Psychological Impacts of Coronavirus Disease 2019 (COVID-19) during the First Nationwide Lockdown in Vietnam: An Internet-based Survey

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Table of Contents

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Abstract

Background: The first nationwide lockdown due to the COVID-19 pandemic has been imposing in Vietnam from April 1 to 15, 2020.

Objective: This study aims to examine the prevalence of and associated factors of mental health impacts of the COVID-19 on the general population in Vietnam during this period

Methods: A self-administered online survey was used to assess psychological distress, depression, anxiety, and stress of participants from April 10 to 15, 2020.

Results: A total of 1,385 respondents completed the survey with 35.9%, 23.5%, 14.1%, and 22.3% suffered from psychological distress, depression, anxiety, and stress, respectively. Respondents self-evaluated their physical health as average had higher IES-R score, DASS-21 depression, anxiety, and stress than those in good/very good health status (beta-coefficient regression (B) = 9.16, 95% Confidence Interval (CI), 6.43 to 11.89), B = 5.85, 95%CI, 4.49 to 7.21, B = 3.64, 95%CI, 2.64 to 4.63, and B = 5.19, 95%CI, 3.83 to 6.56, respectively). Those in bad and very bad health condition suffered more severe depression, anxiety, and stress (B = 9.57, 95%CI, 4.54 to 14.59, B = 7.24, 95%CI, 3.55 to 10.9, and B = 10.60, 95%CI, 5.56 to 15.65, respectively). The unemployment was more likely to associate with depression and stress (B = 3.34, 95%CI, 1.68 to 5.01, and B = 2.34, 95%CI, 0.84 to 3.85). Regarding concerns about COVID-19, over a half (54.5%) of respondents expressed their concerns about their younger-than-18-year-old children, which was increased their IES-R score and DASS-21 stress score (B = 7.81, 95%CI, 4.98 to 10.64, and B = 1.75, 95%CI, 0.27 to 3.24, respectively). The majority (94.6%) of Vietnamese residents were confident on the doctor's expertise in COVID-19 diagnosis and treatment, positively associated with less distress by the disease outbreak (B = -7.84, 95%CI, -14.58 to -1.11)

Conclusions: The findings highlight considerable impacts of the COVID-19 on the mental health of the general population in Vietnam during the first lockdown, providing useful evidence for policymakers to implement interventions to mitigate these impacts.

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Psychological Impacts of Coronavirus Disease 2019 (COVID-19) during the First Nationwide Lockdown in Vietnam: An Internet-based Survey

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Abstract

Background: The first nationwide lockdown due to the Coronavirus disease 2019 (COVID-19) pandemic has been imposed in Vietnam between April 1 and 15, 2020. Nevertheless, there has been limited information on the impact of COVID-19 to society's psychological health.

Objectives: This study aimed to estimate the prevalence of psychological issues and identify the factors associated with the psychological impact of COVID-19 during the first nationwide lockdown among the general population in Vietnam.

Methods: We employed a cross-sectional study design with convenience sampling. A self-administered, online survey was used to collect data and assess psychological distress, depression, anxiety, and stress of participants from April 10 to 15, 2020. The Impact of Event Scale-Revised (IES-R) and the Depression, Anxiety, and Stress Scale (DASS-21) were utilized to assess psychological distress, depression, anxiety, and stress of participants during COVID-19 social distancing. The associated factors were explored by using regression analysis.

Results: A total of 1,385 respondents completed the survey. There were 35.9%, 23.5%, 14.1%, and 22.3% who suffered from psychological distress, depression, anxiety, and stress, respectively. Those respondents who evaluated their physical health as average had higher IES-R score, DASS-21 depression, anxiety and stress than those in good/very good health status (beta-coefficient regression (B) = 9.16, 95% Confidence Interval (CI), 6.43 to 11.89), B = 5.85, 95% CI, 4.49 to 7.21, B = 3.64, 95% CI, 2.64 to 4.63, and B = 5.19, 95% CI, 3.83 to 6.56, respectively). Those who were in bad or very bad health condition suffered more severe depression, anxiety and stress (B = 9.57, 95% CI, 4.54 to 14.59, B = 7.24, 95% CI, 3.55 to 10.9, and B = 10.60, 95% CI, 5.56 to 15.65, respectively). Unemployment was more likely associated with depression and stress (B = 3.34, 95% CI, 1.68 to 5.01, and B = 2.34, 95% CI, 0.84 to 3.85). Regarding concerns about COVID-19, more than half (54.5%) expressed concern on their children aged below 18 years, which increased their

IES-R score and DASS-21 stress score (B = 7.81, 95% CI, 4.98 to 10.64, and B = 1.75, 95% CI, 0.27 to 3.24, respectively). Majority (94.6%) were confident on the doctor's expertise in COVID-19 diagnosis and treatment, which was positively associated with less distress caused by the outbreak (B = -7.84, 95% CI, -14.58 to -1.11).

Conclusions: The findings highlight the impacts on mental health of COVID-19 during the nationwide lockdown among the general population in Vietnam. The study provides useful evidence for policy decision-makers to develop and implement interventions to mitigate these impacts.

Keywords: COVID-19, Mental Health, Psychological Distress, Depression, Anxiety, Vietnam

Introduction

The novel coronavirus disease 2019 (COVID-19) started in December 2019 in China. It was then declared as a pandemic on March 11, 2020 [1]. Globally, there were 58,087 confirmed cases and fatalities up to 3,670 cases last March 31, 2020 [2].

Vietnam detected the first two COVID-19 cases on January 22, 2020 [3]. Since then, the country has faced a huge likelihood of infection spread because of its proximity to China and low-resource healthcare system. Responding to this urgency, the Vietnamese government declared COVID-19 as an epidemic on February 1, 2020. It implemented proactive actions to confront the spread of the disease [4]. The number of cases, however, increased approximately by 15-folds in two weeks from 15 cases on March, 15 to 206 cases on March, 31 [5]. Notably, the epicenter was the largest public hospital in Hanoi, Vietnam [6]. Accordingly, the government imposed the first nationwide lockdown from April 1 to 15, 2020 (declared on 447/QĐ-TTg) [7]. It was a partial lockdown which required people to stay at home, except buying critical supplies, health emergency cases, working at essential authorities and businesses; along with personal protective measures such as wearing facemasks, hand washing in public places [7]. As the government has clearly frequently communicated with the public about the danger of the illness as well as preventive measures through phone messages and social media, the citizens have been aware of the complication of the pandemic, and they thus voluntarily abide [8].

Several social distancing measures, such as home quarantine, school closures and non-essential business closures, have caused negative psychological effects on populations, including depression, anxiety, and post-traumatic distress, which were also found from previous epidemics [9]. Nguyen et al. surveyed the early stage of pandemic from Feb 14 to March 13, 2020 and found that patients with suspected-COVID-19-symptoms had 2.88 times (95% CI, 2.18 to 3.80) more likelihood to suffer depression, and significantly lower Health-Related Quality of Life (HRQOL) ($P < .001$) as compared with those without suspected-COVID-19-symptoms. The study also reported that the prevalence of depression was 7.4% [10]. With dramatically increasing COVID-19 cases and compulsory nationwide lockdown, it is anticipated that the prevalence of mental health issues in the general population in Vietnam would considerably surge. We, therefore, conducted this study to investigate the psychological impacts of COVID-19 among the general population in Vietnam during the first national lockdown and to identify the associated factors of these impacts.

Methods

Participants and Procedure

A cross-sectional study design was employed using a respondent driven sampling method by distributing a self-administered survey through various social media platforms (e.g., Facebook, Zalo, etc.) from April 10 to 15, 2020 in Vietnam. All Vietnamese residents who were aged 18 years and above, had signed informed consent and had voluntarily participated in the online survey during the study period were eligible for the survey.
The starting period for collecting data was more than one week since Vietnam imposed the national lockdown (April 1, 2020) to ensure that participants exposed sufficient time with social distancing in order to properly measure psychological impacts over the past week [11,12]. A written informed consent was received online before the respondents answered the questionnaire. They clicked the link on the platforms and voluntarily responded to the survey. Anonymity and confidentiality were ensured throughout the conduct of the survey.

Measurement Instrument

The instrument is a self-administered questionnaire which consisted of three parts and could be completed in 10 minutes. The first part covered the general socio-demographic characteristics of the participants, including age, gender, living area, education, marital status, income, occupation, history of chronic disease, household size, current physical health status, and other basic information of the participants. The second part was composed of questions related to concerns on COVID-19 pandemic, which were adapted from a previous study [13]. The third part of the survey included two psychological and mental health measurement scales described below.

Impact of Event Scale-Revised (IES-R)

The Impact of Event Scale-Revised (IES-R) has 22 items that measure psychological distress after exposure to a crisis. The total IES-R score was categorized into normal (0-23), mild (24-32), moderate (33-36), and severe ($\geq$ 37) [14]. This IES-R questionnaire was used for the Vietnamese population in previous studies [14-16]. In the present study, a score of 24 or higher signified a positive cutoff point to estimate distress due to lockdown in the COVID-19 pandemic [11,17].

Depression, Anxiety, and Stress Scale-21 (DASS-21)

The impacts on mental health, including depression, anxiety, and stress, were assessed using the Depression, Anxiety, and Stress Scale-21 (DASS-21). The questionnaire consisted of 21 items that covered three domains: depression, anxiety, and stress. The score calculation for each domain was adapted from a previous study [18]. The total score range for each domain was 0 – 42. The level of each domain was interpreted as follows: for depression subscale, normal (0-9), mild (10-12), moderate (13-20), and severe (21-27), and extremely severe (28-42); for anxiety subscale, normal (0-6), mild (7-9), moderate (10-14), and severe (15-19), and extremely severe (20-42); for stress subscale, normal (0-10), mild (11-18), moderate (19-26), and severe (27-34), and extremely severe (35-42). Cutoff scores of 9, 6, and 10 for depression, anxiety, and stress subscale, were used to detect depression, anxiety, and stress, respectively. The DASS-21 questionnaire was assessed for reliability and validity in the Vietnamese context previously [19,20].

The data collection tool was piloted in ten individuals to further develop the questionnaire. Consequently, few questions were adjusted in terms of language and idea expression.

Data analysis

Descriptive statistics were used to present socio-demographic characteristics. Continuous variables were presented as means and standard deviation if they were in normal distribution, or median and interquartile range (IQR) if they were in non-normal distribution. To identify variables which are potentially associated with psychological distress, depression, anxiety, and stress, univariate analyses were performed. Then, all variables with *P-value* of .20 in the analyses were entered into the multivariate regression model [21]. The association between factors and IES-R score, DASS-21 depression, anxiety, and stress subscales score were reported with beta-coefficient regression (B) and 95% confidence intervals (CIs). The $P < .05$ was set as a level of statistical significance. All of the statistical analyses were performed using R software version 3.6.3 [22].

Results

This online survey was reported in accordance with the Checklist for Reporting Results of Internet E-Surveys (CHERRIES checklist) [23] in Multimedia Appendix 1.

A total of 1,412 respondents answered. From these, 1,385 (98.1%) were valid for analysis. Reasons for exclusion were: invalid age information (n = 8), age younger than 18 years (n = 10), and respondents living outside Vietnam (n = 9).

Majority of the respondents were female (63.5%). The median (range) age was 28 years (18 to 70 years), with 82.2% aged at 18-39 years. There were 73.0% who lived in the urban area, and 69.7% who lived in provinces or cities with COVID-19 infected cases. Majority obtained an undergraduate or higher degree (84.8%). As for employment, most were employed during lockdown (64.6%); a few worked from home (32.0%) and some were unemployed (8.2%). Majority (89.7%) had at least one chronic disease. Additional social-demographical characteristics of participants are presented in Multimedia Appendix 2.

The total IES-R score ranged from 0 to 88 with a median of 17 (IQR = 20). The DASS-21 scores for depression, anxiety, and stress spread were 0 to 42 (Median (IQR) = 2 (8)), 0 to 38 (Median (IQR) = 0 (4)) and 0 to 42 (Median (IQR) = 0 (10)), respectively. Using the cutoff points, we found that 35.9% had psychological distress. Also, 23.5%, 14.1%, and 22.3% had symptoms of depression, anxiety, and stress, respectively. These results are displayed in Multimedia Appendix 3.

From multivariate regression analysis, marital status (i.e., married, divorced or widowed), and having an average health were found to be associated with IES-R score. Respondents who were married, divorced or widowed had higher IES-R scores as compared with single ones (regression coefficient, B = 2.60, 95% CI, 0.51 to 4.69 and B = 5.23, 95% CI, 0.50 to 9.95, respectively). Individuals who self-evaluated their physical health as average had higher psychological distress than those in very good or good health condition (B = 9.16, 95% CI, 6.43 to 11.89) (Table 1).

Table 1. Multivariate linear regression results for Impact of Event Scale-Revised with socio-demographical covariates.

Covariates		Coefficient (95%CI)	*P*
Age group (years) (reference: 18 – 39)			
	40 - 59	1.23 (-1.13, 3.58)	.31
	≥ 60	-8.36 (-17.72, 10)	.08

Marital status (reference: Single)			
	Married	2.60 (0.51, 4.69)	.01
	Divorced/ widowed	5.23 (0.50, 9.95)	.03
Education level (reference: Elementary/ Secondary)			
	High school	3.20 (-4.18, 10.58)	.40
	University/ College	5.60 (-1.51, 12.71)	.12
	Postgraduate	4.40 (-2.93, 11.74)	.24
Occupation (reference: Employed)			
	Work from home	0.95 (-1.24, 3.14)	.40
	Student	0.98 (-2.15, 4.11)	.54
	Unemployed	3.32 (-0.01, 6.65)	.051
	Others	1.37 (-3.17, 5.91)	.55
Household size (member) (reference: 1)			
	2	3.86 (-0.05, 7.77)	.05
	3-5	1.65 (-1.65, 4.95)	.33
	≥ 6	2.24 (-1.61, 6.10)	.25
Having children ≤ 18 years old in the family (reference: No)			
	Yes	1.02 (-0.80, 2.83)	.27
Chronic disease (reference: No)			
	Yes	1.38 (-1.23, 40)	.30
Average income per month (million VND[a]) (reference: No income)			
	<1	1.92 (-3.34, 7.18)	.47
	1-5	-0.17 (-3.27, 2.94)	.91
	5-10	1.53 (-1.46, 4.53)	.32
	10-20	-1.12 (-4.34, 2.10)	.49
	>20	-0.22 (-3.75, 3.32)	.90
Average time stays at home during social distancing(reference: 0-10 hour(s))			
	10-20 hours	-0.94 (-3.53, 1.65)	.48
	20-24 hours	-2.74 (-5.60, 0.12)	.06
Current health status (reference: Very good/ Good)			
	Average	9.16 (6.43, 11.89)	<.001
	Bad/Very bad	8.72 (-1.38, 18.81)	.09

[a]VND: Vietnam Dong

Age, marital status, occupation, chronic disease, physical health conditions, and residents in areas with infected cases were found to be associated with depression in the multiple regression model. People aged 60 years and older were less depressed than people aged 18 to 39 years (B = -5.86, 95% CI, -10.52 to -1.20). The married respondents had less depression score than the single counterpart (B = -1.02, 95% CI, -2.00 to -0.03). Those who were unemployed, students, those worked from home had higher risk of depression as compared to employed participants with values of B = 3.34 (95% CI, 1.68 to 5.01), B = 1.76 (95% CI, 0.19 to 3.32), and B = 1.33 (95% CI, 0.24 to 2.43), respectively. Having chronic disease was associated with higher depression (B = 1.32, 95% CI, 0.02 to 2.63). People with average and bad or very bad physical health self-assessment got higher depression scores than those at very good or good health status (B = 5.85, 95% CI, 4.49 to 7.21 and B = 9.57, 95% CI, 4.54 to 14.59, respectively). People residing in provinces or cities with infected

COVID-19 cases had an elevated risk for depression (B = 1.69 (95% CI, 0.83 to 2.55)) as compared with those who lived elsewhere (Table 2).

Table 2. Multivariate linear regression results for Depression, Anxiety, and Stress Scale -21 Depression subscale with socio-demographical covariates.

Covariates		Coefficient (95%CI)	*P*
Age group (years) (reference: 18 – 39)			
	40 - 59	-0.12 (-1.29, 1.05)	.84
	≥ 60	-5.86 (-10.52, -1.20)	.01
Marital status (reference: Single)			
	Married	-1.02 (-2.00, -0.03)	.04
	Divorced/ widowed	0.41 (-1.90, 2.73)	.73
Education level (reference: Elementary/ Secondary)			
	High school	-2.74 (-6.41, 0.94)	.14
	University/ College	-2.65 (-6.19, 0.89)	.14
	Postgraduate	-2.39 (-6.05, 1.26)	.20
Occupation (reference: Employed)			
	Work from home	1.33 (0.24, 2.43)	.02
	Student	1.76 (0.19, 3.32)	.03
	Unemployed	3.34 (1.68, 5.01)	<.001
	Others	2.11 (-0.15, 4.37)	.07
Chronic disease (reference: No)			
	Yes	1.32 (0.02, 2.63)	.047
Current situation (reference: Social distancing)			
	Quarantine/ Isolation	0.62 (-0.91, 2.15)	.43
Average income per month (million VND[a]) (reference: No income)			
	<1	0.16 (-2.46, 2.78)	.90
	1-5	-0.54 (-2.09, 1.00)	.49
	5-10	-0.15 (-1.64, 1.35)	.84
	10-20	-0.79 (-2.40, 0.82)	.34
	>20	-0.08 (-1.85, 1.70)	.93
Average time stays at home during social distancing(reference: 0-10 hour(s))			
	10-20 hours	-0.65 (-1.94, 0.64)	.33
	20-24 hours	-0.38 (-1.8, 1.05)	.60
Current health status (reference: Very good/ Good)			
	Average	5.85 (4.49, 7.21)	<.001
	Bad/Very bad	9.57 (4.54, 14.59)	<.001
Infected cases in province/ city (reference: No)			
	Yes	1.69 (0.83, 2.55)	<.001
[a] VND: Vietnam Dong			

The association between isolation situation and current health self-assessment with symptoms of anxiety were revealed and remained associated in the multivariate analysis. The isolated participants (at quarantine centers or at home) had higher likelihood to suffer from anxiety (B = 1.22, 95% CI, 0.11 to 2.33). The average and bad or very bad health status respondents were more

prone to anxiety than those in good or very good health evaluation (B = 3.64, 95% CI, 2.64 to 4.63) and B = 7.24, 95% CI, 3.55 to 10.90), respectively (Multimedia Appendix 4).

Occupation, physical health condition and living place with infected COVID-19 cases were presented as factors associated with symptoms of stress among respondents. Being unemployed and still studying possessed higher stress than employed people (B = 2.34, 95% CI, 0.84 to 3.85 and B = 1.17, 95% CI, 0.10 to 2.23, respectively). Participants with average and very bad or bad health evaluation demonstrated a higher risk for stress (B = 5.19, 95% CI, 3.83 to 6.56 and B = 10.60, 95% CI, 5.56 to 15.65, respectively) than those in very good or good health conditions. Higher stress score was recorded among respondents who were living in areas with infected COVID-19 cases (B = 0.92, 95% CI, 0.08 to 1.76) (Multimedia Appendix 5).
The results for univariate linear regression for IES-R and DASS-21 Scales and social-demographic factors are presented in Multimedia Appendix 6.
We found that 96.4% of Vietnamese residents were confident on the doctor's expertise for COVID-19 diagnosis and treatment. Most believed that they were at a low likelihood of contracting COVID-19 (63.3%), and perceived that they could survive if they got infected (85.9%). More than half (54.5% and 64.5%) expressed their concerns about their younger-than-18-year-old children and other family members, respectively. In multivariate regression analysis, the likelihood of surviving if infected remained statistically associated with DASS-21 depression and anxiety subscales. Concerns about children younger than 18 years old were revealed to be associated with IES-R score and DASS-21 stress. Respondents who had different levels (i.e., somewhat likely, not very likely, and not at all likely) beliefs on their likelihood of surviving if infected had higher depression than those who did not know their likelihood (B = 2.07, 95% CI, 0.59 to 3.55, B = 4.10, 95% CI, 1.47 to 6.72, B = 8.67, 95% CI, 0.14 to 17.19). Also, those who believed that they were somewhat too likely to survive if infected with COVID-19 were more anxious than those who did not know their likelihood (B = 1.21 (95% CI, 0.15 to 2.27). Those who were very worried about their younger-than-18-year-old children had increased IES-R and DASS-21 stress scores than those who have no children younger than 18 years old (B = 7.81, 95% CI, 4.98 to 10.64, and B = 1.75, 95% CI, 0.27 to 3.24, respectively). Participants who were somewhat worried about children younger than 18 years old also had higher psychological distress (B = 3.19, 95% CI, 0.61, 5.78). The results for the analysis of the association between concerns related to COVID-19 pandemic and psychological distress, depression, anxiety, and stress are shown in Multimedia Appendix 7, 8.

Discussion

Our study investigated in detail the psychological and mental health impacts of COVID-19 pandemic on the general population in Vietnam during the first nationwide lockdown. The findings revealed that more than one-third (35.9%) of respondents suffered from psychological distress, nearly one-quarter (23.5% and 22.3%) exhibited depression and stress, respectively, and 14.1% of those experienced anxiety. The prevalence of the depressed population in the present study was higher than Nguyen et al.'s study which investigated outpatients in hospitals and health centers in Vietnam from Feb 14 to March 13, 2020, in which, 7.4% was depressed [10]. There might be some explanations for this discrepancy. First, in February, Vietnam had not implemented compulsory social distancing at the national level while strictly large-scale social distancing substantially increased anxiety, depression, loneliness, and substance use[24]. Second, our questionnaire was distributed via social media platforms which might involve people who were more concerned about the pandemic and thus there might be a high probability to get exposure to misinformation and fake

news that could elevate their depression [25]. Moreover, different measurement scales could be attributed to different prevalence.

Our research findings also showed factors associated with psychological and mental health impact, which might identify vulnerable populations, such as unemployed individuals, those with bad or very bad physical health status, or those living in areas with COVID-19 infected cases.

Our results confirmed with previous findings, which found that employment could be a protective factor of mental health in the pandemic [26]. Additionally, participants working from home were more prone to be depressed than those who returned to their working places. This could be due to less interaction and more distraction by pandemic-related news among people working from home, which might increase their depression. The unemployed people were deemed to have the worst psychological and mental health status among occupations in our study, suffering all distress, depression, and anxiety. Indeed, the Vietnamese government has implemented some interventions in this vulnerable population, such as an interim relief package (63 trillion VND) for specific populations during the pandemic (e.g., furloughed workers, unpaid leave workers, freelancers, the poor or near-poor people, etc.)[4]. These short-term interventions could partly mitigate their social-economics burden. However, to ensure socio-economic stability in future pandemics, long-term interventions, such as, strengthening healthcare systems and having social protection schemes should be taken into consideration [4].

It was presented in many previous studies that poor health status was a negative factor for mental health during the pandemic [10,13,27], which was reinforced in our study. Notably speaking, residents in provinces or cities where there were infected COVID-19 cases were more sensitive to depression and stress which was revealed in our findings. The increased depression could be accounted for the fear of getting infected by living in higher-risk areas. Shi et al.'s study showed that people living in higher risk areas (Hubei) significantly suffered depression, anxiety, insomnia, and acute stress than those living in other places [26]. This may suggest that public health interventions should be focused on these vulnerable areas.

The previous study revealed that married people expressed lower HRQOL in COVID-19 pandemic, which was aligned with our results, implying that participants those ever married suffered psychological distress during COVID-19 lockdown [10]. However, those who got married tended to have lower depression than single ones during this period. This could be explained by the strong association between loneliness and depression during lockdown; whereas married people were less lonely than single ones [28].

Regarding concerns on COVID-19, majority (85.8%) perceived a high likelihood of surviving if they got infected with COVID-19. This was consistent with a prior study [13]. This can be inferred from their high belief to the doctors' capacity in treating COVID-19, particularly more than 95% Vietnamese citizens were somewhat or very confident to the healthcare professionals. This can lead to decreasing public's distress in this pandemic. Another positive finding about population' concerns with contracting COVID-19 was that if they perceived their less likelihood of contracting COVID-19, they showed less distress in the lockdown. These findings highly suggest the benefits of using the contact tracing application, such as Bluezone [29]. Not only does this intervention effectively support the epidemiological investigation, but it also reduce anxiety among those who were more likely to get exposed with COVID-19 (e.g., taxi drivers).

With regards to concerns about family members, people in family having children younger than 18 years old, the more worried they paid to those children, the more distress, anxiety, and stress they would suffer. It reflects Vietnamese culture as they often live in a three-generation household. Therefore, the community intervention, that aim to enhance health awareness in order to reduce risk and promote resilience among the vulnerable population are needed. These actions can also help strengthen our long-term response to the pandemic and prepare more effectively for future public health emergencies [30,31]. It suggests that providing reliable and accurate health information through health education or consulting programs, should be targeted to protecting children and the elderly, could help decrease mental health impact of lockdown on the family members [32,33].

This study had some strengths. First, it provided comprehensive information on the prevalence of psychological and mental health impacts of COVID-19 during the first nationwide lockdown. It used two scale IES-R to measure the public crisis impact of lockdown, and DASS-21 scale to capture the population's depression, anxiety, and stress complemented each other to give comprehensive picture on psychological and mental health impact of the first nationwide lockdown in Vietnam. Second, we investigated the public's concerns on COVID-19, which played a useful role in determining which public health interventions might be implemented to mitigate the impact. Third, areas with COVID-19 infected was also pointed out in our finding as vulnerable areas, in which the citizens would more likely suffer from mental health issues. This suggests that more action plans should be considered to these areas, which would control the disease effectively and reduce psychological impacts.

Several limitations existed in the study. First, the online survey with convenience sampling might limit the representativeness of the study. Second, measurement tools were self-assessed by participants which might possess social bias. Third, study design was cross-sectional, reflecting the population at the study time point and limit the causal relationship. However, in the situation of social distancing nationwide which restricted face-to-face interviews, and requiring data collection in a very short time, these limitations were inevitable. Still, further studies are needed to assess possible long-term psychological and mental health impacts of COVID-19 pandemic on the population. Moreover, as social distancing during COVID-19 has been applying in many countries, using internet-based tools to measure psychological impacts has been increasing [34,35], more studies in this field should be needed.

Ethics statement

The study protocol was approved by the Council of Medical Ethics at Thong Nhat Hospital at Ho Chi Minh City, Vietnam (Number 10/BB-BVTN).

Author Contributions

Conceptualization, KNCD, PTLN, TNLB, TLP, TVV, APG, LA and BVV; methodology, KNCD, PTLN, TNLB, TLP, LA and BVV; software, KNCD, PTLN, TNLB ; validation, KNCD, PTLN, TNLB, TLP, LA and BVV; formal analysis, KNCD, PTLN, TNLB, TVV, APG ; investigation, KNCD, PTLN, TNLB, TLP, TVV and BVV; data curation, KNCD, PTLN, TNLB, TLP, TVV, APG and BVV; writing—original draft preparation, KNCD, PTLN, TNLB; writing—review and editing, KNCD, PTLN, TNLB, TLP, TVV, APG, LA and BVV; supervision, BVV; project administration, KNCD, PTLN, TNLB, TLP. All authors have read and agreed to the published version of the manuscript.

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Conflicts of Interest

The authors declare no conflict of interest.

Multimedia Appendix 1: CHERRIES checklist
Multimedia Appendix 2: Social-demographic characteristics of general population in Vietnam during the first lockdown due to COVID-19

Multimedia Appendix 3: Prevalence and score of psychological and mental health impacts of COVID-19 on general population in Vietnam during the first lockdown
Multimedia Appendix 4: Multivariate linear regression results for Depression, Anxiety, and Stress Scale -21 Anxiety subscale with socio-demographical covariates.
Multimedia Appendix 5: Multivariate linear regression results for Depression, Anxiety, and Stress Scale -21 Stress subscale with socio-demographical covariates.
Multimedia Appendix 6: Univariate linear regression results for Impact of Event Scale-Revised and Depression, Anxiety, and Stress Scale -21 Scale with socio-demographical covariates
Multimedia Appendix 7: Univariate linear regression results for Impact of Event Scale-Revised and Depression, Anxiety, and Stress Scale -21 with concern-related covariates.
Multimedia Appendix 8: Multivariate linear regression results for Impact of Event Scale-Revised and Depression, Anxiety, and Stress Scale -21 with concern-related covariates.

References

1. World Health Organization. Timeline of WHO's response to COVID-19. 2020; https://www.who.int/news-room/detail/29-06-2020-covidtimeline. Accessed July 21, 2020.
2. World Health Organization. WHO Coronavirus Disease (COVID-19) Dashboard. 2020; https://covid19.who.int/. Accessed July 21, 2020.
3. Phan LT, Nguyen TV, Luong QC, et al. Importation and Human-to-Human Transmission of a Novel Coronavirus in Vietnam. *New England Journal of Medicine*. 2020;382(9):872-874.
4. Tran PB, Hensing G, Wingfield T, et al. Income security during public health emergencies: the COVID-19 poverty trap in Vietnam. *BMJ Glob Health*. 2020;5(6):e002504.
5. Ministry of Health in Vietnam. COVID-19 databoard. 2020; https://ncov.vncdc.gov.vn/pages/viet-nam-1.html?fbclid=IwAR3q2ve1JSS9pKSsOZAEGg_ytCkMO0skq0X4gABnJtrF0psSnrWuXmp_lqA. Accessed

July 21, 2020.
6. Nguyen THD, Vu DC. The largest epicenter of the coronavirus outbreak in Vietnam. *Infect Control Hosp Epidemol*. 2020;41(8):984-985.
7. Ministry of Health in Vietnam. Cong bo dich covid 19 toan quoc. 2020; https://ncov.moh.gov.vn/web/guest/-/cong-bo-dich-covid-19-toan-quoc. Accessed July 21, 2020.
8. Dinh L, Dinh P, Nguyen PDM, Nguyen DHN, Hoang T. Vietnam's response to COVID-19: prompt and proactive actions. *J Travel Med*. 2020;27(3).
9. Brooks SK, Webster RK, Smith LE, et al. The psychological impact of quarantine and how to reduce it: rapid review of the evidence. *The Lancet*. 2020;395(10227):912-920.
10. Nguyen HC, Nguyen MH, Do BN, et al. People with suspected COVID-19 symptoms were more likely depressed and had lower Health-Related Quality of Life: The potential benefit of health literacy. *J Clin Med*. 2020;9(4).
11. Weiss DS, Marmar CR. The Impact of Event Scale—Revised. In: J. P. Wilson, Keane TM, eds. *Assessing psychological trauma and PTSD* New York: Guilford Press; 1997:399–411.
12. Lovibond SH, Lovibond PF. The structure of negative emotional states: comparison of the Depression Anxiety Stress Scales (DASS) with the Beck Depression and Anxiety Inventories. *Behav Res Ther*. 1995;33(3):335-343.
13. Wang C, Pan R, Wan X, et al. Immediate psychological responses and associated factors during the initial stage of the 2019 Coronavirus Disease (COVID-19) Epidemic among the general population in China. *Int J Environ Res Public Health*. 2020;17(5):1729.
14. Creamer M, Bell R Fau - Failla S, Failla S. Psychometric properties of the Impact of Event Scale - Revised. *Behav Res Ther*. 2003;41(12):1489-1496.
15. Dao TK, Poritz JMP, Moody RP, Szeto K. Development, reliability, and validity of the posttraumatic stress disorder interview for vietnamese refugees: A diagnostic instrument for vietnamese refugees. *Journal of Traumatic Stress*. 2012;25(4):440-445.
16. Hendrix CC, Jurich AP, Schumm WR. Validation of the Impact of Event Scale on a sample of American Vietnam veterans. *Psychol Rep*. 1994;75(1 Pt 1):321-322.
17. Asukai N, Kato H, Kawamura N, et al. Reliability and validity of the Japanese-language version of the impact of event scale-revised (IES-R-J): four studies of different traumatic events. *J Nerv Ment Dis*. 2002;190(3):175-182.
18. Le TA, Le MQT, Dang AD, et al. Multi-level predictors of psychological problems among methadone maintenance treatment patients in difference types of settings in Vietnam. *Subst Abuse Treat Prev Policy*. 2019;14(39):1747-1597X (Electronic).
19. Le MTH, Tran TD, Holton S, Nguyen HT, Wolfe R, Fisher J. Reliability, convergent validity and factor structure of the DASS-21 in a sample of Vietnamese adolescents. *PLOS ONE*. 2017;12(7):e0180557.
20. Tran TD, Tran T Fau - Fisher J, Fisher J. Validation of the depression anxiety stress scales (DASS) 21 as a screening instrument for depression and anxiety in a rural community-based cohort of northern Vietnamese women. *BMC Psychiatry*. 2013(1471-244X (Electronic)).
21. Maldonado G, Greenland S. Simulation study of confounder-selection strategies. *Am J Epidemiol*. 1993;138(11):923-936.
22. *R: A language and environment for statistical computing* [computer program]. R Foundation for Statistical Computing: 2013; 2020.
23. Eysenbach G. Improving the quality of Web surveys: the Checklist for Reporting Results of Internet E-Surveys (CHERRIES). *J Med Internet Res*. 2004;6(3):e34-e34.
24. Galea S, Merchant RM, Lurie N. The mental health consequences of COVID-19 and physical

distancing: The need for prevention and early intervention. *JAMA Internal Medicine*. 2020;180(6):817-818.
25. Nguyen THD, Vu DC. Impacts of the COVID-19 pandemic upon mental health: Perspectives from Vietnam. *Psychol Trauma*. 2020;12(5):480-481.
26. Shi L, Lu Z-A, Que J-Y, et al. Prevalence of and risk factors associated with mental health symptoms among the general population in China during the Coronavirus Disease 2019 Pandemic. *JAMA Network Open*. 2020;3(7):e2014053-e2014053.
27. Liu D, Ren Y, Yan F, et al. Psychological impact and predisposing factors of the Coronavirus Disease 2019 (COVID-19) Pandemic on general public in China *The Preprints with THE LANCET*. 2020.
28. Loades ME, Chatburn E, Higson-Sweeney N, et al. Rapid Systematic Review: The impact of social isolation and loneliness on the mental health of children and adolescents in the context of COVID-19. *Journal of the American Academy of Child & Adolescent Psychiatry*. 2020.
29. Vietnamse Government. Remote platform, Bluezone app launched in support of medical treatment, including COVI-19. 2020; http://news.chinhphu.vn/Home/Remote-platform-Bluezone-app-launched-in-support-of-medical-treatment-including-COVI19/20204/39790.vgp Accessed Sep 12, 2020.
30. Do BN, Tran TV, Phan DT, et al. Health literacy, eHealth literacy, adherence to infection prevention and control procedures, lifestyle changes, and suspected COVID-19 symptoms among health care workers during lockdown: Online survey. *J Med Internet Res*. 2020;22(11):e22894.
31. Liao Q, Yuan J, Dong M, Yang L, Fielding R, Lam WWT. Public engagement and government responsiveness in the communications about COVID-19 during the early epidemic stage in China: Infodemiology study on social media data. *J Med Internet Res*. 2020;22(5):e18796.
32. Alsan M, Stantcheva S, Yang D, Cutler D. Disparities in Coronavirus 2019 reported incidence, knowledge, and behavior among US adults. *JAMA Network Open*. 2020;3(6):e2012403-e2012403.
33. Li X, Liu Q. Social media use, eHealth literacy, disease knowledge, and preventive behaviors in the COVID-19 pandemic: cross-sectional study on Chinese netizens. *J Med Internet Res*. 2020;22(10):e19684.
34. Ni MY, Yang L, Leung CMC, et al. Mental health, risk factors, and social media use during the COVID-19 epidemic and cordon sanitaire among the community and health professionals in Wuhan, China: cross-sectional survey. *JMIR Ment Health*. 2020;7(5):e19009.
35. van Agteren J, Bartholomaeus J, Fassnacht DB, et al. Using Internet-based psychological measurement to capture the deteriorating community mental health profile during COVID-19: Observational study. *JMIR Ment Health*. 2020;7(6):e20696.

Abbreviations

- DASS-21 Depression, Anxiety, and Stress Scale-21
- HRQOL Health-Related Quality of Life
- IES-R Impact of Event Scale-Revised
- VND Vietnam Dong

Supplementary Files

Multimedia Appendixes

Checklist for Reporting Results of Internet E-Surveys (CHERRIES).
URL: https://asset.jmir.pub/assets/735a595ee44752e409cbaba74555e4a9.doc

Social-demographic characteristics of general population in Vietnam during the first lockdown due to COVID-19.
URL: https://asset.jmir.pub/assets/0f00952faa25af313caa6ac8ab552a5c.doc

Prevalence and score of psychological and mental health impacts of COVID-19 on general population in Vietnam during the first lockdown.
URL: https://asset.jmir.pub/assets/97ffaaf881cc636ba8ffa796dc500b85.doc

Multivariate linear regression results for Depression, Anxiety, and Stress Scale -21 Anxiety subscale with socio-demographical covariates.
URL: https://asset.jmir.pub/assets/95530dfe1ae77263b8bff679ccaba622.doc

Multivariate linear regression results for Depression, Anxiety, and Stress Scale -21 Stress subscale with socio-demographical covariates.
URL: https://asset.jmir.pub/assets/48cea108069f82e50a3963e47d470cf9.doc

Univariate linear regression results for Impact of Event Scale-Revised and Depression, Anxiety, and Stress Scale -21 Scale with socio-demographical covariates.
URL: https://asset.jmir.pub/assets/35b2b7c38d9b7aa957e6847cec787924.doc

Univariate linear regression results for Impact of Event Scale-Revised and Depression, Anxiety, and Stress Scale -21 with concern-related covariates.
URL: https://asset.jmir.pub/assets/ec8b7cedd5a47b37427bf443e7d8a06a.doc

Multivariate linear regression results for Impact of Event Scale-Revised and Depression, Anxiety, and Stress Scale -21 with concern-related covariates.
URL: https://asset.jmir.pub/assets/5058021d51558477f6c554d62ee9e176.doc