Factors Associated With Common Mental Disorders and the Presence of Noncommunicable Diseases During the COVID-19 Pandemic in Indonesia: A Study in Bogor, West Java

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Abstract

The coronavirus disease (COVID-19) pandemic has significantly impacted the mental health of Indonesians, including those with noncommunicable diseases (NCDs) and those without. However, it is known that COVID-19 has a higher fatality rate in people with NCDs. This study aimed to determine the difference in the prevalence of common mental disorders (CMD) among respondents with and without NCDs and identify the associated factors of CMD from each sub-sample. This cross-sectional study used respondents from the Bogor Cohort Study of noncommunicable disease risk factors. The NCDs in the current study included hypertension, coronary heart disease (CHD), stroke, and diabetes mellitus (DM). The diagnosis of NCD was determined by trained medical professionals following research protocols. A total of 2,936 participants were involved in this study, including 1,734 with NCDs and 1,202 without. Multiple logistic regression was used to analyze factors associated with CMD in respondents with and without NCDs. The prevalence of CMD was slightly higher in respondents with NCDs (5.1%) than in those without NCDs (3.6%). Experiencing COVID-19 symptoms in the last six months was a factor associated with CMD in both groups; those with NCDs (AOR = 4.156; 95% CI [2.37, 7.30]; $p < .001$) and those without (AOR = 5.797; 95% CI [2.63, 12.78]; $p < .001$). Not having health insurance was a factor associated with CMD, only in respondents with NCDs (AOR = 2.582; 95% CI [1.35, 4.93]; $p = .004$). Female gender and low education were factors associated with CMD only in respondents without NCDs. During the COVID-19 pandemic, newly diagnosed subjects with NCDs and non-adherence to treatment were identified as factors associated with CMD in respondents with NCDs who had undergone PCR and/or rapid testing. During the pandemic, the knowledge of COVID-19 symptoms and health insurance ownership significantly impacted the community's wellbeing, not only for physical but also for psychological health.

Keywords

Common mental disorder; COVID-19; health insurance; noncommunicable diseases

Introduction

In 2020, Indonesia, like many other countries worldwide, was hit by severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2 or COVID-19), rapidly spreading throughout the nation. On March 2, 2020, two confirmed cases of COVID-19 were identified in Indonesia. Over the next six months, the cumulative number of confirmed cases rose sharply to over 287,000, while the total death toll reached nearly 11,000 by September 29, 2020 (Mathieu et al., 2020).

The COVID-19 pandemic has caused many issues that have contributed to developing mental health problems. These issues include uncertainty about the future, imminent shortages of resources for testing and treatment, a lack of resources to protect healthcare workers from infection, the implementation of public health measures that restrict individual freedoms, increasing financial losses, and conflicting messages from authorities (Pfefferbaum & North, 2020). In addition, there are also concerns that the family's health may be impacted by COVID-19, leading to anxiety (Wang et al., 2020). It is believed that self-isolation and quarantine may have led to increased mental health problems due to the disruption of daily activities and routines (Wang, Shi, et al., 2021).

Due to the COVID-19 pandemic, there has been a growing concern about the prevalence of mental health issues. A study in China reported that 35.1%, 20.1%, and 18.2% of the population experienced anxiety, depression, and poor sleep quality, respectively (Huang & Zhao, 2020). During Indonesia's first two months of the COVID-19 pandemic, 6.9% of the population experienced anxiety, and another 8.6% experienced depression (Mubasyiroh et al., 2022). Furthermore, another study conducted in Indonesia found that more than 20% of the general population experienced anxiety, while over 30% suffered from depression (Anindyajati et al., 2021; Izzatika et al., 2021).

The impact of mental health on healthy individuals cannot be underestimated. Mental health issues such as depression can lead to and exacerbate some inflammatory processes pertinent to coronary heart disease among healthy people (Stewart et al., 2009), leading to a greater risk of having severe health problems and a reduced immune system (Alghamdi et al., 2021; Kiecolt-Glaser & Glaser, 2002). On the other hand, the mental health aspect in vulnerable groups should be considered. Based on the 2018 Indonesian national survey findings, nearly 10% of respondents suffer from noncommunicable diseases (NCDs), with depression as the primary risk factor (Arifin et al., 2022). Moreover, a meta-analysis showed that the prevalence of mental health problems was 36.6% among people with chronic physical diseases (Daré et al., 2019). Additionally, COVID-19 presents a greater fatality risk in populations with NCDs (Nikoloski et al., 2021).

Multiple variables have been discovered to be associated with mental health conditions during the COVID-19 pandemic. Previous histories of mental illness, chronic illness, and layoffs were the most substantial factors influencing anxiety and depression in the Indonesian community (Mubasyiroh et al., 2022). Additionally, other studies have indicated that young age, female gender, having low education, and low income are associated with mental health during the COVID-19 pandemic (Chekole & Abate, 2021; Nagasu et al., 2021; O'Connor et al., 2021). Those variables aligned with the conceptual framework of social determinants of health proposed by the World Health Organization (WHO) (Solar & Irwin, 2010). During the COVID-19 pandemic, various factors have emerged as potential sources of adverse mental

health outcomes. These factors include being directly impacted by COVID-19 or a chronic illness, experiencing fear of contracting the virus, facing financial and employment difficulties, and access to healthcare as a supporting factor (Lotzin et al., 2020). Another source of fear and anxiety was having a COVID-19 test (Sahu et al., 2021).

During the COVID-19 pandemic, it was imperative to thoroughly examine the issue of mental health, not only to prioritize the management of physical health during pandemics but also to acknowledge the impact on the psychological aspect, as this may potentially worsen the severity of the disease (Druss et al., 2011; Nordentoft et al., 2013). Hence, the primary objective of this research is to examine the prevalence of common mental disorders among individuals with and without NCDs, as well as factors contributing to the occurrence of the disease. Moreover, this study aims to enhance the efficacy of treatments by tailoring them to the specific needs of these individuals.

Methods

Study design

This study was a cross-sectional online survey utilizing a purposive sampling technique. The structured questionnaire was designed online using the Lime Survey application and distributed to eligible respondents using URL links. Each respondent was given a unique code, ensuring no data duplication in this study.

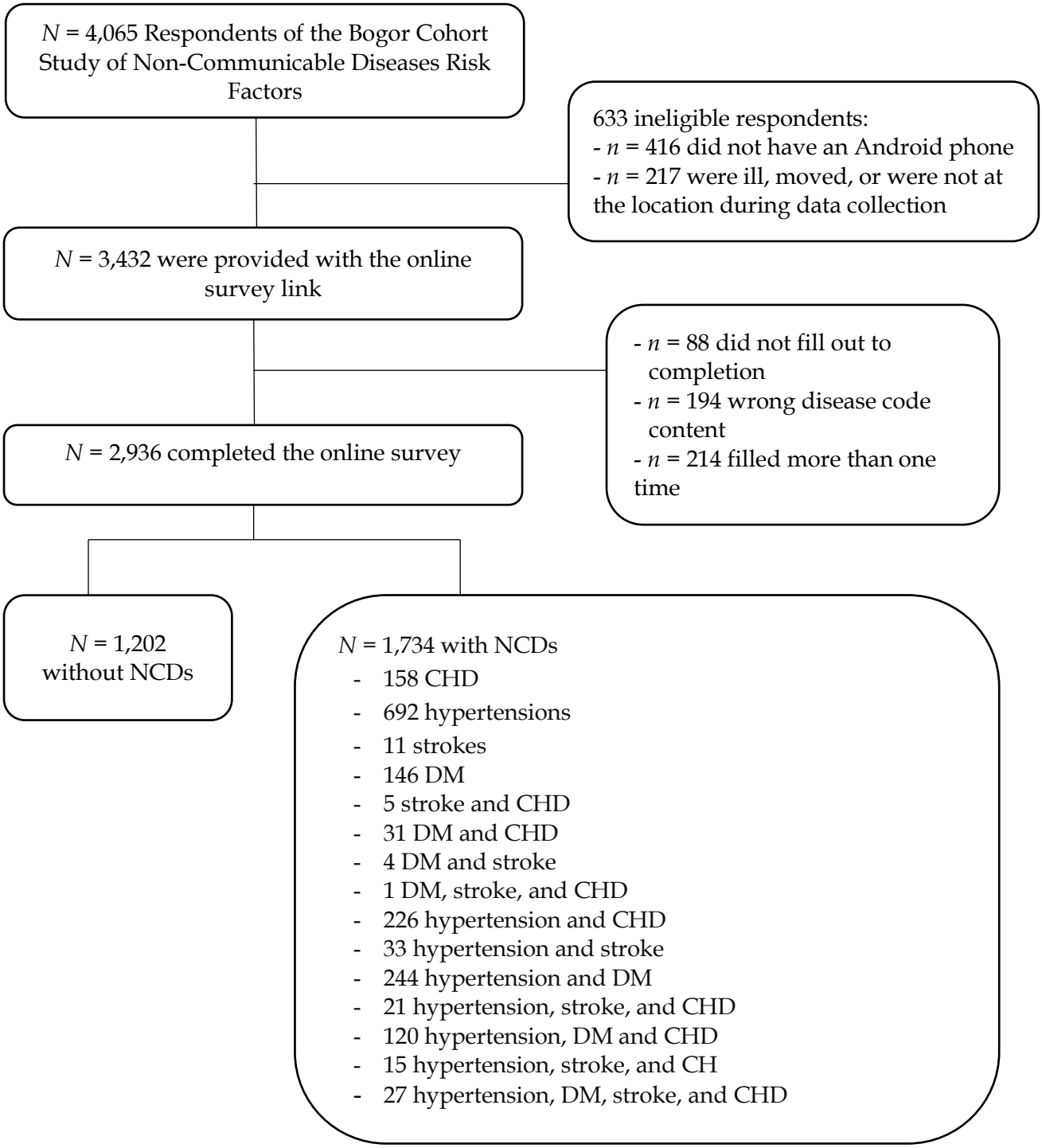
Study participants

The sample frame in this study was all participants of the Bogor Noncommunicable Diseases (NCDs) Risk Factors Cohort Study. The respondents of this cohort study included residents aged 25 years or above and permanent residents of five selected urban villages in Central Bogor Sub-District, Bogor City, between 2011 and 2020. The sample frame was chosen to ensure the adequacy of the minimum sample in each sub-sample: respondents with and without NCDs. For statistical significance, we required a minimum of 555 respondents for both groups. We used a two-proportion estimation formula, considering the proportion of psychological problems in the group with NCDs (p1) as 5.3% and the proportion of psychological issues in the group without NCDs (p2) as 2.1% (Arifin et al., 2022). A 95% confidence interval was used with the power of the test set at 80% and the deff equal to 2.

The inclusion criteria of this study were all sample frames with Android phones to run the Lime Survey application, were willing to complete questionnaires, and were at the research location during the data collection process. Two thousand nine hundred thirty-six eligible respondents completed the survey and were ready to be analyzed. Respondents were grouped into two sub-samples: respondents with NCDs and those without NCDs. Respondents with NCDs were cohort respondents who had at least one of the following diseases: hypertension, coronary heart disease (CHD), diabetes mellitus (DM), and/or stroke, based on the diagnosis of a medical doctor or health professionals. Respondents with systolic blood pressure readings ≥ 140 mmHg or diastolic blood pressure readings ≥ 90 mmHg were classified as having hypertension. Similarly, respondents with fasting blood sugar levels ≥ 126 mg/dL or 2-hour postprandial blood sugar levels ≥ 200 mg/dL were considered to have DM. Furthermore, respondents with CHD were diagnosed using an electrocardiogram (ECG)

examination with Minnesota code, while those with stroke were diagnosed through previous history assessment and neurologist anamnesis. The flow of study respondent selection can be seen in Figure 1.

Figure 1: Selection of the Study Respondents



Data collection

To collect data, the research team enlisted cadres to identify respondents in the NCD cohort who owned Android phones and then created a database of cellphone numbers that could be

used to distribute study questionnaires. Then, the URL link of the study questionnaire was sent to the cadres, which was subsequently forwarded to the respondents in the list via WhatsApp. The online questionnaire was completed by the respondents individually. The cadres were trained and assigned to assist respondents if there were any questions regarding questionnaire completion. The data collection activity was conducted from September 28 to October 8, 2020.

Data quality assurance was conducted by evaluating questionnaires, inspecting data collection flow, and observing data input procedures, ensuring only samples that met the inclusion criteria were included. Additionally, the research team provided a unique five-digit number to the respondents via WhatsApp, which they used to submit the online survey form. The unique identity was provided to minimize errors and enable data tracing.

Variables

The dependent variable in this study was Common Mental Disorders (CMD). As such, CMD is a group of distress states characterized by anxiety, depression, and unknown somatic symptoms. This disease is a contemporary neurotic disorder typically encountered in community and primary care settings (Goldberg, 1994). The 20-item Self-Reporting Questionnaire (SRQ-20) was used to assess CMD and covers neurotic experience in the previous 30 days. The SRQ-20 was introduced by the World Health Organization (WHO) as a screening tool for non-psychotic disorders in the general population (Beusenberg & Orley, 1994). A person was indicated as suffering from CMD if the total "yes" answers exceeded the cut-off point (score = 6). This cut-off point is determined based on research conducted by the Indonesia Ministry of Health (Ganihartono, 1996). Several studies have validated the Indonesian version of SRQ-20, showing good validity and reliability (Ganihartono, 1996; Prasetio et al., 2022). In addition, the SRQ-20 provides good predictive validity compared to gold standard measures, such as the Mini-International Neuropsychiatric Interview (MINI) depression questionnaire (Idaiani et al., 2020).

Sociodemographic variables included gender, age, education, occupation, and marital status. The gender variable was categorized as "Female" and "Male". The age variable was divided into two categories: 25–54 years old and 55 years old and above. This classification conforms to the recommendation of the age classification for health risk, although in broader categories (Diaz et al., 2021). These categories are consistent with previous research regarding NCDs in Indonesia, such as DM and strokes, which started to appear in young adults under 55 (Riyadina et al., 2020; Wati et al., 2021). In the current study, respondents under 25 years old were unavailable. The education level was categorized with "Junior high school or above" (graduated from junior high, high school, diploma, and bachelor) and "Below junior high school" (did not have formal education or only attended primary school). The occupational status was categorized as "Working" and "Not working". Marital status was categorized as "Married" and "Unmarried." The insurance ownership variable represents the respondent's health insurance. This variable was categorized as having or not having health insurance.

Two categories of NCDs were identified based on when health professionals diagnosed the respondent. The first category was "Old case" and included those diagnosed with one or more NCDs before the survey in 2020. The second category was "New case," which refers to those diagnosed with NCDs by healthcare professionals during the survey. In this study, participants' adherence to medication and their management of NCDs were evaluated based on recommendations from healthcare professionals. To eliminate memory biases, the study

examined participants' medication intake within the last week and their use of healthcare facilities within the last month.

One of the variables considered was whether the respondents "Had the COVID-19 symptom". This variable was measured by assessing if the respondent had experienced any COVID-19 symptoms, such as fever, cough, sore throat, loss of taste or smell, shortness of breath, or a combination of these symptoms (Lai et al., 2020; Vaira et al., 2020). The COVID-19 symptoms refer to any symptoms experienced by respondents between March 2020 and the completion of the online questionnaire for this study. Respondents were categorized as having COVID-19 symptoms if they answered "Yes" to have at least one of the symptoms and categorized as "None" if the respondent answered that they had never experienced any of the symptoms. Furthermore, the variable for COVID-19 examination was based on the behavior of the respondents who had undergone the test. It was classified into two categories: "Yes" if the respondent had taken a COVID-19 test, which could either be a rapid antibody test or a Real-Time Polymerase Chain Reaction (RT-PCR) swab test, or "No" if the respondent had never undergone any of those COVID-19 tests.

Statistical analysis

First, the univariate analysis was conducted on all variables to observe the frequency distribution of each category. The relationship between characteristics and health status to CMD was cross-tabulated with the chi-square test. The chi-square test assesses the relationship between each characteristic and health status to CMD. Statistical significance was determined at $p < .05$, with a confidence interval of 95%. Each independent variable with a p value of < .25 was included in the multivariate model. Multiple logistic regression analysis was used to obtain the factors associated with CMD in the group with and without NCDs. The adjusted odds ratio (AOR) with a p value of < .05 was considered statistically significant. Statistical analysis was performed using SPSS version 22.0. Before interpreting the multivariate analysis results, we conducted a Goodness of Fit test (GoF) using the Hosmer and Lemeshow test to determine the suitability of the model formed. The model's suitability was determined by the absence of any significant difference between the model and its observed values ($p \geq .05$).

Ethical statement

The study obtained ethical approval from the National Health Research Ethics Commission of the National Institute of Health Research and Development (LB.02.01/2/KE.511/2020.). Respondents were allowed not to participate in the study after reading the informed consent form. Confidentiality assures that no personal identifiers were included in the analysis.

Results

A total of 2,936 subjects were analyzed, of which 1,734 had NCDs and 1,202 did not. Among subjects with NCDs, the majority were female (76.2%), aged 25–55 years (55.8%), had junior high school education and above (62.7%), were not working (81.4%), were married (77.4%), and had health insurance (92.0%). The same distribution of demographic characteristics occurs in respondents with no NCDs (Table 1).

Table 1 shows that among subjects who had or did not have NCDs, a significant proportion (93%) did not experience any symptoms of COVID-19 over the past eight months (March to October 2020). Moreover, most had never taken a COVID-19 test (95%) and did not have CMD (95%). As many as 96.2% of subjects with NCDs were old cases, and almost half had regular checkups and took medication regularly during the pandemic.

Table 1: Frequency Distribution of Respondent Characteristics and Health Status Based on the Presence or Absence of Noncommunicable Diseases (NCDs)

Variable	NCD (*N* = 1,734) *n*(%)	Non-NCD (*N* = 1,202) *n*(%)	Total (*N* = 2,936) *n*(%)
Demographic characteristic			
Gender			
Female	1,321 (76.2)	826 (68.7)	2,147 (73.1)
Male	413 (23.8)	376 (31.3)	789 (26.9)
Age group (year)			
25–54	967 (55.8)	982 (81.7)	1,949 (66.4)
> = 55	767 (44.2)	220 (18.3)	987 (33.6)
Education level			
Junior high school or above	1,087 (62.7)	910 (75.7)	1,997 (68.0)
Below junior high school	647 (37.3)	292 (24.3)	939 (32.0)
Work status			
Working	322 (18.6)	331 (27.5)	653 (22.2)
Not working	1,412 (81.4)	871 (72.5)	2,283 (77.8)
Marital status			
Married	1,342 (77.4)	1,024 (85.2)	2,366 (80.6)
Unmarried	392 (22.6)	178 (14.8)	570 (19.4)
Insurance ownership			
Yes	1,596 (92.0)	1,083 (90.1)	2,679 (91.2)
No	138 (8.0)	119 (9.9)	257 (8.8)
Health status			
Having COVID-19 symptoms			
Absence	1,618 (93.3)	1,134 (94.3)	2,752 (93.7)
Present	116 (6.7)	68 (5.7)	184 (6.3)
Having COVID-19 examination test			
No	1,648 (95.0)	1,142 (95.0)	2,790 (95.0)
Yes	86 (5.0)	60 (5.0)	146 (5.0)
CMD			
No	1,646 (94.9)	1,159 (96.4)	2,805 (95.5)
Yes	88 (5.1)	43 (3.6)	131 (4.5)
NCD case			
Old-case NCD	1,668 (96.2)	-	-
New-case NCD	66 (3.8)	-	-
Medication-taking behavior and NCDs regular checkups			
Having checkups AND taking medication regularly	828 (47.8)	-	-
Having checkups OR taking medication	390 (22.5)	-	-
Neither have checkups nor regular medication consumption	516 (29.8)	-	-

Note: NCDs= noncommunicable diseases, CMD= common mental disorders

Table 2 shows a bivariate analysis of CMD in subjects with NCDs and subjects without. In subjects with NCDs, factors associated with CMD were insurance ownership, experiencing COVID-19 symptoms in the last six months, having COVID-19 tests, and NCD status. In addition, gender, education level, and COVID-19 symptoms are related to CMD in subjects who do not have NCDs.

Table 2: Frequency Distribution of Respondents Based on the Presence of Noncommunicable Diseases (NCDs) and Common Mental Disorders (CMD)

Variable	NCD (*N* = 1,734)		*p* value	Non NCD (*N* = 1,202)		*p* value
	CMD (*n* = 88)	Not CMD (*n* = 1,646)		CMD (*n* = 43)	Not CMD (*n* = 1,159)	
Demographic characteristic						
Gender						
Female	73 (5.5)	1,248 (94.5)	.161	36 (4.4)	790 (95.6)	.046*
Male	15 (3.6)	398 (96.4)		7 (1.9)	369 (98.1)	
Age group (year)						
25–55	45 (4.7)	922 (95.3)	.431	33 (3.4)	949 (96.6)	.513
> = 55	43 (5.6)	724 (94.4)		10 (4.5)	210 (95.5)	
Education level						
Junior high school or above	49 (4.5)	1,038 (95.5)	.200	25 (2.7)	885 (97.3)	.011*
Below junior high school	39 (6.0)	608 (94.0)		18 (6.2)	274 (93.8)	
Work status						
Working	16 (5.0)	306 (95.0)	.923	11 (3.3)	320 (96.7)	.906
Not working	72 (5.1)	1,340 (94.9)		32 (3.7)	839 (96.3)	
Marital status						
married	63 (4.7)	1,279 (95.3)	.228	34 (3.3)	990 (96.7)	.351
unmarried	25 (6.4)	367 (93.6)		9 (5.1)	169 (94.9)	
Insurance ownership						
Yes	75 (4.7)	1,521 (95.3)	.026*	36 (3.3)	1,047 (96.7)	.154
No	13 (9.4)	125 (90.6)		7 (5.9)	112 (94.1)	
Health status						
Having COVID-19 symptoms						
Absence	68 (4.2)	1,550 (95.8)	< .001*	33 (2.9)	1,101 (97.1)	< .001*
Present	20 (17.2)	96 (82.8)		10 (14.7)	58 (85.3)	
Having COVID-19 examination test						
No	75 (4.6)	1,573 (95.4)	< .001*	40 (3.5)	1,102 (96.5)	.543
Yes	13 (15.1)	73 (84.9)		3 (5.0)	57 (95.0)	
NCD case						
Old-case NCD	80(4.8)	1,588(95.2)	.022*	-	-	
New-case NCD	8(12.1)	58(87.9)				
Medication-taking behavior and NCDs regular checkups						
Having checkups AND taking medication regularly	30(3.6)	798(96.4)	.011*	-	-	
Having checkups OR taking medication	20(5.1)	370(94.9)				
Neither have checkups nor regular medication consumption	38(7.4)	478(92.6)				

*Note: *significance level of p < .05 with chi-square analysis; NCDs= noncommunicable diseases; CMD = common mental disorder*

Both models obtained in the study appear correct, and the test results were acceptable. This finding was supported by the significance values obtained from the Hosmer and Lemeshow tests in Table 3, where the group with NCDs showed a *p* value of 0.292, and the group without NCDs showed a *p* value of 0.562. Furthermore, Table 3 also shows the associated factors and risk of CMD based on the presence of NCDs. Respondents with NCDs who did not have health insurance had a 2.5 times higher risk of CMD than those with health insurance (AOR = 2.582; 95% CI [1.35, 4.93]; *p* = .004). Furthermore, respondents who had COVID-19 symptoms during the last six months had a 4.2 times higher risk of CMD compared to those without COVID-19 symptoms (AOR = 4.156; 95% CI [2.37, 7.30]; *p* < .001).

Respondents who had tested for COVID-19 (having PCR test and/or rapid test) had a 3.4 times higher risk of CMD compared to those who had never tested (AOR = 3.377; 95% CI [1.70, 6.72]; *p* = .001). Respondents who were newly diagnosed as having NCDs during the COVID-19 pandemic had a 2.5 times higher risk of CMD compared to respondents who had NCDs for a long time (before the COVID-19 pandemic) (AOR = 2.470; 95% CI [1.09, 5.61]; *p* = .031). Lastly, subjects who never had checkups and took medication had an almost two-fold higher risk than those who adhered to and took medication (AOR= 1.830; 95% CI [1.08, 3.11]; *p* = .025).

Factors associated with the risk of CMD in subjects without NCDs were female gender (AOR = 2.632; 95% CI [1.08, 6.67]; *p* = .035), having education below junior high school (AOR = 2.348; 95% CI [1.20, 4.60]; *p*= .013), and experienced COVID-19 symptoms during the past six months (AOR = 5.797; 95% CI [2.63, 12.78]; *p* < .001).

Table 3: Associated Factors of Common Mental Disorders on Respondents Based on the Presence of Noncommunicable Diseases (NCDs)

Variable	CMD with NCD			CMD without NCD		
	AOR	**95% CI**	***p* value**	**AOR**	**95% CI**	***p* value**
Gender						
Male	1			1		.035*
Female	1.698	0.89, 3.23	.105	2.632	1.08, 6.67	
Age group (year)						
25–55	1			1		.850
> = 55	1.039	0.62, 1.73	.883	0.922	0.40, 2.13	
Education level						
Junior high school or above	1			1		
Below junior high school	1.337	0.83, 2.15	.230	2.348	1.20, 4.60	.013*
Work status						
Working	1			1		
Not working	0.810	0.44, 1.51	.505	0.808	0.37, 1.76	.593
Marital status						
married	1			1		
unmarried	1.239	0.73, 2.10	.426	1.262	0.56, 2.84	.574
Insurance ownership						
Yes	1			1		
No	2.582	1.35, 4.93	.004*	1.757	0.74, 4.15	.199
Having COVID-19 symptoms						
Absence	1			1		
Present	4.156	2.37, 7.30	<.001*	5.797	2.63, 12.78	<.001*
Having COVID-19 examination test						
No	1			1		

Variable	CMD with NCD			CMD without NCD		
	AOR	95% CI	*p* value	AOR	95% CI	*p* value
Yes	3.377	1.70, 6.72	.001*	1.706	0.49, 6.01	.406
NCD case						
Old-case NCD	1			-		
New-case NCD	2.470	1.09, 5.61	.031*	-	-	-
Medication-taking behavior and NCDs regular checkups						
Having checkups AND taking medication regularly	1			-		
Having checkups OR taking medication	1.262	0.69, 2.30	.447	-	-	-
Neither have checkups nor regular medication consumption	1.830	1.08, 3.11	.025*			
Goodness of fit	χ^2 = 9.625; df = 8		.292**	χ^2 = 4.861; df = 6		.562**

*Note: *significance level of $p < .05$ with multiple logistic regression analysis; ** significance level of $p \geq .05$ with Hosmer Lemeshow test; AOR = adjusted odds ratio; NCDs = noncommunicable diseases; CMD= common mental disorders*

Discussion

The study showed that the proportion of CMD in people with NCDs during the COVID-19 pandemic was 5.1% and 3.6% in people without NCDs. The prevalence of noncommunicable diseases (NCDs) was lower in this study compared to a previous systematic review and meta-analysis. The previous study found that mental health disorders in the general population were over 30%, indicating a higher prevalence among individuals with chronic illnesses (Wu et al., 2021). The results of this study confirm that people with NCDs have a higher risk of developing mental health problems than the general population.

The most significant factors associated with CMD in people with NCDs were having COVID-19 symptoms, having previously had a rapid or swab test, having insurance ownership, being a new NCD case, and people who neither have checkups nor regular medication during the COVID-19 pandemic until the time of the survey. A study in Vietnam showed that people with common COVID-19 symptoms such as fever, cough, and shortness of breath, as well as other less common symptoms such as muscle aches, lethargy, phlegm, headaches, and others, had a strong tendency to experience depression (Nguyen et al., 2020). This susceptibility might be due to people who were sick and in need of visiting healthcare facilities were vulnerable. Moreover, in the initial stage of the COVID-19 pandemic, a lot of confusing information was circulating, making it challenging to identify the COVID-19 symptoms. This confusion can lead to CMD (Pfefferbaum & North, 2020).

Patients with NCDs who had COVID-19 tests were also associated with the incidence of CMD. This association may be due to the fear of having positive test results and being isolated or shunned by the community (Sharma et al., 2020). In Indonesia's early stages of the COVID-19 pandemic, the negative stigma against sufferers was still high. The COVID-19 patients were often stigmatized by their community, and there was a heightened concern that they would be isolated in health facilities.

The respondents without insurance coverage were more than twice as likely to develop CMD. This finding aligns with research showing that stress levels were higher in people with disabilities without insurance than those with insurance (Alang et al., 2014). Another study in Bangladesh showed that NCDs cause significant out-of-pocket expenses for medical care. Consequently, some people might be more likely to borrow or sell personal assets for treatment (Datta et al., 2018). Insurance ownership is associated with greater utilization of health facilities, less out-of-pocket money and loans, and better self-declaration about physical and mental health (Finkelstein et al., 2012). This situation, of course, can positively impact the psychological well-being of patients and their families.

Also, this study found that newly diagnosed patients with NCDs have a higher risk of developing CMD. This finding aligned with research in China, which showed that patients with NCDs such as hypertension, DM, and cardiovascular disease who were newly diagnosed at the early stage (< 1 year) were seen to have more significant psychological problems compared to those who had living with the disease for a long time (above five years) (Liu et al., 2021).

For people with NCDs, regular checkups and taking medication is an effort to stay healthy. This study indicates that people with NCDs who neither had checkups nor regular medication-taking during the COVID-19 pandemic until this survey was conducted had a greater risk of having CMD than those who had checkups and took medication. A study in Nepal showed that hypertensive patients who did not take anti-hypertensive drugs had higher depression scores (Neupane et al., 2015). However, concerning medication and regular checkups, a study in Pakistan showed a contrary result: Anti-hypertensive medication or medication adherence was not significantly related to depression score (Mahmood et al., 2017).

On the other hand, factors associated with CMD in subjects without NCDs were having COVID-19 symptoms in the last six months, being female, and having education below junior high school. The results of this study indicate that people without NCDs with a history of symptomatic COVID-19 were at risk of having CMD. A previous study in Vietnam found COVID-19-like symptoms linked to mental health problems (Nguyen et al., 2020). Female respondents without NCDs were at a higher risk of having CMD, which was consistent with a Brazilian study that indicated a higher risk for women (Giordani et al., 2021; Rakhamanov & Dane, 2020). It has been suggested that the higher incidence of depression among women is due to various factors. These factors include affective factors such as emotional reactions to stimuli, biological factors such as genetics and hormones, cognitive factors such as thinking style, awareness of other people's judgments, and feeling reluctant, as well as socio-cultural factors such as media and gender inequality (Hyde et al., 2008).

Furthermore, education below junior high school also becomes one of the significant associated factors of having CMD in respondents without NCDs. A study showed that a lower educational level was associated with poor mental health during the COVID-19 pandemic (Lei et al., 2020). On the other hand, another study showed that participants with a bachelor's degree had a 0.39-fold higher incidence of depression than those with a master's degree or above (Wang, Di et al., 2021). Education may protect mental health, but higher education can also contribute to psychological problems.

It is important to acknowledge certain limitations in our study. Firstly, our use of cross-sectional data makes it impossible to identify causal relationships. Secondly, the self-report

instrument may introduce bias due to the subjective interpretation of question items compared to face-to-face interviews. Thirdly, as our research was conducted as an online survey, it may not represent the entire population, as only those with internet access could participate. Finally, it is crucial to note that our sample study may not accurately represent the Indonesian population with NCDs.

Despite some limitations, this study has several strengths. First, this study was conducted on people with and without NCDs in community settings, which was rarely done in Indonesia. Second, this study explored the relationship between CMD and NCDs, indicating that each has distinct contributing factors that, if not adequately addressed, can exacerbate overall health outcomes.

Additionally, this study may provide significant public health impacts. This study showed that continuous and integrated healthcare services must be developed between physical and mental health. People were susceptible to mental health problems regardless of whether they had NCDs. Insurance is crucial for individuals with NCDs as they are more vulnerable to death and severe treatment due to COVID-19, which often requires hospitalization and incurs high medical expenses. On the other hand, for those without NCDs, it is vital to have gender-specific interventions, promote health literacy –particularly among less educated populations – and conduct regular health screenings to detect cardiovascular and noncommunicable diseases early.

Conclusion

Based on the recent research, COVID-19 symptoms are the most notable factor in predicting CMD in individuals, regardless of whether or not they have NCDs. Individuals with NCDs who previously had a COVID-19 test, were uninsured, newly diagnosed with NCDs, did not receive regular medical checkups, or not taking the medication regularly were at a higher risk of having CMD. Likewise, for adults without NCDs, the risk of CMD was linked to being female and having a lower level of education. During the COVID-19 pandemic, it is crucial to increase community awareness of the symptoms of the disease and to have health insurance.

Overall, this study provides valuable insights into the complex interplay of CMD risk factors during the COVID-19 pandemic, which is relevant for healthcare providers and policymakers. It is essential to consider various factors associated with the risk of CMD when developing mitigation strategies for this disease. These factors include early detection, management of NCDs, interventions specific to gender, and health literacy initiatives. These measures can help promote cardiovascular health and overall well-being among different populations. Further research is needed to investigate the links between COVID-19 and CMD and to improve targeted interventions for vulnerable groups.

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