

# Depression and associated factors in the era of COVID 19 among frontline health care workers in Addis Ababa, Ethiopia: A comparative cross sectional study

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## Abstract

**Background:** The prevalence of COVID-19 has been increasing starting from its first inception on the 31<sup>st</sup> of December, 2019 in Wuhan, China. The pandemic has a multitude of effects of which impaired mental function among health care workers is the commonest one. Despite this fact, studies about the magnitude of depression are limited in Ethiopia. This study, therefore, aimed to determine the magnitude of depression and associated factors among frontline health care workers in Addis Ababa, Ethiopia.

**Methods:** Hospital-based comparative cross-section study was conducted from June 1<sup>st</sup> to 30<sup>th</sup> of 2020. Data were collected from 133 randomly selected frontline health care providers working at gynaecology and obstetrics units, and 266 frontline health care workers in COVID-19 treatment centers. Epi Info<sup>TM</sup>7 software was used for data entry, cleaning and recoding of the data. Analyses were performed by using SPSS version 25 statistical software. The Hospital Anxiety and Depression Scale was used to diagnose depression. The scale has 14 components of which seven are used to measure depression. Both bi-variable and multivariable logistic regression analyses were performed to identify factors associated with depression.

**Result:** In this study, 399 study participants were included. The median age of study participants in gynaecology and obstetrics was 27 years (interquartile range: 25, 29 years), and it was 27 years (interquartile range: 25, 30 years) in COVID-19 centres. The magnitude of depression was 64.7%, and 89.5% among frontline health care providers in obstetrics and gynaecology units, and COVID-19 treatment centers, respectively. Being ever trained about COVID-19 treatment and prevention, having social support and negative emotional response to stress were independently associated with depression among study participants in obstetrics and gynaecology units.

**Conclusion:** Depression among frontline health care workers was found to be considerably higher. Having training about COVID-19, having a negative emotional response, living with family, and a low coping strategy to stress increased the likelihood of depression. However, having social support decreased the likelihood of depression. Post-training evaluation about the level of understanding and acceptance could help to decrease misperceptions towards COVID-19 promptly and manage it accordingly.

**Keywords:** Depression; mental problem; frontline health care workers; Gynaecology workers; COVID-19; Ethiopia

## Introduction

Corona Virus Disease 2019 (COVID-19) has been increasing since its first inception in Wuhan, China in December 2019 (WHO 2020). Globally, as of 19 October 2021, there have been 241,915,631 confirmed cases of COVID-19, including 219,250,578 recovered cases and 4,921,308 deaths, reported to World Health Organization (WHO) (WHO COVID-19 Dashboard 2021). There have been 359,495 COVID-19 cases, of which 329,257 recovered and 6,238 deaths cases in Ethiopia (Worldometer 2021). The virus continued to become a global challenge due to the absence of specific treatments, higher contagious rate, the remarkable case fatality rate among cases in critical condition, and its huge impacts on the mental health of the population (Zhou et al. 2020).

The emergence of the current pandemic elicited a wide range of emotional responses with different degrees of response among individuals (Chiu et al. 2003). The

likelihood of psychological distress and mental health symptoms is relatively high among frontline health workers who are directly involved in the diagnosis, treatment, and care of patients with COVID-19 (Ayanian 2020; Barelo et al. 2020; Greenberg 2020; Lai et al. 2020). Several studies depicted that the prevalence of depression among frontline health workers is considerably higher than the counterpart health care providers working outside COVID-19 centers (Mehdi et al. 2020; Lai et al. 2020; Lin et al. 2020; Şahin et al. 2020; Shaukat et al. 2020; Zhou et al. 2020). In the previous studies, the prevalence of depression ranged from 34.6% (Mehdi et al. 2020) to as high as 77.6% (Şahin et al. 2020). Likewise, a meta-analytic finding revealed that 22.8% of frontline health workers were found to have depression (Pappa et al. 2020).

The rapid increment of confirmed and suspected cases and an overwhelming workload among health care

workers in an environment with limited personal protective equipment contributed to the incidence of depression and other mental health disturbances among frontline health professionals (Hawari et al. 2020; Lai et al. 2020; Pfefferbaum and North 2020). The mental health disturbances are not limited to health professionals, but family members of health professionals working in COVID-19 treatment centers were found to have a substantial level of depression and other impaired mental symptoms (Ying et al. 2020). In addition, the mental health disturbances of frontline health care workers are associated with burnouts, which could lead to termination of their job (Jalili et al. 2020; Joshi and Sharma 2020; Khasne et al. 2020). In general, mental health problems in the era of the COVID-19 pandemic are unavoidable among frontline health care providers (Kang et al. 2020; Park and Park 2020; Kang et al. 2020; Ho-Chee and Ho 2020; Organization 2020). Thus, identification of the magnitude of depression and provision of psychosocial support about the coping strategies may have paramount importance in mitigating the psychological impacts of COVID-19 among health care workers (Huang et al. 2020; Wu and Gold 2020; Shechter et al. 2020). Moreover, special consideration should be given to health care providers giving care to special populations like pregnant and lactating women. This is because the pandemic impacts maternal health services, mainly in the developing world including Ethiopia (Wilson et al. 2021). This is due to the fact that pregnant women usually have depression and a depressed health care provider could further upsurge the magnitude of maternal depression (Thapa et al. 2020).

In Ethiopia, published studies about the magnitude of depression among frontline health professionals are scant. The findings of this study will have a vital implication to take prompt measures and to improve the quality of care in maternal care units and COVID-19 treatment centers of the country. Hence, this study aimed to determine the magnitude of depression and associated factors among front line health care workers in gynaecology and obstetrics (OBS/GYN) and COVID-19 treatment centers of Addis Ababa, Ethiopia.

## Materials and Methods

**Study area and period:** The current study was conducted from June 1<sup>st</sup> to 30<sup>th</sup> of 2020. Data were collected among 133 gynecologic and obstetric care providers, and 266 frontline health care workers in the COVID-19 treatment centers of Yeka Kotebe General Hospital, St. Paul's Hospital Millennium Medical College (SPHMMC), and St. Peter Specialized Hospital, Addis Ababa, Ethiopia. All

hospitals are located in Addis Ababa, the capital city of Ethiopia. St. Paul's Hospital Millennium Medical College is a teaching hospital where clients referred from the four corners of the country get clinical services. Likewise, St. Peter's hospital was established in 1963 G.C as a treatment center for tuberculosis in the nation. Currently, the hospital is giving all medical services including care and treatment for COVID-19 patients. Besides, Yeka Kotebe General Hospital has a five-floor building that provides mental health and general medical services. Currently, the hospital is giving health care services for COVID-19 clients. It is the first coronavirus treatment center in Ethiopia.

**Study design, study population, inclusion and exclusion criteria:** Hospital-based comparative cross-sectional study design was conducted among frontline health care professionals working in Addis Ababa COVID-19 treatment centers and obstetrics and gynaecology units of the three selected hospitals. Randomly selected staff who gave informed consent was included in this study. However, incomplete records were excluded from the final analysis.

**Sample size determination, sampling technique, data collection and analysis:** Sample size was determined using a single population proportion formula. The sample size was calculated with the following assumptions: the proportion of depression among frontline health workers was considered to be 50% (since there is no prior study and with 95% confidence interval and 5% degree of precision). Hence, the calculated sample size was 384. Finally, we added up a 10% non-response rate, giving the final total sample size of 422. Eventually, we allocated the study population into two with a 1:2 ratio among frontline health care providers working in obstetrics and gynaecology units and COVID-19 treatment centers, respectively. A simple random sampling technique was employed to select a representative sample in the respective study areas. A structured self-administered written questionnaire was administered to collect the data on the independent variables and outcome variables. Data were collected for a month. The completeness and consistency of responses were checked manually by investigators. Depression was measured by using 14 items Hospital Anxiety and Depression Scale (HADS) (Pallant and Tennant 2007). The tool has 14 components of which seven measure depression and the other seven measure anxiety. It is a Likert scale, which has four scales (0 to 3): 3=Yes, definitely; 2= Yes, sometimes; 1= No, not much; and 0= No, not at all. The questionnaire was adopted from a prior study (Pallant and Tennant 2007). Frontline health care workers were inquired to fill the tool accordingly. Then, data were imported and cleaned using the Epi Info<sup>TM</sup>7 software. Finally, the final

analyses were done using SPSS (version 25) software. The scores were summed up and those frontline health care workers with a total score of greater than or equal to eight were considered to have depression. The sum of scores ranged from zero to 16. Bi-variable and multivariable logistic regression analyses were performed to identify statistically significant independent variables associated with depression. Variables having a p-value of  $\leq 0.25$  in the bi-variable analysis were fitted in the multivariable logistic regression. This was done to control for possible confounders. The variables were presented using an

odds ratio (OR), with a 95% confidence interval. Variables with a p-value of  $< 0.05$  on multivariable analysis were considered as independent factors associated with depression. Finally, results were presented in texts, tables and figures.

## Results

**Socio-demographic characteristics of study participants:** In this study, a total of 133 and 266 frontline health care workers from obstetrics and gynaecology units and COVID-19 treatment centers, respectively, were included in the final analyses.

**Table 1: Socio-demographic, professional and social support related characteristics of frontline health care workers in Addis Ababa, Ethiopia**

| Variables              |                                                 | OBS/GNY units |         | COVID-19 treatment centers |         |
|------------------------|-------------------------------------------------|---------------|---------|----------------------------|---------|
|                        |                                                 | Frequency     | Percent | Frequency                  | Percent |
| Age                    | 25 years and below                              | 44            | 33.1    | 75                         | 28.2    |
|                        | 26-30 years                                     | 66            | 49.6    | 137                        | 51.5    |
|                        | 31 and above years                              | 23            | 17.3    | 54                         | 20.3    |
| Sex                    | Male                                            | 94            | 70.7    | 155                        | 58.3    |
|                        | Female                                          | 39            | 29.3    | 111                        | 41.7    |
| Marital status         | Married                                         | 38            | 28.6    | 83                         | 31.2    |
|                        | Unmarried                                       | 95            | 71.4    | 183                        | 68.8    |
| Place of work          | Triage                                          | 6             | 4.5     | 8                          | 3.0     |
|                        | Delivery unit                                   | 70            | 52.6    | -                          | -       |
|                        | Abortion clinic                                 | 2             | 1.5     | -                          | -       |
|                        | Obstetrics operation room                       | 5             | 3.8     | -                          | -       |
|                        | Emergency OBS/GNY                               | 50            | 37.6    | -                          | -       |
|                        | Critical Care Unit                              | -             | -       | 143                        | 53.8    |
|                        | Emergency Medicine                              | -             | -       | 75                         | 28.2    |
|                        | Outpatient Family Medicine                      | -             | -       | 35                         | 13.2    |
|                        | Ward                                            | -             | -       | 5                          | 1.9     |
|                        | Nursing                                         | 9             | 6.8     | 3                          | 1.1     |
| Profession             | Midwifery                                       | 42            | 31.6    | -                          | -       |
|                        | Physician (GP)                                  | 6             | 4.5     | 44                         | 16.5    |
|                        | Obstetric Specialist                            | 10            | 7.5     | -                          | -       |
|                        | Gynecology specialist                           | 7             | 5.3     | -                          | -       |
|                        | Resident/Intern                                 | 59            | 44.4    | -                          | -       |
|                        | Emergency medicine and Critical Care Specialist | -             | -       | 219                        | 82.3    |
| Clinical experience    | 2 years and below                               | 80            | 60.2    | 89                         | 33.5    |
|                        | 3-4 year                                        | 25            | 18.8    | 82                         | 30.8    |
|                        | 5 year and above                                | 28            | 21.1    | 95                         | 35.7    |
| Employer institution   | YekaKotebe Hospital                             | -             | -       | 46                         | 17.3    |
|                        | SPHMMC                                          | 133           | 100     | 170                        | 63.9    |
|                        | St. peter Specialized Hospital                  | -             | -       | 46                         | 17.3    |
|                        | Volunteer                                       | -             | -       | 4                          | 1.5     |
| Have a child           | Yes                                             | 21            | 15.8    | 71                         | 26.7    |
|                        | No                                              | 112           | 84.2    | 195                        | 73.3    |
| Living with family     | Yes                                             | 45            | 33.8    | 118                        | 44.4    |
|                        | No                                              | 88            | 66.2    | 148                        | 55.6    |
| Trained about COVID-19 | Yes                                             | 64            | 48.1    | 205                        | 77.1    |
|                        | No                                              | 69            | 51.9    | 61                         | 22.9    |
| Social support         | Poor social support                             | 53            | 39.8    | 155                        | 58.3    |
|                        | Intermediate social support                     | 68            | 51.1    | 111                        | 41.7    |
|                        | Good social support                             | 12            | 9.0     | -                          | -       |

OBS/GYN: obstetrics and gynaecology units

The median age of study participants in the obstetrics and gynaecology units was 27 years (interquartile range [IQR]: 25, 29 years). Likewise, the median age of study participants working in COVID-19 treatment centers was 27 years (IQR: 25, 30). Regarding the age range of respondents, gynaecology and obstetrics units, the majority 66 (49.6%) were in the age range of 26 – 30 years, whereas the majority, 137 (51.5%) of frontline health workers in COVID-19 treatment centers were classified under the age range of 26 – 30 years. The majority of study participants were males in both groups; 94 (70.7%) were male in gynaecology and obstetrics units, and 155 (58.3%) in the COVID-19 treatment centers. Furthermore, 59 (44.4%) study participants were residents/interns in the profession and 70 (52.6%) were working at delivery units. Similarly, 219 (82.3%) were emergency medicine and critical care specialists in the profession, and 143 (53.8 %) were working at clinical care units of coronavirus treatment centers (Table 1).

***Depression among front line health care providers:***

In the current study, 238 (89.5%) frontline health care providers working in the treatment centers of coronavirus were found to have depression. Likewise, the magnitude of depression among front line health care providers working in OBS/GYN units of the selected institutions was 64.7%.

***Factors associated with depression among front line health care workers:***

In the present study, the factors associated with depression among frontline health workers in COVID-19 treatment centers were primarily computed in bi-variable logistic regression. In the bi-variable logistic regression, gender, workplace, clinical experience, living with family, having training about COVID-19, and coping strategies were found to be eligible for multivariable logistic regression analysis. In the multivariable

logistic regression analysis, living with family during the pandemic and coping strategies of stress were independently associated with depression. Frontline health care providers who lived with their families during the coronavirus pandemic were 3.37 (95% CI: 1.19, 9.55) times more likely to have depression as compared to those who live alone. Similarly, the likelihood of depression among frontline health care providers who had a low coping strategy of stress was 3.40 (95% CI: 1.26, 9.16) times that of health care providers who had high coping strategies (Table 2).

Likewise, both bi-variable and multivariable logistic regression analyses were performed to identify factors associated with depression among frontline health workers in OBS/GYN units of study areas. Thus, marital status, profession, workplace, being trained about COVID-19, having social support, and emotional response to stress were eligible for multivariable logistic regression analysis. In multivariable logistic regression analysis, being trained about COVID-19, having social support, and emotional response was significantly associated with depression. The odds of depression among health care workers who are trained about the care and treatment of COVID-19 was higher among the trained ones than those who were not trained (Adjusted odds ratio [AOR] = 2.81, 95% CI: 1.21, 6.57). In the same way, having intermediate and good social support were found to decrease depression by 89% (AOR= 0.11, 95% CI: 0.02, 0.64) and 87% (AOR=0.13, 95% CI: 0.02, 0.70), respectively as compared to those who had poor social support. In addition, having a negative emotional response was found to increase the likelihood of depression (AOR=3.24, 95% CI: 1.10, 9.56) (Table 3).

**Table 2: Bi-variable and multivariable logistic regression analysis models showing the distribution of factors associated with depression among frontline health care providers in COVID-19 treatment centers (N=266).**

| Bi-variable logistic regression analysis |                           |            |    |                      |         |
|------------------------------------------|---------------------------|------------|----|----------------------|---------|
| Variables                                | Categories                | Depression |    | COR (95% CI)         | P-value |
|                                          |                           | Yes        | No |                      |         |
| Age                                      | 25 years and below        | 66         | 9  | 1.71 (0.496, 5.854)  | 0.397   |
|                                          | 26-30 years               | 122        | 15 | 1.54 (0.486, 4.859)  | 0.464   |
|                                          | 31 & above years          | 50         | 4  | 1                    |         |
| Sex                                      | Male                      | 133        | 22 | 2.90 (1.133, 7.398)  | 0.026*  |
|                                          | Female                    | 105        | 6  | 1                    |         |
| Marital status                           | Married                   | 76         | 7  | 0.71 (0.290, 1.744)  | 0.456   |
|                                          | Unmarried                 | 162        | 21 | 1                    |         |
| Profession                               | Emergency & critical care | 196        | 23 | 0.99 (0.354, 2.742)  | 0.978   |
|                                          | GPs and Nurses            | 42         | 5  | 1                    |         |
| Workplace                                | Critical Care Unit        | 132        | 11 | 1.25 (0.334, 4.682)  | 0.741   |
|                                          | Emergency Medicine        | 61         | 14 | 3.44 (0.933, 12.696) | 0.063*  |
|                                          | Outpatient/Triage/Ward    | 45         | 3  | 1                    |         |
| Clinical experience                      | <= 2 years                | 76         | 13 | 2.11 (0.762, 5.844)  | 0.151*  |
|                                          | 3 - 5 years               | 88         | 9  | 1.26 (0.429, 3.708)  | 0.673   |
|                                          | 6+ and above              | 74         | 6  | 1                    |         |
| Have children                            | Yes                       | 65         | 6  | 0.73 (0.282, 1.871)  | 0.507   |
|                                          | No                        | 173        | 22 | 1                    |         |
| Living with family                       | Yes                       | 113        | 5  | 4.16 (1.530, 11.304) | 0.005*  |
|                                          | No                        | 125        | 23 | 1                    |         |
| Trained <sup>a</sup>                     | Yes                       | 180        | 25 | 2.69 (0.782, 9.220)  | 0.117*  |
|                                          | No                        | 58         | 3  | 1                    |         |
| Place of employment                      | Yekakotebe Hospital       | 41         | 5  | 1.91 (0.430, 8.489)  | 0.395   |
|                                          | SPHMMC                    | 150        | 20 | 2.09 (0.594, 7.342)  | 0.251   |
|                                          | St. Peter Hospital        | 47         | 3  | 1                    |         |
| Social support                           | Poor                      | 141        | 14 | 1.45 (0.663, 3.186)  | 0.350   |
|                                          | Intermediate              | 97         | 14 | 1                    |         |
| Motivation                               | Low level of motivation   | 120        | 13 | 0.85 (0.389, 1.868)  | 0.690   |
|                                          | High level of motivation  | 118        | 15 | 1                    |         |
| Coping strategies                        | Low                       | 112        | 22 | 4.13 (1.615, 10.538) | 0.003*  |
|                                          | High                      | 126        | 6  | 1                    |         |

  

| Multivariable logistic regression analysis |                        |            |    |                      |                       |
|--------------------------------------------|------------------------|------------|----|----------------------|-----------------------|
| Variables                                  | Categories             | Depression |    | COR (95% CI)         | AOR (95% CI)          |
|                                            |                        | Yes        | No |                      |                       |
| Sex                                        | Male                   | 133        | 22 | 2.90 (1.133, 7.398)  | 2.15 (0.792, 5.823)   |
|                                            | Female                 | 105        | 6  | 1                    | 1                     |
| Workplace                                  | Critical Care Unit     | 132        | 11 | 1.25 (0.334, 4.682)  | 1.09 (0.273, 4.376)   |
|                                            | Emergency Medicine     | 61         | 14 | 3.44 (0.933, 12.696) | 2.80 (0.705, 11.155)  |
|                                            | Outpatient/Triage/Ward | 45         | 3  | 1                    | 1                     |
| Clinical experience                        | <= 2 years             | 76         | 13 | 2.11 (0.762, 5.844)  | 1.36 (0.447, 4.149)   |
|                                            | 3 - 5 years            | 88         | 9  | 1.26 (0.429, 3.708)  | 0.88 (0.277, 2.767)   |
|                                            | 6+ and above           | 74         | 6  | 1                    | 1                     |
| Living with family                         | Yes                    | 113        | 5  | 4.16 (1.530, 11.304) | 3.37 (1.189, 9.549)** |
|                                            | No                     | 125        | 23 | 1                    | 1                     |
| Trained <sup>a</sup>                       | Yes                    | 180        | 25 | 2.69 (0.782, 9.220)  | 2.90 (0.761, 11.011)  |
|                                            | No                     | 58         | 3  | 1                    | 1                     |
| Coping strategies                          | Low                    | 112        | 22 | 4.13 (1.615, 10.538) | 3.40 (1.260, 9.163)** |
|                                            | High                   | 126        | 6  | 1                    | 1                     |

a: Ever trained in emergency obstetric/ abortion care treatment and prevention; \*: factors eligible for multi-variable logistic regression ; \*\*: significant factors

**Table 3: Bi-variable and multivariable logistic regression analysis models showing the distribution of factors associated with depression among obstetrics/gynaecology health care providers (N=133)**

| Variables            | Categories                                | Bi-variable logistic regression analysis |    | COR (95% CI)        | P-value |
|----------------------|-------------------------------------------|------------------------------------------|----|---------------------|---------|
|                      |                                           | Depression<br>Yes                        | No |                     |         |
| Age                  | 25 years and below                        | 25                                       | 19 | 0.58 (0.197, 1.678) | 0.312   |
|                      | 26-30 years                               | 45                                       | 21 | 0.61 (0.30, 1.35)   | 0.226   |
|                      | 31 & above years                          | 16                                       | 7  | 1                   |         |
| Sex                  | Male                                      | 63                                       | 31 | 1.41 (0.66, 3.05)   | 0.378   |
|                      | Female                                    | 23                                       | 16 | 1                   |         |
| Marital status       | Married                                   | 29                                       | 9  | 1                   |         |
|                      | Unmarried                                 | 57                                       | 38 | 0.47 (0.20, 1.09)   | 0.079*  |
| Profession           | Nurses & Midwives                         | 38                                       | 13 | 1                   |         |
|                      | Physicians                                | 48                                       | 34 | 0.48 (0.22, 1.04)   | 0.063*  |
| Workplace            | Delivery                                  | 41                                       | 29 | 1                   |         |
|                      | Emergency Gyne/Obs                        | 38                                       | 12 | 0.37 (0.10, 1.31)   | 0.123*  |
|                      | Others                                    | 7                                        | 6  | 0.83 (0.25, 2.71)   | 0.752   |
| Clinical experience  | < 2 years                                 | 22                                       | 10 | 1                   |         |
|                      | 2 to 4 years                              | 26                                       | 22 | 2.14 (0.94, 4.89)   | 0.070*  |
|                      | 5+ and above                              | 38                                       | 15 | 1.15 (0.44, 2.99)   | 0.773   |
| Have children        | Yes                                       | 15                                       | 6  | 1                   |         |
|                      | No                                        | 71                                       | 41 | 0.69 (0.25, 1.92)   | 0.481   |
| Living with family   | Yes                                       | 26                                       | 19 | 1                   |         |
|                      | No                                        | 60                                       | 28 | 1.57 (0.75, 3.29)   | 0.236   |
| Trained <sup>a</sup> | Yes                                       | 54                                       | 32 | 3.60 (1.70, 7.65)   | 0.001*  |
|                      | No                                        | 15                                       | 32 | 1                   |         |
| Place of employment  | SPHMMC                                    | 84                                       | 45 | 1                   |         |
|                      | St.Peter Hospital and Yekakotebe Hospital | 2                                        | 2  | 0.54 (0.07, 3.93)   | 0.539   |
| Social support       | Poor                                      | 38                                       | 15 | 1                   |         |
|                      | Intermediate                              | 45                                       | 23 | 0.17 (0.04, 0.69)   | 0.013*  |
|                      | Good                                      | 3                                        | 9  | 0.13 (0.03, 0.55)   | 0.006*  |
| Perceived stressor   | Yes                                       | 72                                       | 40 | 1                   |         |
|                      | No                                        | 14                                       | 7  | 1.11 (0.41, 2.98)   | 0.83    |
| Emotional response   | Positive                                  | 56                                       | 41 | 1                   |         |
|                      | Negative                                  | 30                                       | 6  | 3.66 (1.40, 9.61)   | 0.008** |
| Coping strategies    | Low                                       | 44                                       | 22 | 1.19 (0.58, 2.43)   | 0.63    |
|                      | High                                      | 42                                       | 25 | 1                   |         |

  

| Variables            | Categories         | Multivariable logistic regression analysis |    | COR (95% CI)      | AOR (95% CI)        |
|----------------------|--------------------|--------------------------------------------|----|-------------------|---------------------|
|                      |                    | Depression<br>Yes                          | No |                   |                     |
| Marital status       | Married            | 29                                         | 9  | 1                 | 1                   |
|                      | Unmarried          | 57                                         | 38 | 0.47 (0.20, 1.09) | 0.35 (0.11, 1.15)   |
| Profession           | Nurses & Midwives  | 38                                         | 13 | 1                 | 1                   |
|                      | Physicians         | 48                                         | 34 | 0.48 (0.22, 1.04) | 0.55 (0.20, 1.53)   |
| Workplace            | Delivery           | 41                                         | 29 | 1                 | 1                   |
|                      | Emergency Gyne/Obs | 38                                         | 12 | 0.37 (0.10, 1.31) | 0.75 (0.19, 2.91)   |
|                      | Others             | 7                                          | 6  | 0.83 (0.25, 2.71) | 0.33 (0.07, 1.57)   |
| Clinical experience  | < 2 years          | 22                                         | 10 | 1                 | 1                   |
|                      | 2 to 4 years       | 26                                         | 22 | 2.14 (0.94, 4.89) | 0.87 (0.25, 3.03)   |
|                      | 5+ and above       | 38                                         | 15 | 1.15 (0.44, 2.99) | 1.67 (0.60, 4.66)   |
| Trained <sup>a</sup> | Yes                | 54                                         | 32 | 3.60 (1.70, 7.65) | 2.81 (1.21, 6.57)** |
|                      | No                 | 15                                         | 32 | 1                 | 1                   |
| Social support       | Poor               | 38                                         | 15 | 1                 |                     |
|                      | Intermediate       | 45                                         | 23 | 0.17 (0.04, 0.69) | 0.11 (0.02, 0.64)** |
|                      | Good               | 3                                          | 9  | 0.13 (0.03, 0.55) | 0.13 (0.02, 0.70)** |
| Emotional response   | Positive           | 56                                         | 41 | 1                 | 1                   |
|                      | Negative           | 30                                         | 6  | 3.66 (1.40, 9.61) | 3.24 (1.10, 9.56)** |

a: Ever trained about COVID-19 treatment and prevention; \*: factors eligible for multivariable logistic regression analysis; \*\*: Statistically significant variables at  $P < 0.05$

## Discussion

The current study determined depression and associated factors among frontline health care providers working in the gynecology and obstetrics units and COVID-19 care and treatment centers of Addis Ababa, Ethiopia. In this study, a total of 399 study participants were involved, of which 133 were from gynecology and obstetrics units, and 266 were from COVID-19 care and treatment centers were included in the final analysis.

Regarding depression, the proportion (89.5%) of depression among frontline health care workers in the COVID-19 care and treatment centers was considerably higher than the prevalence (64.7%) among health care providers working in gynecology and obstetrics departments. The possible elucidation for this discrepancy might be due to the fact that health care workers in the COVID-19 treatment centers have direct exposure to coronavirus, which could increase the liability of depression as compared to those working in the gynecology and obstetrics units (Zerbini et al. 2020). The findings of this study are higher as compared to the previous findings in Chinese frontline health workers in which 57.6% (Zhou et al. 2020), 50.4% (Lai et al. 2020), 43.61% (An et al. 2020), 44.37% (Que et al. 2020), and 46.9% (Lin et al. 2020) were diagnosed to have depression. On the contrary, the proportions of depression in the current study were higher than the findings of the previous studies conducted among health care providers in Pakistan (34.6%) (Mehdi et al. 2020), New York (48%) (Shechter et al. 2020), Turkey (31.8%) (Yörük and Güler 2021), Bangladeshi (38.4%) (Barua et al. 2020), and Italy (26.8%) (Giusti et al. 2020). Besides, in the present study, the proportion of depression among frontline health workers in coronavirus treatment centers is higher than a study finding in Turkey (Şahin et al. 2020), where 77.6% of health workers were found to have depression. However, depression among health care providers in gynecology and obstetrics units of the current study is considerably lower than a study finding in Turkey (Şahin et al. 2020) and it was comparable with another study finding in Turkey (64.7%) (Elbay et al. 2020). The variations in the prevalence of depression from the other findings could be attributed to differences in the measurement scale of depression, given that most of the other studies used Patient Health Questionnaire-9 (Löwe et al. 2004), but HADS was used in the current study. Differences in resources, sample size, study population as well as study settings might be the sources of dissimilarity in the prevalence of depression. The previous findings, including the current one, substantiated the inevitability of depression among health care workers during the era

of the COVID-19 pandemic (Hawari et al. 2020). It is also supported by the previous review findings (Spoorthy et al. 2020; Shaukat et al. 2020; Pappa et al. 2020; Htay et al. 2020).

Regarding the factors, living with family during the pandemic and having a low coping strategy for stress are factors independently associated with depression among frontline health care providers in the COVID-19 care and treatment centers of Addis Ababa. The likelihood of depression among health care workers living with their families is significantly higher than those living alone during the pandemic. This could be due to fear of transmission of the virus to the family members and family members could also develop depression due to fear of acquiring the virus (Ying et al. 2020). Similarly, frontline health care workers having a low coping strategy of stress are found to be at greater risk of developing depression than the counterpart professionals with a high coping strategy of stress. This finding is supported by previous study findings where the odds of depression was higher among those with a negative coping strategy of stress (Shechter et al. 2020; Huang and Rong Liu 2020; Chen, Liu, et al. 2020).

Besides, the independent factors associated with depression among frontline health workers in gynecology and obstetrics units include: being trained about COVID-19, having social support, and having a negative emotional response to stress. Thus, training about COVID-19 care and treatment and having a negative emotional response to stress increased the likelihood of depression. The odds of depression among the trained professionals are increased threefold as compared to untrained professionals. This could be associated with the quality of the training, the short duration of the training leading to a poor understanding of coronavirus by professionals, and scarcity of training about psychosocial support. Likewise, frontline health workers with negative emotional responses are found to be at a greater risk of depression than those with a positive emotional response. Professionals having negative emotional response are at greater risk of poor coping strategies of mental problems, which may lead to burnout and termination of their jobs (Khasne et al. 2020; Joshi and Sharma 2020; Jalili et al. 2021; Hu et al. 2020; Deying et al. 2020). Correspondingly, having intermediate and good social support decreased the risk of depression among frontline healthcare providers. This is because social support is important to decrease stress and it avoids loneliness due to isolation and social distancing (Heath et al. 2020). In addition, social support also plays a key role in improving the well-being and quality of clinicians who are isolated due to the

pandemic (Saltzman et al. 2020; Vafaei et al. 2020; Uzun et al. 2020).

Moreover, the increased prevalence of depression among professionals working in gynecology and obstetrics units could further compromise the quality of sexual and reproductive health services, which were public health emergencies during the pandemic (Tang et al. 2020). Hence, special care and support strategies need to be designed to alleviate the complications of pregnancy-related to the COVID-19 itself and substandard care given by clinicians due to depression as well as fear of the pandemic (Rasmussen et al. 2020; Liu et al. 2020). In general, a well-organized system that allows pregnant women to access maternal health care with minimum exposure risk is expected to during pandemics (Chen et al. 2020).

The findings of the current study may serve as a benchmark to conduct large scale studies in the country. The findings can be vital to improving the quality of health care services through early verification and management of depressive symptoms among frontline health workers. Despite the strengths, the current study has the following limitation. First, the data were collected by self-administered questionnaire and there could be social desirability bias. Besides, the small sample size could compromise the generalizability of the study findings.

## Conclusion

The study revealed that proportion of depression was remarkably higher among frontline healthcare providers. Living with family during the pandemic, having low coping strategy, being trained about COVID-19 care and treatment, and having a negative emotional response to stress increased the likelihood of depression among frontline healthcare providers. Conversely, social support was found to decrease depression among frontline healthcare workers. Thus, training on psychosocial support needs to be designed to decrease the magnitude of depression. The training focused on altruism with special emphasis on the value of working during the pandemics can mitigate depression in these susceptible populations.

## Ethics approval and informed consent

Ethical approval and clearance were obtained from the SPHMMC ethical review board and the supportive letter was written to Yeka General Hospital, SPHMMC, and St. Peter Hospital. In addition, verbal consent of the respondents was obtained after giving information and thoroughly explaining the aim of the study to each respondent. The verbal consent was approved by the ethical review board prior to the actual data collection period. The participants were told that participation is voluntary, could withdraw

any time or refuse to answer any question if they want to. The tool was self-administrated to maintain privacy. Information was kept anonymous and confidentiality was kept.

## Availability of data and material

All data are included within the manuscript.

## Acknowledgments

The authors are grateful for frontline health care providers at the selected health institutions.

## Competing of interests

The authors report no actual or potential conflicts of interest.

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