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POST-PANDEMIC MENTAL HEALTH OF FOREIGNERS AND IMMIGRANTS LIVING IN NAGASAKI PREFECTURE JAPAN: A QUANTITATIVE CROSS-SECTIONAL ANALYSIS.

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ABSTRACT

Major depressive disorder (MDD) and clinically significant anxiety (CSA) are among triggers of morbidity globally, and also contribute to heavy economic burden. These mental health issues are more common among immigrants and foreigners. In Nagasaki Prefecture Japan, the number of foreigners and immigrants has increased in recent years; however, their mental health conditions in the post-COVID-19 pandemic period have not been well assessed. This study aimed to evaluate the prevalence and associated factors of MDD and CSA among foreigners and immigrants living in Nagasaki Prefecture post- pandemic. A cross-sectional quantitative study was conducted among non-Japanese residents living in Nagasaki Prefecture. Data were collected through both online and paper-based self-administered questionnaires, which included demographic information, validated scales to measure depression and anxiety, and variables related to potential risk factors. Statistical analyses consist of descriptive statistics and multivariable logistic regression analysis using Akaike Information Criteria (AIC) was performed. A total of 326 individuals participated, of whom 63.5% were single. The median and interquartile range were 1 and 4 for the Patient Health Questionnaire-9 and 7 and 3 for the State-Trait Anxiety Inventory-6. The prevalence of MDD and CSA was 7.97% and 11.35%, respectively. Predictors of mental health outcomes include; age, stress at work, loss of loved one, experiences of sexual harassment, and socioeconomic conditions such as financial instability. Overall, the findings shows that non-Japanese residents living in Nagasaki Prefecture experienced increased mental health challenges in the aftermath of the COVID-19 pandemic more than the general Japanese population. These findings highlight the importance of developing tailored mental health strategies to support

this vulnerable population.

KEYWORDS: Mental health, Depression, Anxiety, Immigrants, Foreigners in Japan, COVID-19.

INTRODUCTION.

Major depressive disorder (MDD) and clinically significant anxiety (CSA) are one of the major contributors to morbidity and reduced quality of life globally (Friedrich, 2017). The World Health Organization has in several occasion stated that immigrants and foreigners are more prone to developing mental health problems. Even before the advent of COVID-19 pandemic, many young people suffered from anxiety and depression with prevalence rate of 11.6% and 12.9% respectively globally (Tiirikainen et al., 2018; Lu, 2019). The advent of COVID-19 pandemic as a global health emergency caused massive daily life disruption (Lee, 2020). Measures put in place to curb it, such as social distancing, school closures, quarantine implementation, and decreased social interaction contributed heavily to psychological distress (Spran et al., 2013; Loades et al., 2020; Cleofas & Rocha, 2021; TMGH-Global COVID-19 Collaborative, 2021). As a result of these, the global prevalence rates increased to 22% and 25% in major depressive disorder and clinical anxiety respectively during the pandemic phase compared to pre-pandemic rate of 10–12% for MDD and 14% for clinical anxiety (WHO, 2018; WHO, 2022). These increments were more noticed among vulnerable immigrant population. In Japan, mental health issues among foreign workers have been associated to harsh working conditions like long hours, heavy workloads and low renumerations (Hall et al., 2019; Luu et al., 2024; Goel et al., 2015). Study conducted in Japan between 2013 and 2015 indicated that 5.3% of the population (which was around 7.2 million people) suffered from MDD and anxiety disorders (Ishikawa et al., 2018). Also, another study documented that 45% of Japanese employees had also experienced depressive symptoms (Fushimi et al., 2013). Earlier, a study conducted among foreigners living in Japan showed a 3.7% prevalence of MDD and anxiety (Kawakami et al., 2005). During the pandemic, nearly one-third of non-Japanese residents complained of worsening mental health issues (Universalaid.jp, 2021). Even with all these findings, the evidence on the burden of MDD and CSA among immigrants and foreigners living in Nagasaki prefecture Japan especially in the post-pandemic period is very limited. Also, existing national prevalence rate cannot be a representative of current realities in Nagasaki Prefecture both in pre-pandemic and pandemic period. With this, there is a need to fill this knowledge gap and provide an up- to-date

epidemiological data for this vulnerable immigrants and foreign population. Therefore, epidemiologic silence in Nagasaki must be broken.

Research in context

Evidence before this study.

A comprehensive literature search was conducted using Scopus, Google scholar, PubMed and PsycINFO, which centered on studies conducted previously, with important words like anxiety, mental health condition of foreigners, anxiety disorder in migrants and foreigners, depression, depressive disorders etc., emphasizing the importance of this study to the vulnerable foreign population and immigrants. However**,** with the advent of the COVID-19 pandemic, there has been an increase in the prevalence of MDD and CSA worldwide (WHO, 2022). While studies have been conducted to ascertain the issues related to mental health challenges during the pandemic period, there are insufficient studies that pay more attention to migrants populations during the post-pandemic period.

Added value of this study

This study addressed the knowledge gap by concentrating on the mental health challenges of the vulnerable foreigners and immigrants population living in Nagasaki Prefecture during the post-pandemic period. The study compared the post-pandemic data with both global and national pandemic prevalence rates, as well as pre-pandemic prevalence rates. It also provided a comprehensive understanding of the overall mental health conditions of this vulnerable group. Such knowledge was important not only for understanding the broader effect of the pandemic but also for guiding the development of specialized and targeted interventions to improve the mental health outcomes of foreigners and immigrants living in Nagasaki Prefecture. It will also help the policymakers in formulating long-lasting policies that will help to cushion the effects of mental health challenges, not only in Nagasaki Prefecture, but beyond.

Implications of all the available evidence.

Systemic challenges affecting the mental health conditions of vulnerable immigrants and foreigners need to be improve, not only in Nagasaki Prefecture but beyond. In addition, addressing these challenges faced by immigrants and foreigners living in Nagasaki Prefecture is crucial, especially during the post COVID- 19 pandemic era. Increasing the financial assistance to immigrants and foreigners, improving the work-life balance, reducing the rate of inflation and devaluation of Japanese yen, and strengthening the operation of ‘Hello Work

Nagasaki;- a municipal department where immigrants and foreigners are being assisted to secure jobs in Nagasaki Prefecture is crucial to improve the overall health conditions of immigrants and foreigners living in Nagasaki Prefecture Japan.

METHODS

Study design and participants

A post-pandemic cross-sectional quantitative survey was carried out from December 2023 to August 2024, focusing on the mental health conditions of non-Japanese residents living in Nagasaki Prefecture, Japan. A key criterion for participation was that each participant must be living in Japan, must have lived in Nagasaki for at least 6 months before the study, must be 18 years and above, and was willing to participate voluntarily, with one response per participant. The study was conducted in accordance with the latest version of the Helsinki Declaration and the CROSS checklist so as to ensure comprehensive and transparent reporting (Sharma A et al., 2021). The informed consent process was integrated into both online and print questionnaires and participants were given the liberty to either consent to the terms and conditions outlined in the form and go ahead with the survey or withdraw if they refused to agree to the conditions.

Questionnaire development

The self-reported questionnaire which contained 25 questions divided into five sections were used, and it included questions for exclusion, general information, Patient Health Questionnaire (PHQ)-9, State Trait Anxiety Inventory (STAI)-6, and potential associated factors comprising social and economic challenge. Section 1 contains information for inclusion criteria. Also, I incorporated general information – section 2. The general information contained questions like the participants' country of origin, the age range, the gender, the occupations, educational level, etc. Section 3 has nine questions adopted from the PHQ-9 which is used to assess depression. Section 4 has 6 questions that explore anxiety. Section 5 has 14 questions identified through a literature review that was associated with the subject matter.

Sample size calculation

The sample size for the study was calculated using an estimated prevalence (22%) of depression and anxiety globally during the pandemic phase [WHO 2022]. The sample size calculation was based on the past studies [Pourhoseingholi M et al., 2013]. The required

sample size was 264. By adding 10% non-response rates, the final sample size was estimated to be 291.

Participant selection and survey implementation

To ensure the participants met the inclusion criteria, an initial screening section was included at the beginning of the online questionnaire – section 1. This section contained questions related to eligibility criteria, such as age of 18 or above, non-Japanese nationality, duration of residency in Nagasaki Prefecture, and in Japan. Only those respondents who met these criteria were allowed to proceed with the full survey. In addition, to confirm that the same person does not reply more than once, the online questionnaire using SurveyMonkey limited one-time participation per unique IP address.They were recruited through direct face-to-face contact at public events/venues, through contact with community organizations which served non-Japanese residents. These included the Fukuoka Immigration Office, Nagasaki Branch, religious organizations, ethnic organizations, and social service organizations. Also, local businesses that catered for foreigners such as restaurants, cafes, and companies in Nagasaki Prefecture and during school events were all involved. I also posted flyers and advertisements in areas where foreigners usually congregated. These included ethnic grocery stores, restaurants, and places of worship. I also used snowball sampling.

Statistical analysis

After completing the data collection using SurveyMonkey and a print questionnaire, which yielded 378 responses (Table 1), I carried out a three-step data cleaning procedure. After removing 52 responses that did not complete their survey were excluded, a total of 326 participants were included in the analysis. I utilized the frequency tables, which were used for all the study variables. I used the median and the Interquartile range for continuous variables. Also, the frequencies and percentages were utilized to explain categorical variables. The PHQ-9 item used was graded on a three-point Likert scale for each item, with options from 0 (not at all) to 3 (almost every day). The total score ranges from 0 to 27.

Depression severity was grouped into five levels according to the PHQ-9 total score: none =0–4, mild =5–9, moderate =10–14, severe = 15–19, and extremely severe = 20–27. A total score of 10 or above on the PHQ-9 means the presence of MDD [WHO ICD-11, 2018]. Before calculating the scores of STAI-6, I reversed the total scores for three items ("I'm so calm", "I am totally relaxed", and "I feel more content"), then summed up the scores of relevant items. The STAI-6 score ranged from 6 to 24. To evaluate the level of state anxiety,

the STAI-6 scores undergo multiplication by 20/6 and get the prorated scores that could be comparable with the 20-item state scale of the original STAI tool (STAI-S) [knight RG et al., 1983]. A cut-off score of 44 was used to define clinically significant anxiety (CSA) or a high level of anxiety [millar K et al., 1995]. The descriptive statistical analysis was performed using Pearson's chi-square test to compare the characteristics of the CSA and non-CSA groups and non-MDD with MDD (binary outcomes). Also, a multivariable logistic regression analysis using Akaike information criteria was performed to assess some of the factors associated with MDD and CSA, which served as the dependent variables. The analysis involved the potential predictors such as socio-demographic factors (age, status of marriage, education level), immigrant-specific factors (visa status, duration of residence in Japan, Japanese language proficiency), occupation status, and social connectedness indicators (availability of a discussion partner). All selected variables were entered into the regression model at the same time. The significance of the study was assessed at the probability level of 0.05. All data analyzed were performed using the STATA statistical software – version 18 for Windows.

RESULTS

In the analysis, males constituted 52% of the participants, while females made up 48%. Most of the respondents were single (63.5%) including divorced, separated and widowed. 36.5% stated they had a partner with whom to discuss their health issues (not shown in the table). The most common occupations were students (71.78%), while college/university degrees were the common educational qualification (66.56%). In terms of age, the largest groups were those aged 25-34 years (45.71%) and 35-44 years (40.49%). A vast majority held a student visa (73.31%) and were covered by national health insurance (75.15%). Most had resided in Japan for 1-2 years (66.54%). Japanese language proficiency was generally low, with the majority (59.81%) not speaking well. Family mostly resided in participants' home countries (94.48%), and communication with family typically occurred weekly (61.66%).

Table 1. Socio-demographic, economic and social support status of the study participants.

Characteristics	Number	Percentage (%)
Gender		
Male	170	52.15
Female	156	47.85
Marital status		
Single	158	48.47

Married	119	36.50
Divorced	4	1.23
Widowed	44	13.50
Separated	1	0.31
Education level		
Post Graduation	107	32.82
College/university	217	66.56
Senior High School	2	0.61
Occupation		
Full time employee	86	26.38
Part time employee	2	0.61
Self-employed	1	0.31
Housewife/husband	1	0.31
Unemployed	2	0.61
Students	234	71.78
Age		
18-24 years	4	1.23
25-34 years	149	45.71
35-44 years	132	40.49
45-54 years	38	11.66
55-64 years	3	0.92
Immigration		
Naturalized	2	0.61
Permanent Resident	4	1.23
Work Permit	79	24.23
Student Visa	239	73.31
Family dependent	1	0.31
Temporary visa	1	0.31
Health insurance		
National health insurance	245	75.15
Employee health insurance	80	24.54
Private health insurance	1	0.31
Time living in Japan		
Less than 1 year	39	11.96
1-2 years	217	66.54
3-5 years	57	17.48
6-10 years	10	3.07
More than 10 years	3	0.92
Japanese language level		
Same as Japanese	3	0.92
Well enough for work	5	1.53
Enough for daily activity	55	16.87
Can’t speak well	195	59.81
Can’t speak at all	68	20.86
Living place of family members		
I don’t have	1	0.31
With me in Japan	11	3.37
In another house in Japan	3	0.92

Home country	308	94.48
Other countries	1	0.31
Prefer not to answer	2	0.61
Meeting another family member		
Less than 1 year	86	26.38
1-2 years	223	68.40
3-5 years	15	4.60
6-10 years	2	0.61
Calling family members		
Every day	74	22.70
Every week	201	61.66
Every month	35	10.74
A few times a year	14	4.29
Prefer not to answer	2	0.61
Social and economic challenges		
Conflict at home (more than before)	31	9.51
Communication with neighbors (less than before)	69	21.17
Chronic body pain (more than before)	26	7.98
Stress at work (more than before)	24	7.36
Support system (less than before)	20	6.13
Abuse physical & emotional (more than before)	21	6.44
Personal Income (less than before)	21	6.44
Overall financial stability (less than before)	21	6.44
Loss of loved ones (yes)	64	19.63
Family history of suicide (yes)	32	9.82
Domestic violence (yes)	30	9.20
Sexually harassed (yes)	26	7.99
Family history of mental problems (yes)	38	11.66
History of job loss (yes)	33	10.12

Prevalence of depression among participants

Table 2 presents the depression status of participants as determined by PHQ-9 scores. Notably, 26 participants (7.97%) scored 10 or higher on the PHQ-9, indicating the presence of MDD.

Table 2. Depression status of the study participants.

Depression status (PHQ-9 score	Number	Percentage (%)
No depression (0-4)	251	76.99
Mild depression (5-9)	49	15.03
Moderate depression (10-14)	19	5.83
Moderately severe depression (15-19)	5	1.53
Severe depression (20-24)	2	0.61
Total	326	100

Prevalence of clinically significant anxiety among participants

The CSA, indicated by STAI-S scores of 44 and above, was observed in 37 participants, accounting for 11.35% of the sample.

Table 3. Anxiety status of the study participants.

STAI-6	Frequency	Percentage (%)
No anxiety	289	88.65
Anxiety	37	11.35
Total	326	100

Table 4 displays the factors associated with MDD, using both univariable and that of multivariable logistic regression analyses. In univariable logistic regression, it identified multiple factors associated with MDD (factors with $p<0.05$). However, in multivariable logistic regression using stepwise Akaike Information Criteria (AIC) indicated that significant predictors included female gender, being under 34 years, experiencing a loss of a loved one, enduring work-related stress, and encountering sexual harassment in the past six months.

Table 4. Associated factors of MDD of non-Japanese residents living in Nagasaki Prefecture Japan.

Variables		Unadjusted OR (95% CI)	P-Value	Adjusted OR (95% CI)	P-Value
Gender	Female Male	3.229 (1.318-7.910) Ref	0.010	1.354 (1.264-2.476)	0.001
Age	Above 35 years Below 34	0.141 (0.047-0.419) Ref	<0.001	0.132 (0.039-0.447)	0.001
Marital Status	Married Presently unmarried	1.292 (1.098-1.870) Ref	0.027		
Call family members	Within a week Monthly and above	0.199 (0.085-0.466) Ref	<0.001		
Communication with neighbors	More than before Same/less than before	0.497 (0.317-0.780) Ref	0.002		
Chronic pain	less than before Same/More than before	0.681 (0.497-0.966) Ref	0.031		
Stress at work	less than	1.695 (1.495-	<0.001	1.524 (1.318-	0.011

	before Same/More than before	1.977) Ref		2.865)	
Overall financial stability	More than before Same/less than before	1.657 (1.462-2.935) Ref	0.019		
Loss of loved one	No Yes	1.516 (1.196-1.781) Ref	<0.001	1.132 (1.041-3.422)	0.001
Family history of suicide	No Yes	0.055 (0.022-0.135) Ref	<0.001		
Loss of job	No Yes	0.058 (0.024-0.143) Ref	<0.001		
Domestic violence	No Yes	0.074 (0.030-0.184) Ref	<0.001		
Sexual harassment	No Yes	1.045 (1.018-1.117) Ref	<0.001	1.099 (1.026-3.377)	0.001
Family history of mental problem	No Yes	1.061 (1.025-1.148) Ref	<0.001		

Associated factors of CSA

Table 5 displays the factors associated with CSA, using both the univariable and that of multivariable logistic regression analyses. In univariable logistic regression, it identified multiple significant predictors of CSA. However, after applying the stepwise Akaike Information Criteria (AIC) method for multivariable logistic regression, key factors significantly associated with CSA were narrowed down to lower education level, holding a student visa, increased stress at work, and the recent loss of a loved one.

Table 5. Associated factors of CSA of non-Japanese residents living in Nagasaki Prefecture, Japan.

Variables	**Category**	**Unadjusted OR (95% CI)**	**P-value**	**Adjusted OR (95% CI)**	**P-value**
Education	College/University degree. Post Graduation	3.485 (1.725-7.044) Ref	<0.001	2.292 (1.091-3.930)	0.037
Immigration status	Position/Work visa. Student status	1.406 (1.153-1.884) Ref	0.027	1.169 (1.048-3.593)	0.006

Call family members	Within the week Monthly and above	0.361 (0.165-0.789) Ref	0.011		
Chronic body pain	Less than before Same/More than before	0.511 (0.382-0.684) Ref	<0.0001		
Stress at work	Less than before Same/More than before	1.354 (1.262-2.478) Ref	<0.0001	1.560 (1.350-2.894	0.015
Abuse, physically or emotionally	Less than before Same/More than before	1.365 (1.241-1.552) Ref	<0.0001		
Personal Income	More than before Same/less than before	0.344 (0.247-0.479) Ref	<0.0001		
Overall Financial Stability	More than before Same/less than before	0.317 (0.228-0.443) Ref	<0.0001		
Loss of loved one	No Yes	1.457 (1.216-2.969) Ref	<0.0001	1.041 (1.011-3.280)	<0.0001

DISCUSSION

My finding shows that 7.98% of participants experienced symptoms of MDD, which were associated with female gender, younger age, stress at work, loss of loved ones and sexual harassment. On the other hand, 11.35% of the respondents experienced CSA, which were associated with loss of loved one, low level of education, student status and stress at work in the multivariable logistic regression analysis.

Even though the prevalence of MDD (moderate, moderately severe, and very severe) is 7.98% in this study, the prevalence is higher when compared to the prevalence reported in two separate studies in Japan. For example, a previous study conducted in 2005 stated a prevalence rate of 3.7% for depression and anxiety among non-Japanese residents living in Japan (Kawakami et al., 2005), while another study reported a national prevalence of 5.3% (Ishikawa et al., 2018). Even though my finding is higher than the two reported studies in Japan, it is lower when compared to the global prevalence that was reported in both pre-pandemic and pandemic periods. For example, the global pre-pandemic prevalence of MDD and CSA were reported to be 11.6% and 12.9%, respectively (Tirikainen et al., 2018; Lu

2019). Also, WHO reported a global pandemic prevalence of 22% (WHO, 2022). Porter in 2020 reported that the prevalence of MDD and anxiety seen in young people with PHQ-8 in the global south were 9.5% (Porter et al., 2020).

On April 7, 2020, Japan made a pronouncement of a state of emergency in response to the rapid spread of COVID-19 infection. The Japanese government requested citizens to stay indoors, minimize social contacts, and implement precautionary measures. In this study, around 21 (6.44%) complained about a change in their financial status, which means that some non-Japanese residents in Nagasaki are worried about their current and future lives. Even though the Nagasaki city government has been providing some financial assistance, including occasional transport assistance, work assistance with counselling support to secure employment are made (MHLW, 2024), however these have not been yielding desired results. Nevertheless, there is a need for continuous support of non-Japanese residents not only in Nagasaki Prefecture but in the whole Japan as well since poor economic situation, current inflation, devaluation of Japanese yen, and stressful work culture are contributing factors to the development of mental health conditions (Kotera et al., 2022; Luu et al., 2024).

This study showed that age has a significant effect ($P<0.001$) on MDD and an increase in age is protective against MDD and this means that young people are more prone to developing MDD than older people. Similar findings were also seen in the global south (Porter C et al. 2021). Notwithstanding, the results of this study were in tandem to that of the Japanese national health survey conducted in 2018 which put it at 5.3% (Ishikawa et al., 2018) and the small difference in the estimated prevalence could be because of different study population, and different estimation method. The current study showed that the prevalence of MDD and CSA were higher in females compared to males, with estimated prevalence of MDD of 12.18% and 4.12% respectively (not shown in the table above). This discovery is in consistent with other previous studies conducted globally (Barua et al., 2010; Gurina et al., 2011), which have previously declared that females have higher prevalence of mental health disorder than males due to various factors, but not limited to physiological factors (hormonal), social and cultural restrictions and environmental influence (Kajantie et al., 2006). The result also showed that there is an association between education and mental health disorders, such that lower level of education is associated with higher rate of disorder (Noorbala et al., 2014). This is because with higher levels of education, there will be better communication skills and people can easily reach out to others for help, particularly economic assistance, and such individuals can easily cope with economic difficulties (Noorbala et al., 2014).

This study showed no association between marital status and MDD and CSA in the multivariable logistic regression. In previous studies, having someone to discuss one's health helped to reduce the rate of MDD and anxiety. For example, a study conducted in South Korea in 2020 shows that non-Japanese residents who lived alone are prone to developing MDD and anxiety when compared with those who lived with their partners (Acharya et al., 2021). Although my findings are consistent with the study conducted by (Mirzaei et al.2019), which shows no association, it is not in alliance with another study conducted by (Azaraeen et al. 2017), which shows there is association. The reason for these differences could be due to the use of different tools or due to different study populations.

This study demostrate a groundbreaking step as it is the first ever comprehensive evaluation of mental health of immigrants and foreigners, not only in Nagasaki Prefecture, but the whole of Southwestern region of Japan. However, the study has some limitations that need to be taken into consideration when interpreting the results of the findings. Firstly, because of the self-reported nature of the questionnaire, there is likelihood that it may have introduced recall bias. Secondly, more than 71% of my respondents were students because of easy access to the student communities in Nagasaki. Thirdly, in this study and other previous studies, the prevalence of major depressive disorder occurs more in females than their male counterparts. Therefore, further studies will be needed to explore areas related to female hormonal profiles and contraceptive histories. Finally, since it was a cross-sectional analysis, foreigners and immigrants that showed psychological symptoms associated with depression and anxiety during questionnaire distribution phase were not followed up for expert management.

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Statements and Declarations

Conflict of interest

I declare no conflict of interest.

Ethics approval

The study protocol was approved by the Institutional Review Board of the School of Tropical Medicine and Global Health, Nagasaki University, Japan (No. NU_TMGH_2023_281_1), on 4th December, 2023.

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CONCLUSION

In this cross-sectional quantitative study, I evaluated the mental health conditions of 326 non-Japanese residents living in Nagasaki Prefecture post-pandemic. Symptoms of MDD and CSA were observed in 7.98% and 11.35%, respectively. Younger participants were found to be more prone to have MDD, while females also showed a higher likelihood of developing the condition. Sexual harassment also emerged as a risk factor for MDD. Additionally, the loss of loved ones and stress at work were predictors of both MDD and CSA. Anxiety was more prevalent among participants with lower levels of education, and students were identified as one of the predictors. In overall, my findings shows that mental health conditions are more pronounced among non-Japanese residents living in Nagasaki Prefecture compared to the Japanese general population.

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