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Prevalence and correlates of depression during the COVID-19 pandemic and the major role of stigmatization in low- and middle-income countries: A multinational cross-sectional study

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ABSTRACT

Objectives: Currently, there is little data on the mental health consequences of the COVID-19 pandemic in low- and middle-income countries (LMICs). This study aims to examine the pooled and separate prevalence and determinants of depression during the pandemic in samples from four LMICs.

Methods: Participants (N= 1267, 40.9% women) were recruited from the Democratic Republic of the Congo (DRC), Haiti, Rwanda, and Togo. They completed an online cross-sectional survey on sociodemographics, exposure and stigmatization related to COVID-19, the Hopkins Symptom Checklist depression subscale, and the Connor-Davidson Resilience Scale-2.

Results: The pooled prevalence for depression symptoms was 24.3% (95% CI: 22.08-26.79%), with significant differences across countries. Younger age, gender (women), and high levels of exposure and stigmatization related to COVID-19, and resilience were associated with depression in the pooled data. There were significant variations at the country level. Stigmatization (but not exposure to COVID-19 and resilience) was a strong predictor among the four countries.

Conclusions: The prevalence of depression symptoms in the LMICs are similar to those reported in China and in most high-income countries during the pandemic. The findings emphasize the need for implementing non-fear-based education programs during epidemics to reduce stigmatization.

1. Introduction

The current Coronavirus Disease 2019 (COVID-19) pandemic has caused significant human damage, including more than 1.5 millions deaths among 66.5 million confirmed cases worldwide as of December

6, 2020 (John Hopkins University, 2020). In addition to concerns, anxiety, and distress provoked by the spread of COVID-19, the pandemic has had major negative impacts on people's lives (Bonaccorsi et al., 2020; Cénat, 2020a; Di Nicola et al., 2020; Helliwell et al., 2020; Holmes et al., 2020). In fact, measures taken to curb the spread of the

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virus (confinement of populations, closure of schools, universities and non-essential activities, physical and social distancing) have had major psychological, social, and economic impacts (Cénat et al., 2020a; Iacobucci, 2020). Studies conducted in China and in high-income countries (HIC) revealed an exacerbation of mental health problems during the pandemic among affected populations (Cénat et al., 2021a; Fitzpatrick et al., 2020; Lai et al., 2020; Lei et al., 2020; Mazza et al., 2020; Pappa et al., 2020). Studies have shown that COVID-19 is associated with a higher prevalence of anxiety, psychological distress, insomnia, post-traumatic stress disorder, and depression (Cénat et al., 2021a; Lai et al., 2020; Liu et al., 2020; Pappa et al., 2020). The fear of being infected or of having a loved one become infected, social isolation due to physical and social distancing, exacerbation of violence within families, multiple job losses, and financial problems caused by the pandemic are among the potential risk factors for depression and other mental health problems observed in affected populations (Cénat et al., 2021a; Kokou-Kpolou et al., 2020a; Mazza et al., 2020). Studies have also shown that people with low socioeconomic status are at even greater risk of contracting COVID-19, and related complications such as death, but also mental health problems (Iacobucci, 2020; Raifman and Raifman, 2020; Yancy, 2020).

While the COVID-19 pandemic has revealed the vulnerability of healthcare systems and facilities in HIC (Chopra et al., 2020; Emanuel et al., 2020), people in low- and middle-income countries (LMICs) are also concerned about the known fragility of their healthcare systems (Cénat, 2020b; Gilbert et al., 2020). In addition, situations of precariousness and poverty have made it impossible to confine populations and to respect physical distancing measures and other restrictive measures (Cénat, 2020b; Gilbert et al., 2020). Lack of education and the fear of being infected has contributed to stigmatization related to COVID-19 (Bruns et al., 2020; Roberto et al., 2020). In another context, studies conducted on the Ebola Virus Disease (EVD) have revealed strong associations between experiences of stigmatization and mental health problems (Cénat et al., 2020d, 2020b). While this pandemic has fostered stigmatization, it is important to study its association with mental health problems in LMICs in order to develop mental health programs that respond to the real needs of communities. On the other hand, resilience has often been observed as one of the protective factors associated with depression (Cénat et al., 2015; Kokou-Kpolou et al., 2020b; Kukihara et al., 2014). Studies that have explored the association between resilience and mental health problems during the COVID-19 pandemic have particularly shown its protective role in the development of depressive symptoms (Barzilay et al., 2020; Zhang et al., 2020; Luceño-Moreno et al., 2020; Ran et al., 2020). However, few studies have evaluated resilience in LMICs. During this pandemic it is particularly important to evaluate the association between resilience and mental health problems, as it may play a role in the development of prevention and intervention programs among infected populations (Cénat et al., 2020b; Mymin Kahn et al., 2016; United Nations Children's Fund, 2016).

1.1. The current study

The purpose of this study is to analyse the prevalence and the risk and protective factors associated with depressive symptoms during the COVID-19 pandemic in four low-income countries: Rwanda (5,174 confirmed cases and 35 deaths), Haiti (9,100 confirmed cases and 232 deaths), Democratic Republic of the Congo (DRC, 11,450 confirmed cases and 315 deaths), and Togo (2,406 confirmed cases and 57 deaths). Specifically, this study aims to: 1) examine the combined and separate prevalence of depression during the pandemic in relation to socio-demographic characteristics (gender, age, and relationship status); 2) analyse the level of exposure to COVID-19 and stigmatization related to COVID-19 as risk factors associated with depression; 3) investigate resilience as a protective factor associated with depression.

2. Method

2.1. Participants and procedures

We recruited 1 267 participants (40.8 % women) to complete an online survey on COVID-19, from March to May 2020. Participants were from four LMICs: RDC (626; 43.4% women), Haiti (225; 42.0% women), Rwanda (174; 40.5% women), and Togo (242; 33.2% women). Participants mean age was of 32 (SD = 10.1). Participants were recruited through the social networks Facebook, Twitter, WhatsApp, and via telephone, where they received information on the study and a recruitment script. Participants had the option of completing the questionnaire in French, Creole, English, or Kinyarwanda. Participants signed an informed electronic consent form or provided oral consent by phone. The study was reviewed by the University of Ottawa Research Ethics Board and the Institut National de Recherche Biomédical of the Democratic Republic of the Congo.

2.2. Measures

We used self-reported measures to assess sociodemographic characteristics of the sample, level of exposure to COVID-19, stigmatization related to the COVID-19, resilience, and depression.

2.2.1. Sociodemographics

Information about gender, age, marital status, living country, etc. were provided by participants.

2.2.2. Exposure to COVID-19

The Exposure to COVID-19 scale was inspired by the Exposure to Infectious Disease Questionnaire (Cénat et al., 2020d). However, the Exposure to COVID-19 scale differed as it was created to be a short form questionnaire. The Exposure to Infectious Disease Questionnaire has been used to examine exposure level to Ebola Virus Disease (e.g., Have you been in a town or village where people have fallen ill with Ebola? Have you been sick with Ebola yourself?). Exposure to COVID-19 was measured with five items on a two-point scale (yes, no). Cronbach's alpha was .68 in our sample.

2.2.3. Stigmatization related to the COVID-19

The Stigmatization Related to the COVID-19 scale was inspired by the Stigmatization Related to Ebola Virus Disease Questionnaire (Cénat et al., 2020d). This scale was adapted to be a short form questionnaire and was developed in our laboratory with a panel of experts according to WHO studies. Cronbach's alpha was .81 in our sample.

2.2.4. Depression

Depressive symptoms were assessed using the depression subscale of the Hopkins Symptom Checklist (HSCL) (Winokur et al., 1984). The HSCL depression subscale is a 15-item scale ranging from 1 to 4 ("Not at all", "A little", "Quite a bit", "Extremely"). It is a widely used questionnaire with strong psychometric properties among different cultures (Lee et al., 2008). An average score of 1.75 indicates a significant level of distress and this was the cutoff point used in our analyses (Winokur et al., 1984). Cronbach's alpha was .91 in our sample.

2.2.5. Resilience

We used a short version of the Connor-Davidson Resilience Scale (CD-RISC) to assess resilience: the CD-RISC2 (Connor and Davidson, 2003; Vaishnavi et al., 2007). This scale includes two items, which are items 1 (Able to adapt to change) and 8 of the original scale (Tend to bounce back after illness or hardship). The CD-RISC2 has shown good internal consistency across different cultures. Cronbach's alpha was .72 in our sample.

2.3. Data analysis

Frequencies of the prevalence of clinical depression were computed across country, gender, age, and marital status along with Chi-Squared tests (95% confidence intervals). We then performed a *t*-test to compare the mean score of exposure level to COVID-19, stigmatization related to COVID-19, and resilience scores among those who are clinically depressed or not. We tested the homogeneity of variances using a Levene test and *t*-test results were reported accordingly.

The risk and protective factors associated with depression were further investigated using multivariate linear regressions on the scores of exposure to COVID-19, stigmatization, and resilience as covariates and while controlling for the sociodemographic characteristics mentioned above.

We assessed normality and heterogeneity by examining the Shapiro test, Skewness and Kurtosis values, and the Levene test. All analyses were performed using the Statistical Package for Social Science (SPSS) – version 26 for Mac.

3. Results

Overall, 24.37% (95% CI: 22.08-26.79%) of participants in the combined sample reported significant depressive symptoms (Table 1). Results showed significant discrepancies in the reported prevalence across the four countries (11.18%, 30.86%, 27.02%, and 20.66%, respectively for Togo, Haiti, RDC, and Rwanda; $\chi^2 = 23.0, p < .0001$). The prevalence of significant symptoms of depression was generally higher among women participants compared to their men counterparts in the pooled data (respectively 29.9% and 20.1%; $\chi^2 = 12.6, p = .002$) and among participants from Haiti (respectively 45.5% and 17.9%; $\chi^2 = 13.9, p = .001$). However, no significant differences were found between male and female participants in DRC, Rwanda, and Togo (respectively, $\chi^2 = 2.37, p = .31$; $\chi^2 = 4.76, p = .09$; $\chi^2 = 3.35, p = .19$). The same pattern was observed when comparing the prevalence of clinical depression within different age groups.

The second part of Table 1 shows the distribution of mean scores of exposure to COVID-19, stigmatization related to COVID-19, and resilience for participants that presented significant symptoms of depression or not (according to the ANOVA). For exposure to COVID-19 and stigmatization related to COVID-19 statistically significant higher mean scores were observed among those with significant symptoms of depression in the pooled data (.9 ± 1.0 VS .6 ± .8, $p < .001$; 4.1 ± 4.2 VS 2.4 ± 3.4, $p < .001$ respectively for exposure to COVID-19 and stigmatization). Similarly, those without clinical depression reported higher resilience scores compared to those with depression (8.5 ± 1.9 VS 7.3 ± 2.1, $p < .001$). When considered individually, a significant difference was found for stigmatization related to COVID-19 and resilience scores; nevertheless, only DRC and Haiti presented significant differences for exposure to COVID-19.

Multivariate linear regression analyses were performed for the pooled sample and for each country to further investigate the relationship between depression and exposure to COVID-19, stigmatization related to Covid-19, and resilience (Table 2). Results for the pooled data showed a significant relationship between both exposure to COVID-19 ($\beta = .09, p < .001$) and stigmatization related to COVID-19 ($\beta = .03, p < .001$). Additionally, resilience was negatively associated with depression ($\beta = -.07, p < .001$). Compared to DRC as the reference country, participants from Haiti were more likely to report higher depression scores ($\beta = 0.18, p < .001$).

When performing national regression models, stigmatization related to COVID-19 was similarly significant for each country ($\beta = .02, p = .002$; $\beta = .07, p < .001$; $\beta = .04, p = .004$; $\beta = .05, p < .001$, respectively for the DRC, Rwanda, Haiti, and Togo). However, exposure to COVID-19 was statistically associated with depression scores only for Haiti ($\beta = .26, p < .001$) and DRC ($\beta = .08, p < .001$). Moreover, resilience was negatively associated with depression in Togo and DRC (respectively $\beta = -.06, p =$

Table 1

Prevalence of depression over gender, age and marital status, and mean (standard deviation) scores of exposure to COVID-19, stigmatization, and resilience over clinical depression.

	Prevalences Pooled %	Countries			
		DRC %	Rwanda %	Haiti %	Togo %
Total	24.37	27.02	20.66	30.86	11.18
Gender					
Men	20.07	24.71	14.29	17.86	9.09
Women	29.93	29.74	23.64	45.45	17.65
Non-binary	26.09	40.00	44.44	41.67	5.00
χ^2	13.32	2.37	4.76	13.90	3.35
<i>p</i>	0.001	0.306	0.093	0.001	0.187
Age					
Less than 24 years	30.48	32.18	28.57	54.17	15.79
25-34 years	26.37	26.84	22.86	33.33	14.29
35 and more	18.50	22.11	15.63	19.44	6.38
χ^2	12.55	4.80	1.60	7.81	2.32
<i>p</i>	0.002	0.091	0.449	0.020	0.314
Marital status					
Single	26.82	27.21	24.39	39.36	14.43
In relationship	21.66	26.72	19.48	21.31	5.63
Other	23.64	27.27	0.00	0.00	50.00
χ^2	3.70	0.019	1.20	8.44	6.27
<i>p</i>	0.157	0.99	0.55	0.015	0.044
Mean (SD)					
Exposure to COVID-19					
Clinical Depression	0.91 (1.04)	0.96 (1.09)	1.16 (1.14)	0.76 (0.92)	0.53 (0.61)
No clinical Depression	0.62 (0.82)	0.65 (0.81)	0.93 (1.00)	0.42 (0.79)	0.46 (0.63)
<i>t</i> -value	-4.69	-3.81	-1.01	-2.28	-0.41
<i>p</i>	<.001	<.001	0.315	0.025	0.682
Stigmatization due to COVID-19					
Clinical Depression	4.14 (4.16)	4.36 (4.20)	3.76 (4.08)	3.72 (4.46)	3.53 (2.93)
No clinical Depression	2.42 (3.43)	3.06 (3.84)	1.42 (2.31)	2.01 (2.92)	1.45 (2.61)
<i>t</i> -value	-6.05	-3.48	-2.76	-2.48	-3.22
<i>p</i>	<.001	<.001	0.01	0.016	0.002
Resilience					
Clinical Depression	7.29 (2.12)	7.13 (2.25)	8.16 (1.68)	8.32 (1.65)	7.00 (2.19)
No clinical Depression	8.50 (1.86)	8.40 (2.03)	8.92 (1.62)	7.50 (1.74)	8.70 (1.51)
<i>t</i> -value	8.27	6.64	2.08	2.86	3.28
<i>p</i>	<.001	<0.001	0.04	0.005	0.004

.003 and $\beta = -.07, p < .001$). For the combined data, 19% of the variance was explained by the model; the R^2 value varied from 17% to 30% for the individual regression models (Table 2).

4. Discussion

This study had three main objectives. The first was to analyse the combined and separate prevalence of depression in Rwanda, Haiti, DRC, and Togo in relation to socio-demographic characteristics. The results first showed that one in five participants presented significant symptoms of depression during the COVID-19 pandemic. The results then revealed that symptoms of depression were more prevalent in Haiti and the DRC compared to Rwanda and Togo. The prevalence of depressive symptoms remains high in all four countries, considering the latest World Health Organization studies in which between 3.8 and 4.3% of populations in these countries presented significant symptoms of depression (World Health Organization, 2017). However, these prevalence rates are comparable to those observed among adults in crisis situations in Haiti, Rwanda, Togo, and the DRC (e.g., an earthquake, an epidemic) (Cénat et al., 2020c; Nakimuli-Mpungu et al., 2012). The results also showed

Table 2
Results of multivariate linear regression analyses predicting depression.

	β	t	p	% 95 CI	
Pooled – F(11, 964) =20.26, p <.0001, R ² = 18.8					
Age	-.004	-2.141	.033	-.008	0
Sex ^a					
Women	.090	2.806	.005	.027	.154
Other	.013	.158	.875	-.147	.172
Marital status					
In relationship	.009	.241	.810	-.066	.084
Other	.010	.126	.900	-.140	.159
Country ^b					
Togo	-.075	-1.578	.115	-.169	-.018
Haiti	.180	3.781	<.001	.086	.273
Rwanda	.030	.582	.561	-.071	.131
Exposition to COVID-19	.091	4.911	<.001	.055	.128
Stigmatization related to Covid-19	.025	5.662	<.001	.016	.033
Resilience	-.068	-8.447	<.001	-.084	-.052
DRC– F(8, 587) =15.07, p <.0001, R ² =17.0					
Age	-.005	-2.377	.018	-.01	-.001
Sex ^a					
Women	.042	1.028	.304	-.038	.123
Other	.072	.293	.77	-.413	.558
Marital status					
In relationship	.074	1.507	.132	-.023	.171
Other	.062	.71	.478	-.109	.232
Exposition to COVID-19	.08	3.571	<.001	.036	.124
Stigmatization related to Covid-19	.016	3.148	.002	.006	.027
Resilience	-.073	-7.624	<.001	-.092	-.054
Rwanda – F(8, 101)=3.85, p=.01, R ² =23.4					
Age	-.01	-1.505	.136	-.022	.003
Sex ^a					
Women	.07	.675	.501	-.136	.276
Other	.055	.214	.831	-.454	.564
Marital status					
In relationship	-.154	-1.227	.223	-.402	.095
Other	-.413	-1.308	.194	-1.039	.213
Exposition to COVID-19	.051	.872	.385	-.064	.165
Stigmatization related to Covid-19	.069	3.937	<.001	.034	.104
Resilience	-.037	-1.074	.286	-.107	.032
Haiti – F(8, 121)=6.45, p<.001, R ² =29.9					
Age	-.006	-.63	.53	-.023	.012
Sex ^a					
Women	-.224	-2.339	.021	-.413	-.034
Other	-.227	-1.329	.186	-.566	.111
Marital status					
In relationship	-.191	-1.818	.072	-.399	.017
Other	-.144	-.542	.589	-.672	.383
Exposition to COVID-19	.259	4.181	<.001	.136	.381
Stigmatization related to Covid-19	.036	2.967	.004	.012	.06
Resilience	-.042	-1.595	.113	-.094	.01
Togo – F(8, 131)=5.52, p<.001, R ² =25.2					
Age	.005	1.037	.302	-.005	.016
Sex ^a					
Women	.154	2.001	.047	.002	.307
Other	.03	.304	.762	-.163	.223
Marital status					
In relationship	-.174	-1.875	.063	-.357	.010
Other	.117	.414	.68	-.442	.676
Exposition to COVID-19	.042	.778	.438	-.064	.148
Stigmatization related to Covid-19	.054	4.268	<.001	.029	.079
Resilience	-.061	-3.052	.003	-.1	-.021

^a Reference to men

^b Reference is DRC

that, except for Haiti, there were no significant gender differences. This observation is becoming more and more consistent in our studies of mental health problems in African countries (Cénat et al., 2020d, 2020b). In Haiti, studies generally indicated gender differences for internalized health problems, as in HICs (Cadichon et al., 2017; Cénat and Derivois, 2014; Derivois et al., 2017). This observation deserves to

be investigated with mixed and longitudinal methods to better analyze gender roles in LMICs and their association with lack of differences between men and women in the prevalence of internalized mental health problems. Similarly, the results showed significant age differences only for Haiti, where more than one in two young adults under the age of 24 and more than one in three participants aged 24 to 34 presented significant depressive symptoms, whereas this prevalence was less than one in four among participants aged 35 and over. These findings reflect the vulnerability of young adults in Haiti, which is an issue that needs to be addressed (Cénat et al., 2018). Studies conducted in the context of the 2010 earthquake in Haiti found similar results (Cadichon et al., 2017; Cénat et al., 2018; Cénat and Derivois, 2015; Derivois et al., 2014). The pandemic may be exacerbating a situation of hopelessness among youth in Haiti, as they have the feeling that their future is bleak in this Caribbean country.

The second objective of this study was to analyze the roles of perceived exposure to COVID-19 and stigmatization related to COVID-19 as risk factors associated with depression during the pandemic. First, the results showed that level of exposure is not always a risk factor and that this differs between countries. In fact, exposure was a risk factor for the DRC and Haiti, but not for Togo and Rwanda. There are fewer cases and deaths in Togo (15) and Rwanda (4); this can create a feeling among local populations that the situation is under control and that there is hope. Regarding stigmatization related to COVID-19, the results of this study revealed that it is a consistent risk factor for predicting symptoms of depression in all four countries. Although we have not identified any studies on the association between COVID-19-related stigmatization and mental health problems in LMICs, various articles published since the beginning of the pandemic have alerted this issue (Jung and Jun, 2020; Zhai and Du, 2020). In addition, we have observed the same pattern for anxiety symptoms (Cénat et al., 2021b). Moreover, studies on Ebola and HIV have extensively documented the role of stigmatization in predicting mental health problems (Cénat et al., 2020d, 2020b; Obilade, 2015).

The third objective of this study was to explore the protective role of resilience in presenting symptoms of depression during the COVID-19 pandemic. The results showed different observations across countries. Indeed, resilience predicted a lower depression score for Togo and DRC, but not for Haiti and Rwanda. Although similar results were found in Haiti in the aftermath of the 2010 earthquake, this is a variable that deserves to be better explored in LMICs. In addition to individual resilience, factors such as social support and community resilience should also be studied to explore protective factors associated with depression from a more collective and community-based perspective.

5. Limitations

Although this study explores an important topic with a multinational sample, it has certain limitations. First, this study used a cross-sectional research design that does not allow for the exploration of causal relationship between the factors studied and depression. Considering the lack of information on the pre-existence of mental disorders among participants, a longitudinal design would help to better determine the association between the COVID-19 and related stigmatization and depression symptoms. Second, this study was conducted using self-reported questionnaires. Third, we had to adopt prevention measures because of the ongoing COVID-19 pandemic by conducting a web-based study. Knowing that this could be a barrier to participation in these LMICs, we also solicited participants by telephone to address this issue. However, it would be useful to have research that could include all segments of the population, especially the most vulnerable who do not have access to the Internet or to telephone services. The sample could also include more adults and elderly participants. Even though the populations of these countries are very young with a low median age, this is a selection bias that future studies should devote more efforts to reducing. Finally, other factors such as employment status, salary,

number of hours worked per week during the pandemic, adherence to social distancing measures and level of education, among others, could also have been explored.

6. Implications for research and practice

Despite these limitations, this study is important for understanding mental health issues during the pandemic in LMICs. It also provides insights for future research and implications for prevention and intervention. First, future research should focus on the observation that there are no gender differences in internalizing disorders in several African countries. What does this tell us about gender roles in Western societies where women are showing significant symptoms of depression and other internalizing disorders? But also, what does this tell us about gender roles in these so-called more traditional communities in which Western societies seek to insert their visions on the role of women? To answer these complex questions, comparative, mixed-methods, and longitudinal studies are needed and should also include Asian countries where some studies have made the same observation during the COVID-19 pandemic (Cao et al., 2020; Chen et al., 2020; Huang and Zhao, 2020). Studies should also look at the differences found between countries on resilience. Specifically, studies should also analyze both social support and community resilience because they often constitute important value in LMICs.

From a prevention and intervention perspective, this study shows the importance of implementing positive, non-fear-based education programs during epidemics to reduce stigmatization. In addition to causing mental health problems, stigmatization can play a determining role in the adoption of preventive measures (Obilade, 2015). Similarly, while intervening among those who present symptoms of depression, mental health professionals should also take an interest in the experiences of stigmatization related to the pandemic. This is a good way to address a consistent predictor of depressive symptoms, but also of other mental health problems in epidemic situations.

7. Conclusions

By examining the prevalence and factors associated with depression in these low-income countries, this study offers a global mental health perspective. Between the Caribbean (Haiti), West Africa (Togo), and Central Africa (Rwanda and DRC), this study showed similarities, but also differences that should be considered in the development of mental health programs in epidemic situations. The high prevalence of depression in these countries during the pandemic shows a pressing need to develop programs and tools that can address mental health in a global view. From this perspective, the *"Psychological intervention guide: Intervening in the context of infectious disease outbreaks"* is an important tool because it is adaptable, integrative, cross-cultural, and offers several possible options for mental health professionals (Cénat et al., 2020e).

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Declaration of Competing Interest

No conflict of interest for any author.

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