–6,000	2.18 (1.47–3.23)	1.92 (1.3–2.83)	2.4 (1.2–4.75)	-
6,001–9,000	2 (1.36–2.93)	1.78 (1.21–2.59)	2.44 (1.24–4.81)	-
9,001–12,000	1.7 (1.13–2.55)	1.51 (1.01–2.26)	2.62 (1.3–5.32)	-
> 12,000	1	1	1	
Number of vaccine shots				
<=2	1		1	1
>2	0.92 (0.76–1.11)	-	0.7 (0.53–0.91)	0.74 (0.56–0.97)

Note: *35 THB ≈ 1 USD; CI = confidence interval

After adjusting for sex and age, multivariable analysis showed that students who had public stigma (AOR = 1.53; 95% CI [1.27–1.84]), lived with high-risk COVID-19 people (AOR = 1.63; 95% CI [1.10–2.41]), had income of < 3,000 (AOR = 2.22; 95% CI [1.34–3.66]), 3,001–6,000 (AOR = 1.92; 95% CI [1.30–2.83]), 6,001–9,000 (AOR = 1.78; 95% CI [1.21–2.59]) and 9,001–12,000 (AOR = 1.51; 95% CI [1.01–2.26]) had statistically significant increased chances of stress.

Age, master's degree, and having two shots of vaccination showed a significant reverse effect
on depression, while COVID-19 public stigma indicated an increased risk of depression when
performing univariate analysis. In multivariable analysis, after adjusting for sex and age,
public stigma (AOR = 1.34; 95% CI [1.01–1.79]) and lived with high risk COVID-19 people
(AOR = 2.28; 95% CI [1.50–3.46]) showed a statistically significant increased risk of depression,
while students vaccinated with more than two shots had a significantly decreased chance of
depression (AOR = 0.74; 95% CI [0.56–0.97]) (Table 2).

Univariate analysis factors associated with COVID-19 public stigma showed that those
infected with COVID-19 had a statistically significant reduced risk of COVID-19 public stigma
while living with more than three family members showed borderline increased public
stigma. For multivariable analysis, those infected with COVID-19 had a significantly reduced
risk of public stigma (AOR = 0.61; 95% CI [0.50–0.73]), while living with more than three
family members increased the risk of public stigma compared to living alone (AOR = 1.35;
95% CI [1.04–1.74]) (Table 3).

Table 3: Factors Associated with COVID-19 Public Stigma

Variable	COVID-19 Public Stigma	
	Odds Ratio (95% CI)	Adjusted Odds Ratio (95% CI)
Age	1 (0.973–1.028)	1 (0.971–1.027)
Sex		
Male	1.03 (0.85–1.26)	1.05 (0.86–1.28)
Female	1	1
Ever infected with COVID-19		
Yes	0.61 (0.5–0.75)	0.61 (0.5–0.73)
No	1	1
Lived with high-risk COVID-19 people		
Yes	1.34 (0.96–1.88)	-
No	1	-
Housing		
In university	1	-
Out of university	0.95 (0.78–1.15)	-
House	1.04 (0.82–1.33)	-
Member		
1	1	1
1–3	1.2 (0.96–1.48)	1.21 (0.98–1.51)
> 3	1.27 (1–1.64)	1.35 (1.04–1.74)
Monthly income (baht)*		
<3,000	1.31 (0.88–1.97)	-
3,001–6,000	1.24 (0.91–1.68)	-
6,001–9,000	1.23 (0.91–1.66)	-
9,001–12,000	1.16 (0.84–1.6)	-
> 12,000	1	-
Number of vaccine shots		
<=2	1	-
>2	1 (0.85–1.18)	-

*Note: *35 THB ≈ 1 USD; CI = confidence interval*

Discussion

Most countries have recognized COVID-19 as a common disease in the post-pandemic period. In October 2022, Thailand eased all pandemic restrictions. However, no research has been conducted on student stress, depression, and public stigma as a result of COVID-19. This study investigated the stress, depression, and public stigma of COVID-19 among Thai University students, with data collected in August, during a period when some restrictions had been eased. Results showed that 72.34% experienced stress, 10.24% suffered from depression, and 63.71% of students reported public stigma about COVID-19. COVID-19 public stigma significantly increased the chances of both stress and depression.

In our study, stress was 72.34%, which is almost two times higher than in a previous Thailand study (vs. 44.3%, 51%); however, previous research measured high to severe stress among students (Siripongpan et al., 2022; Srichan et al., 2020). Hence, stress among universities remains high even post-pandemic. The explanation for this may be the consequence of COVID-19, which has a negative impact on the economy. Economics is one of the issues that have proved to be a factor causing deterioration in mental health and pose a severe threat to the general populace (Marazziti et al., 2021).

Our study also found that lower-income groups of students have higher stress levels. Most of the Thai students are from district and rural areas. The rate of poverty reduction decreased starting in 2015; however, it increased in 2016–2018 and 2020, mirroring the slowing economy. The rural poor is higher than the urban poor by almost 2.3 million. The distribution of poverty has also been uneven across geographic regions, with the poverty rate in the South and the Northeast nearly double the national level (World Bank, 2022). However, our result shows that the highest stress prevalence was in the Central, followed by the Northeast; therefore, the economy may not be the only contributing factor to stress. In addition, many college students register each semester for courses, leading to productive careers that fulfill their lives. It is common for university students to keep a high grade point average (GPA) to have a good job after graduation, which results in stress (Graves et al., 2021).

Our depression results were in a range that was found in other studies. In the early pandemic, an analysis of Malaysian students, however, using Depression Anxiety Stress Scales (DASS-21) by Amir Hamzah et al. (2019) revealed that among 1,602 students, 21% were highly depressed. Based on studies using PHQ-9 for screening depression, a study in Thailand conducted earlier in the pandemic, however, among medical students reported depression range from 9.3% to 80.2% (Biswas et al., 2022; Boonvisudhi & Kuladee, 2017; Kaewpila et al., 2020; Kolkijkovin et al., 2019; Phomprasith et al., 2022). This phenomenon was also observed worldwide (Ochnik et al., 2021; Wickramasinghe et al., 2023). Even though the disparity in prevalence could be due to the usage of multiple measurement scales and countries' contexts, this study used the PHQ-9, which was demonstrated and is being used globally (Fonseca-Pedrero et al. 2023; Marlow et al.,203; Rahman et al., 2022); however, it appear that a higher depression prevalence during the COVID-19 pandemic.

An explanation for depression among university students may be that college campuses are highly sociable places where students can perceive pressure to fit in, making depression and anxiety more common among college students (Ebert et al., 2019). Depression and social anxiety typically occur together, and social anxiety often surfaces before depression (Kraft et al., 2021). Depression, anxiety, and other psychological illnesses are frequent and adversely

affect perceived stress and its contributing variables. Student anxiety and depression symptoms have recently increased drastically with the rapid switch to online learning during COVID-19 (Li et al., 2021). This issue may negatively affect students' relationships with their families and friends, academic performance, and physical health. As a result, their abilities deteriorate, and they lose the desire to learn new things, which leads to poor work and even university dropouts (Wahid et al., 2021).

Public stigma due to the COVID-19 pandemic reflects negative attitudes and beliefs. Several studies evaluated during the early days of the pandemic showed a lower prevalence of stigma (27% to 37%) compared with the present study (63.71%) (Yuan et al., 2022). A study in China found that 31.8% of the participants endorsed stigmatization toward people infected with COVID-19 (Zhang et al., 2021). However, comparable with public stigma in Lebanon, over half of the sample population had moderate to severe stigma discrimination (62%) (Haddad et al., 2021), while in Thailand, we observed a lower public stigma of COVID-19 during post-pandemic than the pandemic period (75.8%); however, compared with the general population (Ruengorn et al., 2022). The difference in the prevalence of stress, depression, and public stigma about COVID-19 might be due to different tools and measurements applied in the study. Another issue is the variety of sample sizes in cross-national research, ranging from 100 students in the United Kingdom to 1,285 in Latvia (Gloster et al., 2020). Furthermore, our study was performed during the post-pandemic stage when the situation was eased. Hence, depression was low in our research.

Understanding how these mental illnesses are present in college students is crucial to developing prevention measures and improved treatment outcomes. Thus, factors associated with stress and depression were also investigated. For stress, multivariable analysis showed that females, public COVID-19 stigma, living with high-risk COVID-19 people, and having lower income were significantly positively associated with stress. Our result is similar to other studies; females had higher stress levels than their male counterparts (Cheema et al., 2022; Costa et al., 2021; Graves et al., 2021). Gender has been reported to influence stress differently (Cheema et al., 2022). Female students reported stress-related issues such as low self-esteem, pressure from exams, and depression. Chhetri et al. (2021) reported that 411 female college students in India reported higher stress levels than their male counterparts due to persistent pressure from stressful life events during the pandemic and worries about their academic performance (Chhetri et al., 2021).

Students who lived with high-risk COVID-19 individuals had higher stress. COVID-19 is often more severe in people older than 60 years or those who have health conditions like lung or heart disease, diabetes, or ailments that affect their immune system (COVID-19 High-risk groups). We hypothesized that students may worry about those close to people infected with the disease and fear COVID-19 infection. An increase in financial stress leads to reduced mental health, whereas a decrease in financial stress improves mental health levels (Simonse et al., 2022). Higher financial worries were significantly associated with greater psychological distress (Ryu & Fan, 2023). Therefore, the lower financial status would increase stress levels, similar to our results.

Depression is a multifactorial disease that occurs from a complex interaction of social, psychological, and biological factors. People who have experienced adverse life events (unemployment, bereavement, trauma) are more likely to develop depression (Evans-Lacko et al., 2018). After adjustment, living with high-risk COVID-19 people, getting fewer vaccine shots, and COVID-19 public stigma significantly increased the risk of depression among students in Thailand. Those living with high risk of COVID-19 suffer increased stress levels.

A review study suggested that stress can develop into depression as an underlying mechanism due to the alteration of synaptic plasticity and the formation of stress-related memories. This may explain why living with high-risk COVID-19 people increased depression in our study (Richter-Levin & Xu, 2018).

Students who received fewer shots of vaccination had a significantly increased risk of depression. The finding was consistent with a national cross-sectional study in the United States where participants who received the COVID-19 vaccine had 15% (AOR = 0.85; 95% CI [0.83–0.90]) and 17% (AOR = 0.87; 95% CI [0.79–0.85]) lower odds of anxiety and depression compared to those not vaccinated. The possible mechanism for this association remains elusive but might be explained because the SARS-CoV-2 vaccination reduced the fear of contracting COVID-19, which subsequently reduced mental health problems (Chen et al., 2022). Another case study reported depression following COVID-19 vaccination (Balasubramanian et al., 2022). Further research is needed to elucidate and verify these results.

The COVID-19 public stigma was significantly associated with an increased risk of depression. Depression was reported by 49% of 500 respondents and aroused negative reactions, with 41% arousing discrimination in society (Peluso Ede & Blay, 2009). Another survey revealed that one-third of the respondents thought that "a weak personality caused depression"; therefore, they also believed that an infected person would be depressed (Yokoya et al., 2018). Previous studies also suggested that public stigma of depression increased suicide rates (Schomerus et al., 2015). As a result, we hypothesized that this mindset, together with the COVID-19 public stigma, also increased the risk of depression, as shown in our results.

Public COVID-19 stigma plays a vital role in both stress and depression. Thus, knowing the factors associated with this stigma may lead to better control and care of stress and depression among students. Results in Table 3 show that those infected with COVID-19 had significantly decreased COVID-19 public stigma, while those living with over three people showed a positive association. People who have never been infected with COVID-19 have a less public stigma against the disease. A previous Thai study also found that living with family members increased COVID-19 public stigma compared to living alone, but the difference was not significant (Ruengorn et al., 2022). This could be explained by fear of COVID-19 since fear of contracting the disease is one of the major precursors for people to indulge in stigmatizing the infected (Bhanot et al., 2021). Living with higher numbers of people increases the chances of infection. Therefore, these individuals are afraid of being infected, and this increases the public stigma surrounding COVID-19.

This study had certain limitations. First, the response rate was extremely low compared to the number of students, approximately only 1.9% among all students in our selected universities. A possible explanation is that the data collection period was over a semester break, and students may not be concerned about COVID-19. Hence, the findings in this study should be considered with caution because a low response rate can influence generalization. Furthermore, online data collection relates to population samples and their non-random nature, and there was no control over who and how many people filled out the questionnaire. Therefore, face-to-face surveys will be adopted for the future study. Finally, many other variables may also be associated with stress, depression, and COVID-19 public stigma that were not assessed in this study. Further research is required to explore these remaining variables.

Implication and recommendation

This study highlights that students facing public stigma related to COVID-19 experience significantly increased levels of stress and depression, underscoring the urgent need for targeted anti-stigma initiatives within university settings to promote mental well-being. Additionally, the research points out that lower income is a significant risk factor for stress and depression. Females showed a significantly increased risk of being stressed than males. While increasing age significantly decreased both mental outcomes. Vaccinated with > 2 shots, students significantly reduced the risk of depression.

Based on these findings, several vital recommendations emerge. Universities should launch comprehensive anti-stigma campaigns to reduce stigma and promote mental health awareness. Developing financial support programs for low-income students can help alleviate financial stress and improve mental health outcomes. Moreover, universities should offer additional resources and flexible study options for students living with high-risk individuals. Encouraging vaccination among students may reduce depression. Implementing gender-specific interventions, such as workshops and support groups tailored to the unique needs of female students, is essential. Finally, further research is needed to explore additional factors affecting student mental health and to validate these findings.

Conclusions

This cross-sectional study assessed the prevalence and factors associated with stress, depression, and COVID-19 public stigma among Thai university students during the post-pandemic period. The findings revealed high levels of stress (72.34%), depression (10.24%), and COVID-19 public stigma (63.71%). COVID-19 public stigma significantly increased the risk of both stress and depression. Key findings included higher stress levels among female students, those living with high-risk COVID-19 individuals, and those with lower incomes. Age was inversely related to stress, and students vaccinated with more than two doses had a reduced risk of depression. Living with high-risk individuals increases the risk for both stress and depression. The study's implications emphasize the need for targeted anti-stigma initiatives, financial aid programs for low-income students, and additional resources for those living with high-risk individuals. Encouraging vaccination and implementing gender-specific mental health interventions are also crucial. Future research should focus on longitudinal studies to verify long-term impacts and explore additional variables affecting mental health. Conducting large-scale, in-person surveys could improve response rates and generalizability. In conclusion, addressing public stigma, financial stress, and vaccination status is vital for managing student mental health post-pandemic. The findings advocate for comprehensive mental health strategies tailored to university students, highlighting the importance of targeted interventions to promote their well-being.

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Ethical approval and consent to participate

The study was reviewed and approved by the Institutional Ethical Review Board of the Faculty of Public Health, Chiang Mai University (IRB No.ET003/2022). The participants were asked to sign an online informed consent form by clicking on it. No animals were used in this research. All human research procedures were per the ethical standards of the committee responsible for human experimentation (institutional and national) following the Helsinki Declaration of 1975, revised in 2013.

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