



# Mental health problems during the COVID-19 pandemic among residents of Jimma town: a cross-sectional study

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## Abstract

The COVID-19 pandemic presents an unprecedented challenge to community wellbeing and mental health. However, quantifiable information on the extent of mental health problems and associated factors due to the pandemic is still lacking in low-income countries. Thus, this study aimed to investigate the levels of depression, anxiety, and stress and their association with risk and resilience factors among residents of Jimma town in Southwestern Ethiopia. A community-based cross-sectional study was conducted between October 2021 and November 2021. Data were collected from 1196 adult Jimma town residents selected through multi-stage sampling. The following scales were used for the cross-sectional assessment of depression, anxiety and stress and their associations: depression, anxiety, and stress-21(DASS-21), World Health Organization (WHO) wellbeing, University of California, Los Angeles Loneliness Scale (UCLA), Childhood trauma questionnaire, and brief resilience scales. A pre-tested, interviewer-completed questionnaire was used for data collection. Bivariate and multivariate logistic regression analyses were conducted to identify factors associated with depression, anxiety, and stress. Odds ratios consistent with 95% CI were used to report the presence of an association between risk and resilience factors and the outcome variable at a P-value < 0.05. Overall, 963 (80.53%) respondents had divergent DASS-21 score findings. Specifically, 27.68%, 31.52% and 21.32% experienced depression, anxiety, and stress respectively. Higher DASS-21 scores were associated with the presence of one or more COVID-19 risk factors for anyone close to the participants (AOR = 1.53, 95% CI 1.03–2.27), feelings of stress/burden ( $\beta = 1.09$ , 95% CI 1.07–1.12), positive coping ( $\beta = 1.044$ , 95% CI 1.01–1.07), loneliness ( $\beta = 1.063$ , 95% CI 1.04–1.08), and childhood trauma ( $\beta = 1.03$ , 95% CI 1.01–1.04). In contrast, lower DASS-21 scores were associated with beliefs about the necessity of solidarity-based behavior ( $\beta = 0.94$ , 95% CI 0.90–0.98), resilience ( $\beta = 0.92$ , 95% CI 0.87–0.97) and wellbeing ( $\beta = 0.90$ , 95% CI 0.87–0.94). In the course of the COVID-19 pandemic in 2021, symptoms of depression, anxiety, and stress in the study community were prevalent, and associated with numerous risk and resilience factors. Although causality cannot be inferred, these findings underscore the importance of strengthening mental health services and may guide COVID-19 prevention and treatment strategies.

**Keywords** COVID-19 · Depression · Anxiety · Stress · Community · Ethiopia

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## Introduction

The coronavirus disease 2019 (COVID-19) pandemic presents an unprecedented challenge to public health globally. As of December 2022, worldwide over 652 million confirmed cases and 6.65 million deaths were reported [1]. During the same time, in Ethiopia, more than 467 thousand confirmed cases and nearly 7400 deaths were registered [2]. The pandemic has disrupted economic activities and livelihoods all around the world. Despite increasing levels of vaccination, the coronavirus (Severe Acute Respiratory

Syndrome–Coronavirus 2, SARS-CoV-2) continued to spread [3].

COVID-19 not only threatens physical health but has also led to mental health sequelae (i.e., loss of family, job loss, social constraints and uncertainty, and fear about the future) [4–8]. To reduce the spread of SARS-CoV-2 infections, various containment strategies have been used, such as restricting public gatherings, closing entertainment venues, and social distancing. Higher levels of social isolation and difficulties in maintaining traditional social relationships resulting from these countermeasures can expose the community to various mental health problems [9].

The uncertainties and fears associated with the virus outbreak, as well as the economic recession are expected to lead to an increase in mental health problems among the population. The rapidly evolving COVID-19 related adverse conditions have drastically altered people's lives, as well as multiple aspects of the global, public, and private economy [5].

The COVID-19 pandemic has seriously threatened people's physical health and lives. It has also triggered a variety of psychological problems, such as mental distress, anxiety, and depression [10, 11].

Studies conducted in China, Spain, Italy, Iran, USA, Turkey, Nepal, Saudi Arabia, and Denmark revealed relatively high rates of anxiety symptoms (6.33% to 50.9%), depression (14.6% to 48.3%), psychological distress (34.43% to 38%) during the COVID-19 pandemic [5, 12, 13]. Risk factors associated with psychological distress included female sex, younger age group, chronic/psychiatric illnesses, unemployment, student status, and frequent exposure to social media/news about COVID-19 [5].

Public health emergencies resulting from COVID-19 negatively impact population mental health and increase the incidence of psychological crises [14]. Early identification of populations with pandemic-related mental health problems will allow for the efficient implementation of interventional strategies [15]. Some studies conducted in Ethiopia have reported the prevalence of COVID-19 associated with mental health problems [16–18]. The COVID-19 pandemic has triggered mental health problems and there is an urgent need for timely identification and management of the mental health status of society [18–20].

In most low-income countries, there is considerable uncertainty about the course of the COVID-19 disease and its psychological consequences. Due to larger household sizes, crowded living conditions, and inadequate water and sanitation, higher transmissibility is expected, which may affect the application of recommended prevention measures [21]. Ethiopia is particularly vulnerable to the pandemic due to its relatively weak health care system, inadequate infrastructure, population mobility, and susceptibility to social and political unrest [22].

COVID-19 has impacted livelihoods in Ethiopia, with significant implications for poverty increase. In addition to the pandemic, ongoing conflicts in Ethiopia, internal displacements, desert locust outbreaks, and rapid escalation of economic inflation pose particular challenges for health planners trying to contain the spread of the pandemic and design and implement effective COVID-19 mitigation strategies [3].

Research suggests that timely identification and precise classification of mental health problems in society will facilitate the development of evidence-based psychological interventions for individuals affected by the pandemic [23–25]. In addition to psychological support for patients and healthcare workers, considerable attention needs to be paid to the mental health of the general population. There are limited data on the magnitude of mental health problems among the general population during the COVID-19 pandemic in low-income countries such as Ethiopia. Therefore, there is an urgent need to inform governments and public health planners about the actual mental health burden and associated factors in order to develop effective public health strategies and psychological interventions that can protect the mental health of the general public. The aim of this study is to measure the extent and associated factors of depression, anxiety, and psychological distress resulting from the COVID-19 pandemic in Jimma town's population in 2021.

## Methods and materials

### Setting and period

Jimma town is located in Oromia regional state, 352 km southwest of Addis Ababa, the capital of Ethiopia. The town has 17 administrative units (kebeles). The total number of households reported in the town was 32,191. The total population of Jimma town in the 2007 census was reported by the central statistical agency (CSA) as 120,960 of whom 60,824 were male and 60,136 were female with a projection rate of 4.7 [26]. The study was carried out between October 2021 and November 2021. This study was carried out during the late phase of the COVID-19 pandemic in the study setting.

### Design and ethics

A cross-sectional survey was conducted to determine the magnitude and associated factors of mental health problems during COVID-19 among residents of Jimma town, Ethiopia. Ethical approval was obtained from the Institutional Review Board of Jimma University, Institute of Health (IHRPG/483/21). All respondents were informed about study purposes and provided written informed consent.

## Population

Adult residents of Jimma town participated in the study. Participants with severe mental and physical health problems affecting their communication skills were excluded from the study.

## Sampling technique and sample size determination

A multi-stage sampling technique was used to select study participants. The minimum sample size required was estimated using a single population proportion formula with the following assumptions: expected percentage proportion ( $p$ ) of 50% COVID-19 pandemic associated depression, anxiety, and stress level of the respondents, 5% margin of error, confidence interval (%) of 95%. A design effect of 3 was assumed due to multi-stage sampling and an adjustment of 5% for non-response was added to the estimated sample size. Thus, the final calculated sample size was 1200.

## Sampling procedure

Of the 17 kebeles, 5 were selected by a simple random sampling technique according to WHO district health system recommendations [27]. The total sample size was distributed after proportional allocation of the number of people in each kebele. From each selected household, each adult member of the household was included. When a sampled adult member of the household was not present for three consecutive visits, the nearest household was involved. Sampled adults with severe mental illnesses impairing communication were excluded from the study. Data were kept confidential at all stages of data processing. Data collectors and supervisors applied the required SARS-CoV-2 infection prevention and control procedures according to WHO standards [28]. Respondents with mental health problems were referred to the nearest mental health care service centers.

## Study instruments

The questionnaire covered participants' socio-demographic, substance use, COVID-19 related, mental, and physical health characteristics.

The Depression, Anxiety, and Stress Scale—21 items (DASS-21) were used to assess depression, anxiety, and stress symptoms in the community. DASS-21 is based on a three-part model of psychopathology that comprises a general distress construct with different characteristics. The DASS-21-scores were calculated based on a previous study [29]. Questions 3, 5, 10, 13, 16, 17 and 21 formed the depression subscale. The total depression subscale score was divided into normal (0–9), mild depression (10–12), moderate depression (13–20), severe depression (21–27),

and extremely severe depression (28–42). Questions 2, 4, 7, 9, 15, 19, and 20 comprised the anxiety subscale. The total anxiety subscale score was divided into normal (0–6), mild anxiety (7–9), moderate anxiety (10–14), severe anxiety (15–19), and extremely severe anxiety (20–42). Questions 1, 6, 8, 11, 12, 14, and 18 formed the stress subscale. The total stress subscale score was divided into normal (0–10), mild stress (11–18), moderate stress (19–26), severe stress (27–34), and extremely severe stress (35–42). The tool has robust psychometric properties in all studies [30–32].

## COVID-19 pandemic mental health questionnaire (CoPaQ)

We used the COVID-19 Pandemic Mental Health Questionnaire (CoPaQ) to measure COVID-19 pandemic-related mental health variables. The CoPaQ is a validated self-report questionnaire consisting of SARS-CoV-2 infection status, COVID-19 physical health risk factors (self/others), employment status, health insurance status, lifetime mental health diagnosis; contamination anxiety, the necessity of and compliance with countermeasures, mental health symptomatology, positive coping, stressors, interpersonal conflicts, social media usage, political and institutional trust, paranoid ideations, conspiracy beliefs, and social cohesion [33].

## World Health Organization- five well-being index (WHO-5)

Mental well-being: we used the World Health Organization-five well-being index (WHO-5). It is a short self-reported measure of current mental wellbeing. The WHO-5 consists of five statements, which respondents' rate according to the scale below (in relation to the past two weeks). All times = 5, most of the times = 4, more than half of the times = 3, less than half of the times = 2, some of the times = 1, no time = 0. The total raw score, ranging from 0 to 25, is multiplied by 4 to give the final score, with 0 representing the worst imaginable well-being and 100 representing the best imaginable well-being [34].

## The University of California, Los Angeles (UCLA) loneliness scale

Loneliness: we used the UCLA loneliness scale. UCLA is a 20-item scale designed to measure one's subjective feelings of loneliness as well as feelings of social isolation. The scale consists of 10 positively and 10 negatively scored items. The scale has shown consistently high internal consistency, with a coefficient alpha of greater than 0.90. The scoring is based on a four-point scale with higher scores indicating a greater expression of loneliness [35].

## Childhood trauma questionnaire (CTQ)

Childhood trauma history: a childhood trauma questionnaire (CTQ) with a 28-item screening questionnaire was used to quantify self-reported childhood trauma history in the home. The CTQ subscale scores have test–retest reliability coefficients ranging from 0.79 to 0.86, and internal consistency coefficients ranging from 0.66 to 0.92 across initial validation samples [36]. Responses are measured on a 5-point Likert scale (1 = never true, 2 = rarely true, 3 = sometimes true, 4 = often true, 5 = very often true). Each subscale is represented by five questions with a score range from 5 to 25; scores fall into four categories: none to low trauma exposure, low to moderate trauma exposure, moderate to severe trauma exposure, and severe to extreme trauma exposure for each scale [37]. The CTQ high scores indicate more trauma [38].

## Brief resilience scale (BRS)

Resilience: the brief resilience scale (BRS), is a five-item Likert questionnaire that was used to assess the perceived ability to bounce back or recover from stress. The possible score range on the BRS is from 1 (low resilience) to 5 (high resilience) [39, 40]. Higher scores reflect greater resilience [41].

The presence of one or more COVID-19 risk factors was considered to be present if the participants reported one or more of the following factors: age older than 60, cardiovascular disease, diabetes, immunodeficiency, or taking medication that suppresses the immune system (example cortisone), chronic disease of the respiratory system (example asthma, chronic bronchitis), chronic liver disease, chronic kidney disease, acute cancer, cancer during past 5 years, long-standing heavy cigarette consumption (more than 20 cigarettes per day in the last 5–10 years).

Beliefs about the need for solidarity behaviors included donating blood, supporting vulnerable people, such as shopping for them or staying at home to protect people at risk, supporting people who are experiencing existential hardship due to the current situation, offering help to close friends and family members and engaging in neighborhood support.

Positive coping included maintaining a regular daily routine, planning the day as detailed as possible, integrating sports and exercise into daily life, maintaining social contacts (telephone, visits, or video chats), enjoying the time together with close people, focusing on inner strengths, resources, abilities, and talents, and changing attitudes about what is important in life.

## Data collection procedures

The data were collected using a structured and pre-tested questionnaire in the local Afan Oromo and Amharic

languages completed by an interviewer. Data were collected by health professionals holding a BSc degree under supervision by MSc and Ph.D. professionals.

Data collectors and supervisors were trained on the survey tool, data collection techniques, the study objectives, and ethical considerations for two days. A pre-test was conducted in Jimma town on 5% of the total sample. Based on the pretest results necessary modifications to the study instruments were made.

## Statistical analysis

Data were entered into Epi data version 3.1 and analyzed using STATA version 16 statistical analysis software. Descriptive analyses were conducted for sociodemographic characteristics. Hosmer–Lemeshow model fitness test was done before the final model. The model was fit with a *P* value greater than 0.05. Additionally, a multicollinearity diagnostic test was conducted with tolerance and variance inflation factor (VIF); all the variables scored less than 5 VIF and greater than 0.2 tolerance. Hence, there is no multicollinearity. Multivariate logistic regression with enter elimination was used to determine the best joint associated factors of depression, anxiety, and stress scores. All tests of associations were carried out at a level of significance of <0.05 and a 95% confidence interval.

## Results

### Participant characteristics

Of the 1200 persons who were invited, 1196 respondents (females 61.29%, *n* = 733, and males 38.71%, *n* = 463) agreed to participate in the study yielding a response rate of 99.7%. The mean age of the study participants was  $34.77 \pm 11.46$  years. Nearly one-third of the respondents (31.77%, *n* = 380) attended secondary education, and about one quarter (24.11%, *n* = 292) of participants were government employees (See Table 1).

### Health-related characteristics

Nearly one-third (33.44%, *n* = 400) of participants changed their diet after the COVID-19 pandemic, about 50% (49.83%, *n* = 596) used substances once in their lifetime. About 3% (2.93%, *n* = 35) of the participants had a history of mental illnesses. Almost all participants (94.90%, *n* = 1,135; 95.99%, *n* = 1,148; and 99.25%, *n* = 1,187, respectively) were currently asymptomatic, had never tested for COVID-19, and were currently not in quarantine. Only 8.03% (*n* = 96) of the study, respondents lost someone close to them due to COVID-19. Approximately one-third (29.01%, *n* = 347)



**Table 1** Sociodemographic characteristics of respondents from Jimma town, Oromia, Ethiopia, 2021

Variable	Frequency	Percentage
<b>Sex</b>		
Male	463	38.71
Female	733	61.29
Others*	0	0
<b>Age</b>		
Mean ( $\pm$ SD): 34.77 ( $\pm$ 11.46)		
<b>Educational status</b>		
Illiterate	90	7.53
Read and write	47	3.93
Primary education	227	18.98
Secondary education	380	31.77
Diploma	204	17.06
Degree and above	248	20.74
<b>Marital status</b>		
Single	284	23.75
Married	745	62.29
Divorced	77	6.44
Separated	17	1.42
Widowed	64	5.35
Other*	9	0.75
<b>Occupation</b>		
Merchant	188	15.72
Farmer	27	2.26
Housewife	217	18.14
Government employee	292	24.41
Nongovernmental employee	61	5.10
Self-employed	116	9.70
Student	115	9.62
Daily laborer	83	6.94
Unemployed	97	8.11
<b>Family role</b>		
Father	323	27.01
Mother	586	49.00
Son/daughter	206	17.22
Other	81	6.77
<b>Religion</b>		
Muslim	447	37.37
Orthodox	510	42.64
Protestant	227	18.98
Catholic	9	0.75
Other*	3	0.25
<b>First language</b>		
Afaan Oromoo	520	43.48
Amharic	534	44.65
Other*	142	11.87

\*Sex includes non-binary, \*other marital status includes living together but not formally married, \*other religion: Wakefeta. \*Other family role includes uncle, aunt, grandmother, and father. \*Others' first language includes languages spoken in the SNNP region, Tigrigna, Sidamegna

had one or more COVID-19 risk factors for anyone close to them (see Table 2).

## COVID-19 related characteristics

### Depression, anxiety and stress

Overall, 963 (80.53%) of the participants had abnormal DASS-21 scores. Specifically, 27.68% had mild to severe depression ( $n = 331$ ), and 50.16% of these ( $n = 166$ ) had moderate depression. Regarding anxiety, 31.52% ( $n = 377$ ) had mild to severe scores, and 41.65% of those ( $n = 157$ ) had moderate anxiety. The prevalence of stress among the total study respondents was (21.33%,  $n = 255$ ), about 50% of this group (52.95%,  $n = 135$ ) experienced mild stress (See Fig. 1).

### Factors associated with depression, anxiety and stress

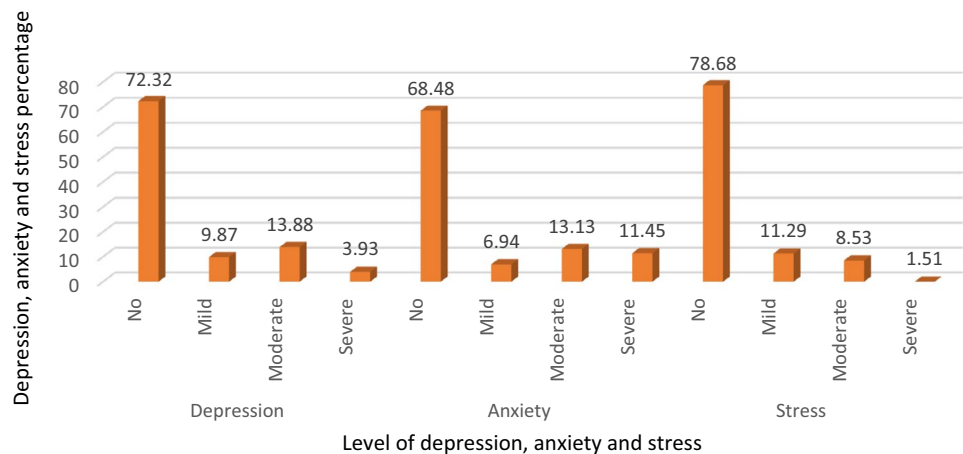
The presence of one or more COVID-19 risk factors for anyone close to the participants is associated with an increased risk of developing depression, anxiety, and stress by one and half times compared to the participants without this risk factor (AOR = 1.539, 95% CI 1.039–2.279). A better belief of the necessity of solidarity-based behavior reduced the likelihood of having depression, anxiety, and stress by 5.7% ( $\beta = 0.943$ , 95% CI 0.905–0.982). Feelings of higher stress/burden slightly is associated with an increased risk of acquiring depression, anxiety, and stress ( $\beta = 1.097$ , 95% CI 1.075–1.120). Likewise, applying positive coping skills is associated with an increased risk of having depression, anxiety and stress a little ( $\beta = 1.044$ , 95% CI 1.016–1.073). Additionally, participants with better well-being have reduced risk of developing depression, anxiety, and stress ( $\beta = 0.908$ , 95% CI 0.873–0.944). Furthermore, the likelihood of acquiring depression, anxiety, and stress was higher among participants who had reported loneliness ( $\beta = 1.063$ , 95% CI 1.041–1.085). Similarly, for participants who had history of childhood trauma it is associated with an increased risk of having depression, anxiety, and stress ( $\beta = 1.031$ , 95% CI 1.013–1.049). Finally, the likelihood of developing depression, anxiety, and stress was reduced among respondents with higher resilience ( $\beta = 0.923$ , 95% CI 0.878–0.970) (See Tables 3 and 4).

## Discussion

This study aimed to assess the prevalence of depression, anxiety, and stress and associated factors among adult Jimma town residents in the late phase of the COVID-19 pandemic. Accordingly, 27.6%, 31.5%, and 21.6% of the participants

**Table 2** Health-related characteristics among an adult community of Jimma town, Oromia, Ethiopia, 2021

Variables		Frequency	Percentage
Wealth status	Low	630	52.72
	Medium	545	45.61
	High	20	1.67
Access to free health services	Yes	90	7.53
Changed diet after the COVID-19 pandemic	Yes	400	33.44
Started exercising after the COVID-19	Yes	351	29.35
Lifetime substance use	Yes	596	49.83
Substance use during the COVID-19 pandemic	Yes	74	6.19
Diagnosed mental illness	Yes	35	2.93
Family history of mental illness	Yes	78	6.52
Welfare benefits	Yes	51	4.26
Psychotherapy	Yes	15	1.25
Currently symptomatic	Yes	61	5.10
Ever tested positive for COVID-19	Yes	48	4.01
Tested antibody positive for COVID-19	Yes	48	4.01
Has anyone close to you been infected with COVID-19?	Yes	144	12.04
Have anyone close to you died of COVID-19?	Yes	96	8.03
Anyone you have contacted has been infected with COVID-19	yes	18	1.51
Presence of one or more COVID-19 risk factors for self	Yes	178	14.88
Presence of one or more COVID-19 risk factors for anyone close to you	Yes	347	29.01
An essential worker during the COVID-19 pandemic	Yes	95	7.94
Currently in quarantine	Yes	9	0.75
Working remotely from home	Yes	14	1.17

**Fig. 1** Depression, anxiety, stress among adult community of Jimma town, Oromia, Ethiopia, 2021

showed elevated scores of depression, anxiety, and stress, respectively.

### Depression, anxiety and stress

In this study, 27.6% of the study respondents had elevated scores for depression. Our finding is lower than that of previously published studies done in Ethiopia 32.1–59.9% [42–45]. This could be because studies were done during the active stage of the pandemic, and lockdown period in

the country. Besides, a quarter of our study population were government employees, thus they were financially protected during the pandemic period compared to others. However, the current study found a depression prevalence higher than that in a comparable study done in Jimma zone residents where depression was measured among 13% of the cohort [46]. This might also be ascribed to the aforementioned study being conducted in the early phase of the pandemic period and in a rural area of the country where little information was available about the pandemic effect.

**Table 3** Factors associated with depression, anxiety, and stress among adult community of Jimma town, Oromia, Ethiopia, 2021

Variable	COR	95% CI COR	AOR	95% CI AOR
<b>Sex</b>				
Male	1		1	
Female	1.31	1.03–1.65	1.25	0.83–1.90
<b>Educational status</b>				
No education	1.43	0.68–2.96	0.50	0.20–1.24
Read and write	1.26	0.75–2.11	0.48	0.16–1.38
Primary education	1.25	0.77–2.04	0.81	0.44–1.50
Secondary education	1.56	0.92–2.63	0.85	0.51–1.43
Diploma	1.82	1.09–3.02	1.03	0.60–1.78
Degree and above	1		1	
<b>Marital status</b>				
Single	1		1	
Married	0.83	0.62–1.09	0.92	0.56–1.52
Divorced	2.68	1.58–4.53	2.19	0.94–5.08
Separated	2.07	0.76–5.59	1.02	0.23–4.37
Widowed	0.93	0.53–1.61	1.53	0.61–3.81
Other*	1.81	0.47–6.88	0.27	0.03–2.02
<b>Occupation</b>				
Merchant	1		1	
Farmer	1.57	0.92–2.68	1.96	0.58–6.66
House wife	3.77	1.55–9.15	1.29	0.68–2.43
Government employee	1.13	0.68–1.96	1.07	0.59–1.95
Nongovernmental employee	2.35	1.42–3.88	0.83	0.34–2.04
Self-employed	1.26	0.63–2.53	1.38	0.71–2.68
Student	3.67	2.06–6.54	1.34	0.62–2.90
Daily laborer	1.61	0.89–2.87	0.66	0.28–1.52
Un-employed	1.12	0.58–2.13	1.12	0.52–2.41
<b>Have health insurance</b>				
Yes	1		1	
No	1.62	1.14–2.30	1.25	0.75–2.07
<b>Lifetime substance use</b>				
Yes	1.33	1.05–1.67	1.14	0.78–1.66
No	1		1	
<b>Ever tested positive for COVID-19</b>				
No	1		1	
Yes	1.99	1.11–3.57	1.28	0.46–3.55
<b>Tested antibody positive for COVID-19</b>				
No	1		1	
Yes	1.83	1.02–3.26	2.06	0.75–5.66
<b>Has anyone close to you been infected with COVID-19</b>				
No	1		1	
Yes	1.70	1.20–2.41	1.05	0.62–1.78
<b>Presence of one or more COVID-19 risk factors for self</b>				
No	1		1	
Yes	1.46	1.06–2.01	1.34	0.79–2.27
<b>Presence of one or more COVID-19 risk factors for anyone close to you</b>				
No	<b>1</b>		<b>1</b>	

**Table 3** (continued)

Variable	COR	95% CI COR	AOR	95% CI AOR
Yes	<b>1.97</b>	<b>1.52–2.53</b>	<b>1.53</b>	<b>1.03–2.27</b>
<b>Essential worker during the COVID-19 pandemic</b>				
No	1		1	
Yes	1.67	1.10–2.55	0.82	0.45–1.50

Bold variables are variables that are associated with the outcome variable at p-value <0.05

Dependent variable: DASS group; 0–normal and 1–not normal

\*Other marital status includes living together but not formally married

1-reference

Our findings fall within the range of depression prevalence reported in international studies presented in a systematic review by Chung-Yi Lin, which showed a wide variance—between 5.9 and 48.3% in China [47], 25% pooled prevalence in systematic review by Juan Bueno-Notivo et al. [48], between 26.1 and 27.1% in Iran and Indonesia [49, 50]. However, another series of studies reports a comparatively higher range of depression prevalence—e.g. 47–52.1% in Iran [51, 52], 64% in New Zealand [53], 42.3% in Malaysia [54], and 58.6% measured in a global population (USA, Europe, Asia, Middle East, and Australia) [55]. The lower prevalence of depression in our study might be due to the study being conducted in Ethiopia during the late phase of the COVID-19 pandemic in 2021. Hence, the community's fear of the infection might have decreased due to the lowering morbidity and mortality rate in the country compared to the beginning of the pandemic [3, 56]. Data showed only 497,312 confirmed coronavirus cases and 7572 deaths were reported in Ethiopia (the total population more than 100 million) since COVID-19 pandemic was reported in the country [56]. Additionally, there was low perceived health threat from COVID-19 [57, 58] in Ethiopia compared to the early period of the pandemic observed in the country, which might have contributed to the lower prevalence of depression compared to other studies.

On the other hand, our study shows higher rates of depression than studies from USA 24% [59], Spain 19% to 22% [60], Ecuador 18% [61], Russia 17% [62], China 17% [63], and Croatia 8% [64]. This might be due to various influential factors, i.e., better psychological and mental health support in these countries compared to Ethiopia, COVID-19 related multidirectional social, and economic effects in developing countries, a relatively smaller sample size of our study compared to the studies from the USA and Spain as well as to the fact that our study only focused on Jimma town, but the compared studies here were conducted nationwide. In our study setting, the unprecedented nature of the COVID-19 outbreak caused various disruptions in economic, social,

**Table 4** Factors associated with depression, anxiety, and stress among adult community of Jimma town, Oromia, Ethiopia, 2021

Variable	$\beta$	95% CI $\beta$	$\beta$	95% CI $\beta$
Age	0.98	0.97–0.99	0.98	0.96–1.00
Family size	0.92	0.86–0.98	0.96	0.87–1.05
Beliefs in the necessity of reduction of social contacts	1.05	1.03–1.07	1.04	1.00–1.09
Beliefs in the necessity of political measures	1.04	1.02–1.06	1.01	0.96–1.05
Beliefs on necessity of solidarity-based behavior	<b>0.90</b>	<b>0.88–0.92</b>	<b>0.94</b>	<b>0.90–0.98</b>
Handling and impact of COVID-19	1.04	1.03–1.05	1.01	0.98–1.03
Feelings of stress/burden	<b>1.15</b>	<b>1.13–1.17</b>	<b>1.09</b>	<b>1.07–1.12</b>
Positive coping	<b>1.05</b>	<b>1.03–1.06</b>	<b>1.04</b>	<b>1.01–1.07</b>
Beliefs in conspiracy thoughts	1.02	0.99–1.04	0.96	0.92–1.00
Social cohesion	1.06	1.02–1.09	1.01	0.95–1.07
WHO well-being index (WHO_5)	<b>0.88</b>	<b>0.857–0.90</b>	<b>0.90</b>	<b>0.87–0.94</b>
UCLA loneliness scale (UCLA)	<b>1.12</b>	<b>1.10–1.13</b>	<b>1.06</b>	<b>1.04–1.08</b>
Childhood trauma questionnaire (CTQ)	<b>1.09</b>	<b>1.07–1.10</b>	<b>1.03</b>	<b>1.01–1.04</b>
Brief resiliences	<b>0.84</b>	<b>0.80–0.86</b>	<b>0.92</b>	<b>0.87–0.97</b>

Bold variables are variables with P values: < 0.05

Dependent variable: DASS group; 0–normal and 1–not normal

1-Reference

and religious participation; additionally, the pandemic has brought many uncertainties to people's lives as well as to their health and safety. The sense of uncertainty can aggravate the individual's fear of COVID-19, causing people unable to think rationally when dealing with COVID-19, and easily inducing depressive symptoms [3, 65]. Furthermore, the finding of the study conducted in the early phase the pandemic in the Jimma community showed 13.1% [46] of the residents had depression.

In this study, 31.5% of the respondents had elevated scores for anxiety which is in line with the studies conducted in Indonesia 31.5% [50], Ecuador 31% [61], USA 32% [59], Iran 33% [49], Russia 30% [62], and China 29% [63]. However, these numbers are lower than in the North Shoa Zone, Ethiopia 68.7% [42], Malaysia 67% [54], New Zealand 53% [53], Bangladesh 47% [52], Iran 42% [51], Tepi town, Ethiopia 39% [43], and in a global population study (USA, Europe, Asia, Middle East, and Australia) 51% [55], as well as those reported by a systematic review, i.e. 38% [45]. However, our study shows higher rates than studies from Spain 22% [66], India 15% [67], and Croatia's 8% [64] as well as those reported by a systematic review done in Spain 20% [60]. This could be ascribed to the long-lasting effect of the pandemic on people's socio-economic status, accessibility, affordability of vaccine and personal protective equipment, the effect of the pandemic on individual mental well-being, and fear of further exacerbation of another wave of the pandemic might associated with an increased risk of having anxiety [3, 65, 68].

Finally, 22% of the study participants reported elevated scores for stress which was comparable to other studies

done in Ethiopia among residents of Addis Ababa, 18% [69], Dessie Town [70], as well as to a nationwide online survey 25.5% [18]. However, our result is lower than that of other studies from Ethiopia e.g. among Tepi town residents 44% [43]. This might be explained by the study period in Tepi town encompassing the period of lockdown, which might have contributed to elevated levels of stress due to the uncertainty of the pandemic outcome, lack of social support, movement and socio-economic impact of lockdown. Similarly, 44.1% of Jimma University hospital visitors [71] had experienced elevated prevalence of stress, which might similarly be ascribed to the study being conducted during a 2 week period following the first COVID-19 cases detected in Ethiopia, subsequently leading to elevated stress levels due to the pandemic related infodemic, knowledge of the mortality rate of the pandemic in other countries. Furthermore, this study was conducted among hospital visitors which might account for an associated with increased risk of stress due to the perceived fear of a COVID-19 diagnosis and possible stigma and discrimination during the early phase of the pandemic [72]. Contrarily, our study reports a higher level of anxiety compared to the findings from Gondar town, Ethiopia 15% [44], which could be due to the lower sample size of 693 included in the Gondar study.

In this study, we have found that depression, anxiety and stress were shown to have an association with numerous risk and resilience factor. In contrast to previous findings regarding risk factors, we did not observe an association of female sex, younger age or psychiatric illness with psychological distress. The missing associations could be due to nearly one fifth of our study participants were housewives,



this may reduce exposure to the infection compared to those who works outside of the house, so does the distress of concurring the infection. Similarly, we didn't found association between young age and distress, this may be explained by the mean age of our study participants were 34. Finally, our study result did not replicate the association between having a diagnosis of mental health and psychological distress, the disparities could be explained by only around 3% of our study samples had mental illness diagnosis.

### Risk factors

In our study, the presence of one or more COVID-19 risk factors for anyone close to the participants is associated with an increased risk of developing depression, anxiety, and stress. Consistent findings were reported from studies done in Russia [62], Israel [73], Iran [51], and China [12]. This could be explained by immunocompromised patients and those with pre-existing chronic diseases tending to be at greater risk of developing serious complications and, subsequently having a higher mortality risk due to a SARS-CoV-2 infection. Therefore, a highly likely fear of morbidity and mortality from the associated SARS-CoV-2 infection might increase the respondent's psychological distress [74, 75].

In this study, feelings of burden/stress is associated with an increased risk of having depression, anxiety, and stress. A study from Canada showed parents faced burdens due to the pandemic's effect on relationships and finance [76]. Similarly, findings from studies in Ireland [77], Bangladesh [78], Iran [51, 79], Mexico [80], and the USA [81] reported the loss of loved ones, perception of family burden as well as secondary adversities due to economic difficulties, unavailability of food, psychosocial effects, disruption of plans, being significantly linked to adverse psychological conditions [78, 81]. Further evidence is available that stressful life events are causal to the onset of depression, anxiety, and stress due to the interplay of biological, psychological and social factors [82].

We found that participants who report higher levels of loneliness had increased risk of depression, anxiety, and stress. In agreement with our findings, studies from Russia [62], North Africa and Middle East [83], New Zealand [53], Israel [73], Hong Kong [84], Norway [85], the Netherlands [86, 87], as well as two systematic reviews by VicHealth [88] and Cacioppo JT et al. [89] report loneliness, social distancing measures and social isolation being associated with higher rates of depression, anxiety, and stress. Loneliness invokes a stronger self-concerned inadaptability to threat response and may lead to more mental diseases through more serious intolerance for uncertainty as well as insomnia [65, 90].

Our study found that having a history of childhood trauma is associated with an increased risk of developing depression, anxiety, and stress. In line with our study findings, studies conducted in Jimma town, Ethiopia [91], South Africa [92], Finland [93], Slovakia [94], Netherland [95], Germany [96, 97], Brazil [98], as well as a systematic review by VicHealth [88], and a guidance document for the promotion of positive mental health and wellbeing [99], report psychological, physical and sexual childhood trauma, being associated with higher levels of depression, anxiety, and stress. This can be explained by psychic trauma abruptly overwhelming the capacity to provide a minimal sense of safety and integrative intactness, resulting in overwhelming anxiety or helplessness, or the threat of it, and producing an enduring change in the psychic organization that might expose individuals to various mental health problems [100]. The relationship between childhood maltreatment and adverse psychosocial outcomes during the pandemic were unclear in previously published data [96], however, our study finding observed a probable association between childhood maltreatment and pandemic related mental health problems such as depression, anxiety, and stress.

### Resilience factors

Our study has found that beliefs in the necessity of solidarity-based behavior are associated with a decreased risk of having depression, anxiety, and stress. In line with our study findings, studies from Mexico [80], Iran [101], China [102–104] and WHO manual of mental health and psychosocial considerations during the COVID-19 outbreak [105] showed that spiritual well-being, support from family, friends and social support were associated with lower odds of depression and anxiety symptoms and distress. Likewise, a study conducted by the Organization for Economic Cooperation and Development (OECD) found that people with less secure employment and lower income are experiencing higher rates of mental distress during the COVID-19 crisis [106]. However, a study from China observes that greater social support from other sources correlates with greater mental health symptoms. Reasons for these varied relationships go to the different roles each support has. According to the weak tie and strong tie theory intimate friends and family members usually are regarded as the strong ties and generally provide practical and emotional support when people get exhausted, whereas other people like colleagues are often considered as weak ties and could provide more information support that would always turn into rumors spreading and negative emotions in pandemic context, which further exacerbates excessive pressure [107–109].

The current study found that increased well-being reduced associated risk of developing depression, anxiety,

and stress. Well-being includes life satisfaction, social support and other resilience factors. Our results are in accordance with previously published data revealing that low sense of well-being, higher levels of negative affect, low positive affect, and low life satisfaction significantly predict associated increased risk of depression [82, 110–112]. On the other hand, studies in Germany [113] and England [114] revealed that strategies such as maintaining a healthy lifestyle and social contacts, fostering self-efficacy seem to protect from mental health problems. Most of the research on the topic reported mental well-being as fundamental to the quality of life and productivity of individuals, families, communities, and nations, enabling people to experience life as meaningful and to be creative and active citizens [99].

Similarly, our study found that participants with higher resilience had low rates of depression, anxiety, and stress. Consistent with our findings, studies from Croatia [64], Jimma town, Ethiopia, [91] Dutch and Belgian samples [115], China [116], and a review done by Raheel Mushtaq et al. [90], revealed that people who score high in resilience and active coping styles had a lower rate of depression, stress, and anxiety during the outbreak of COVID-19.

Finally, our study found that applying positive coping mechanisms does not influence the likelihood of developing depression, anxiety, and stress. Contrary to this, the study findings from New Zealand [53], China [116] Greece [117], Iran [101, 118], USA [119], the Netherlands [87], and Hong Kong [84] reported positive coping mechanisms such as healthy lifestyle, exercise, spiritual well-being, and social support as protective factors against depression, anxiety, and stress. On the other corner, a study done in Spain showed that emotion-focused strategies such as expressing emotions and social support were associated with higher anxious symptomatology [120]. First, this could be due to the cross-sectional design. Next, our findings underscore the importance of furthering our understanding of coping as a way to aid psychological distress during global public health emergencies. Obtaining further knowledge about positive coping strategies and their effectiveness during the pandemic seems to be essential. Moreover, further prospective research using longitudinal methods is necessary to examine potential causal relationships between variables.

## Limitations

Our study provides relevant information on COVID-19 related burden on mental health even at a later stage of the pandemic in an African country where less abundant data

are available compared to North America, Europe and Asia and transculturally confirms risk and resilience profiles. However, this study has also its considerable limitations: first, this study was conducted in a single Ethiopian town, which might impair generalizability, second, the study is entirely cross-sectional which does very much limit causal inferences, and third, depression and anxiety were not diagnosed in terms of their nosology but based on DASS-21 scales that measure the respective symptom clusters. Fourth, most of our study participants were government employer, this might affect our result because they were better educated and financially protected compared to others. Fifth, gender distribution appeared imbalanced in our sample, possibly due to gender response bias and selection bias (more females at home during the time of recruitment); therefore, results might not be fully representative for the community. Further, our data collection method was interview-based. We implemented a rigorous selection process for interviewers and organized a thorough onboarding training followed by a pre-test of the interview tools and their subsequent adaptation. However, a certain level of social desirability bias cannot be excluded [121]. Finally, the finding of this study needs to be interpreted cautiously in different country and setting due to different factors may play a role in the onset of depression, anxiety and stress. Thus, future trials with improved methodology addressing these shortcomings may built on our findings. Finally, yet importantly it is crucial to emphasize that our study was conducted after two years of the COVID-19 pandemic observed in the country, this might influence the prevalence and associated factors compared to the studies conducted during the early and acute phases of the pandemic.

## Conclusion

This study reports comprehensive data on the considerable prevalence of mental health problems among Jimma town residents during a later phase of the COVID-19 pandemic. More importantly, the study emphasizes the importance of risk and resilience factors associated with this mental health burden. Concerted efforts of governmental, non-governmental, and community-based initiatives are needed to mitigate the problem.

**Table 5** Mean duration day and standard deviation scores of COVID-19 related characteristics of the study respondents at Jimma town, Oromia, Ethiopia, 2021

Variable	Mean	Standard deviation (SD)
Days of stay in quarantine (for those currently in quarantine)	8.55	19.90
Days working remotely from home (for those working remotely from home)	116	233.22
Necessity and compliance with COVID-19 countermeasures	77.52	23.73
Beliefs in the necessity of hygiene measures	19.27	5.62
Beliefs in the necessity of reduction of social contacts	12.83	6.25
Beliefs in the necessity of increasing/building up stocks	12.87	5.17
Beliefs in the necessity of political measures	11.89	6.25
Beliefs in the necessity of solidarity-based behavior	14.59	5.32
Risk Perception	6.45	5.22
Mental health symptoms related to COVID-19/handling and impact of COVID-19	6.75	8.46
Feelings of stress/burden	9.75	10.75
Positive coping	13.84	8.13
Political and institutional trust	8.51	4.39
Beliefs in conspiracy thoughts	3.95	4.98
Social cohesion	6.95	3.37
WHO well-being Index (WHO_5)	16.56	5.16
UCLA loneliness scale (UCLA)	46.11	10.98
Childhood trauma questionnaire (CTQ)	59.95	13.54
Brief resilience scale (BRS)	19.69	3.88

## Appendix

See Table 5.

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**Author contributions** AJ, KA, MA coined and designed the idea. MA, YT, MS, SG, BA design and implement the study. AJ, KA, MR, SR, AZ, FP, MA, YT, MS, SG, BA were participated in methodological correction, supporting statistical analysis, interpreting the results, and revising the manuscript. YT write the first draft. All the authors read and approved the manuscript.

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**Data availability** The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

## Declarations

**Conflict of interest** The authors have no relevant financial or non-financial interests to disclose.

**Ethical approval and consent to participate** The study was reviewed and approved by the Institutional Review Board (IRB) of Jimma University institute of health. An official letter of support was written and approved by the Oromia health bureau, Jimma zone health bureau. A subsequent support letter was obtained from the selected kebele health office before the commencement of data collection. Respondents were briefed on the study objectives and were assured of the anonymity of their participation. The study participation was voluntary and written informed consent was obtained from each respondent. Informed consent was taken from a legally authorized representative for individuals who were unable to read and write. The study was conducted under the Helsinki declaration.

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