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RESEARCH ARTICLE

Psychological Responses to Coronavirus Disease 2019 amongst Healthcare Workers in South Africa during the Pandemic

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Abstract:

Background:

It is important to understand HCWs' (healthcare workers) psychological responses to the Coronavirus disease 2019 (COVID-19) pandemic as they are exposed to the virus on a daily basis. This study helps identify some of the challenges they face.

Aim:

The overall aim of the study was to investigate psychological responses to COVID-19, including vaccinations and stressors, amongst healthcare HCWs in South Africa during the pandemic.

Setting:

HCWs who worked in private and state hospitals and private practice in Tshwane, South Africa.

Methods:

A quantitative approach using a cross-sectional survey design was used. Several standardised and validated questionnaires were used in the survey including the Coronavirus-19 Fear Scale, the COVID-19-related stigma scale and the COVID-19 stress scale. A purposive sample (N=103) was analysed using descriptive statistics and chi-square.

Results:

There were 103 completed questionnaires. Many (76% and 54%) either knew someone close who contracted COVID or died from COVID-19, respectively. Most (58%) were in favour of being vaccinated. A significant proportion (42%; $p = 0.009$) of the HCWs felt uncomfortable when thinking about COVID. Physical reactions such as sweating, or a pounding heart were reported by 17% of the HCWs. A majority of the HCWs disagreed with any form of stigmatization of COVID-19. Most of the HCWs expressed a need for mental health support during the COVID-19 pandemic. About three-quarters of the respondents expressed a need to talk to someone about their worries about COVID-19.

Conclusion:

Most of the respondents either knew someone who either contracted COVID-19 or died because of it. Many experienced anxiety symptoms when thinking about COVID-19. Many HCWs reported anxiety and stress symptoms such as insomnia, palpitations, sweating and difficulty concentrating. An overwhelming majority of the HCWs stated that people should not be discriminated against or stigmatized in any way because of COVID-19. The majority of the HCWs expressed a need for psychological support during the COVID-19 pandemic. About 20% of the HCWs were against being vaccinated. This is worrisome as they are at high risk. The HCWs clearly expressed a need for more attention and support towards their mental health during the COVID-19 pandemic.

Keywords: Psychological responses, COVID-19 pandemic, Mental health, Healthcare workers, Virus, Anxiety symptoms.

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1. INTRODUCTION

Since the start of the COVID-19 pandemic, mental health globally has worsened, both for those with existing disorders

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[1] and those who have not previously been diagnosed with a psychiatric disorder. Globally, public health officials have expressed concern that fear, related to the pandemic and the COVID-19 vaccines, could make this challenging situation worse [2]. Psychological illnesses associated with social isolation, anxiety, and fear, are on the rise amongst all age

groups [3], which is detrimental to individuals' overall health and well-being [2]. This is underpinned by Gan *et al.* [4] who report that exposure to the pandemic and associated stressors have resulted in increasing mental illnesses related to social isolation, such as depression and anxiety [5]. This has been found in all population groups globally and puts vulnerable populations at a high risk of suicidality [6 - 8]. Healthcare workers are one of these populations because, as a group, they have ongoing exposure to COVID-19 and all its variants [9]. However, there is a dearth of research on HCW's responses to the COVID-19 pandemic.

De Kock *et al.* [10] report that amongst HCWs female nurses are likely to have the most negative mental health responses to the COVID-19 pandemic, however, it has a significant impact on all workers in the sector particularly women and older HCWs [11, 12]. Robertson *et al.* [13] concur and noted that depression, anxiety, Post Traumatic Stress Disorder [PTSD] were found in HCWs exposed to the COVID-19 pandemic when they reviewed 19 studies. This is problematic as HCWs were stressed and suffered burnout before the pandemic. Moreover, it was estimated that 40% or more now experience burnout, 50% suffer from anxiety and many had some form of depression [14]. Tomlin *et al.* [15] report that the mental health of HCWs can be enhanced by the organisations they work for in terms of proper provisions being made for them in terms of specific models and interventions. This is supported by the Department of Health in South Africa [16], which reports that managing stress, anxiety, and the mental health of HCWs during the COVID-19 pandemic is of critical importance.

Although vaccines can reduce the likelihood of morbidity and mortality associated with COVID-19, according to the World Health Organisation (WHO) [17], it was estimated that in 2021 only 1 in 4 HCWs in Africa had been vaccinated against COVID-19, it is unlikely that this has changed substantially. Wiysonge [18] reports that vaccine hesitancy is high among HCWs in Cape Town, South Africa and that older individuals were more likely to show vaccine acceptance. This is supported by Daniel [19] who indicated that up to 47% of South Africans would not get vaccinated because of its perceived lack of efficacy, not liking vaccines and possible side effects. At the time of this research, it was estimated that over 60% of public HCWs in SA have been vaccinated [20]; however, it seems a sizeable proportion are hesitant to vaccinate (there are no statistics available for HCWs in the private sector).

Vaccine hesitancy exists worldwide, for instance, Callaghan *et al.* [21] report that in the United States of America (USA) nearly a third of adults in the country, particularly women, conservative persons, and people of colour, did not want to have the COVID-19 vaccination because it was not [in their opinion] safe or effective. In support of this Jolley and Cookson [22] report that 1 in 6 British adults are likely to refuse the COVID-19 vaccine. This is important because to develop resistance to COVID-19, or so-called 'herd immunity,' around 70% of any country's population needs to be vaccinated against it. In South Africa, there are many negative opinions related to the COVID-19 vaccines, which suggests there is a

rise in the anti-vax movement [23]. A survey carried out by Daniel [19] suggested that in December 2020 up to 47% of South Africans would not get vaccinated because of their perceived lack of efficacy, not liking vaccines and possible side effects. Schmidt *et al.* [24] support these findings as they found that false information, or conspiracy theories, that were accessed *via* social media instilled 'confusion, fear and panic' into the populace and heightened 'stigmatising' responses. Cooper *et al.* [25] report that disinformation and conspiracy theories drive concerns people have about vaccine safety and efficacy in South Africa.

The pandemic was in a stable or chronic phase in South Africa at the time this article was written, however, it is certainly putting a strain on both private and public hospitals and their staff as it was in the acute phase [26]. As all restrictions have been lifted it will only be in several months' time South Africa may see any rise in infections. It is thus important that psychological responses to the COVID-19 pandemic are documented so as to respond appropriately to the HCWs mental health needs before another wave of infection. To do this, it is necessary to find out the levels of fear, stress, and anxiety among HCWs, as well as levels of vaccine acceptance.

The conceptual framework of this research is linked to factors that are associated with the COVID-19 pandemic, for instance, socio-demographic determinants with variables such as chronic illness, race, and age [27].

The study aimed to investigate psychological responses to COVID-19 amongst HCWs in South Africa during the COVID-19 pandemic. Its objectives were to: explore the differences in demographics and social indicators in the sample associated with the COVID-19 pandemic; examine the psychological responses to COVID-19 and consider HCWs' acceptance of the COVID-19 vaccination.

2. METHODS

2.1. Study Design

The study utilised a quantitative approach and a cross-sectional survey design.

2.2. Setting

HCWs approach included medical practitioners and allied healthcare professionals such as psychologists and nurses.

2.3. Study Population and Sampling Strategy

As it was not possible to hand out survey questionnaires owing to COVID-19 pandemic health protocols a purposive sample of 20 HCWs were identified by the researchers and emailed surveys. Snowball sampling was then used as the identified HCWs were asked to send the protocol on to colleagues. One hundred and three (103) questionnaires were returned that were properly completed and constituted the final sample.

2.4. Data Collection

English was the medium for the survey as the healthcare

professionals were all trained in that medium. The protocol consisted of several instruments. Demographic questions provided information such as gender, age, any underlying risk factors, family structure and if respondents knew of someone who had died or recovered from COVID-19. The Coronavirus-19 Fear Scale. This instrument measured fear of COVID-19 using a five-point Likert type scale from ‘strongly disagree to strongly agree’. Internal consistency or Cronbach Alpha of the overall scale was, $\alpha = .82$ [28]. In this study it was $\alpha = .80$. The COVID-19-related stigma scale [29] was used. It is a 12-item COVID – 19 related stigma scale which measures self-reported perceptions of stigma to COVID-19. It uses Likert scale type measurements from ‘strongly agree to strongly disagree’. The scale has an overall internal reliability of Cronbach Alpha, $\alpha = .74$, which was found to be the same in this research. The COVID-19 Stress Scale was used to measure stress and anxiety [30]. The instrument has a Likert scale response format from ‘never to 4 almost always’. Cronbach Alpha was estimated at $\alpha = .93$ in American and Canadian samples and $\alpha = 0.90$ in this research. Various items of the vaccine acceptance survey developed by WHO, UNICEF (United Nations Children’s Fund) and NITAG (National Advisory Committee on Vaccinations, 2020) were also used which had a Cronbach Alpha, $\alpha = .78$. Lastly, the Perceived Mental Healthcare Needs of Participants during the COVID-19 Pandemic was adapted from Roy *et al.* (2020) [31]. This 4 – item questionnaire was used as a self-report mechanism for HCWs to report their mental health needs. In our adapted version it used a ‘Yes’ and ‘No’ scoring format.

2.5. Data Analysis

Data were uploaded into the spreadsheet by one of the researchers. Another researcher analysed the data which was checked by another member of the research team. Data were cleaned and checked for any outliers however, none were found. Missing data in the spreadsheet was checked against the protocols and errors were corrected.

Descriptive statistics were used to give a broad overview

of the data that is, percentages, frequencies, and correlations. Correlation analysis was used to see if there were any associations between COVID-19 fear, anxiety, stress, and mental healthcare needs. An independent t-test was used to see if there were any significant differences between male and female HCWS who participated in the study, stress, and overall mental health healthcare needs as well as acceptance of the COVID-19 vaccination.

2.6. Ethical Considerations

Ethical clearance was given from the University of Limpopo’s Research Ethics Committee (TREC) number TREC/459/2020: IR. We have followed all the guidelines of the Helsinki Declarations.

3. RESULTS

3.1. Demographic Characteristics of the Participants

Thirty-nine percent (39%) of the sample of HCWs were male and 69% were female. Twenty-nine percent (29%) of the sample were in the age range 20 – 29 years, 36% were aged 30 – 39 years, 19% were aged 40 – 49 years, 11% were aged 50 to 59 years of age, 4% were aged 60 to 69 years and 1% were age 70 to 79 years of age. In terms of ethnicity, 89% of the sample were black, 9% coloured, 1% Indian/Asian and 1% white. Educational achievements by the sample were 47% had a matriculation certificate, 31% had a degree, 12% had post-graduate degrees and 1% noted ‘other’ academic achievements. Forty-four percent (44%) of the HCWs were single, 17% were single with a child, 4% were married with one child, 32% were married with more than one child and 3% stated ‘other.’ In terms of socio-economic status, 57% identified as working class and 43% identified as middle class.

The response rate was 51.5%, and the majority of the respondents were Black and female. Males were under-represented as this was a purposive sample and gender was not stratified. The sample was diverse in terms of age, educational attainment, and family status (Table 1).

Table 1. Demographic characteristics (N = 103).

		Number	Percentage %	Cumulative %
Male	-	40	38.83	38.83
Female	-	63	61.17	100.00
-	Total	103	100	-
Age	20 – 29 years	30	29.13	29.13
	30 – 39 years	37	35.92	65.05
	40 – 49 years	20	19.42	84.47
	50 – 59 years	11	10.68	95.15
	60 – 69 years	4	3.88	99.03
	70 – 79 years	1	0.97	100.00
-	Mean age: M = 38 years	-	-	-
-	Standard Deviation: SD = 11.6 years	-	-	-
-	Total	103	100.00	-
Race	Black	92	89.32	89.32
	Coloured	9	8.74	98.06
	Indian/Asian	1	0.97	99.03
	White	1	0.97	100.00

(Table 1) contd.....

		Number	Percentage %	Cumulative %
-	Total	103	100.00	-
Education	Matriculation	48	46.60	46.60
	Degree	32	31.07	77.67
	Post-Graduate degree	22	21.36	99.03
	Diplomas	1	0.97	100.00
-	Total	103	100.00	-
Marital Status	Single	45	43.69	43.69
	Single 1 child	18	17.48	61.17
	Married no children	4	3.88	65.05
	Married with children	33	32.04	97.09
	Cohabiting no children	3	2.91	100.00
-	Total	103	100.00	-
Socio-economic Class	Working class	59	57.28	57.28
	Middle class	44	42.72	100.00
-	Total	103	100.00	-

Sex differences in HCWs' personal knowledge of death and illness related to COVID-19 were analyzed with t-tests and are presented in Table 2. As seen in Table 2, most variables related to personal knowledge of death and illness related to COVID-19 did not differ across males and females. The exception was that males were more likely than females to know someone who had contracted the COVID-19 virus.

These results do not include any persons who the HCWs have treated in a hospital or clinic setting (which is made clear in the protocol).

Over a third (37%) of the sample agreed that they were very afraid of COVID-19 as shown in Table 3. Overall, 42% felt uncomfortable when thinking about the virus. Additionally, 15% indicated that their hands started to sweat when they thought about COVID-19. In total, 35% of the sample thought they might lose their lives to the virus. Twenty-nine percent of respondents noted feeling nervous or anxious when listening to stories about the virus on social media. Nine percent reported not sleeping because of worry and 15% indicated that they suffered palpitations when thinking about COVID-19. There were no sex differences in these outcomes.

Table 2. HCWs personal knowledge of death and illness related to COVID-19.

Question	Sex	N	Mean	SD	T	P
Do you have a close friend or family who has contracted the COVID-19 virus?	Male	40	1.250	0.439	-0.136	0.892
-	Female	63	1.238	0.429	-	-
Do you have a close friend or family who has died from the COVID-19 disease?	Male	40	1.450	0.504	0.101	0.919
-	Female	63	1.460	0.502	-	-
Do you know anyone who has contracted the COVID-19 virus?	Male	40	1.350	0.483	-3.123	0.001*
-	Female	63	1.095	0.296	-	-
Do you know anyone who has died from the COVID-19 disease?	Male	40	1.375	0.490	-1.202	0.195
-	Female	63	1.354	0.490	-	-

Note: *= significant result at the 0.01 level.
Yes, was coded as 1 and No was coded as 2.

Table 3. Independent t-test results for Fear of COVID-19 scale for HCWs.

Question	Sex	n	Mean	SD	T	P
I am very afraid of COVID-19.	Male	40	2.937	1.390	1.374	0.173
-	Female	63	2.550	1.395	-	-
It makes me uncomfortable to think about COVID-19.	Male	40	2.875	1.381	0.920	0.360
-	Female	63	3.127	1.338	-	-
My hands start to sweat when I think about COVID-19.	Male	40	2.150	1.167	-0.656	0.513
-	Female	63	2.000	1.107	-	-
I am afraid of losing my life because of COVID-19.	Male	40	2.625	1.372	1.029	0.306
-	Female	63	2.921	1.451	-	-
When watching news and stories about COVID-19 on social media, I become nervous or anxious.	Male	40	2.425	1.338	1.287	0.201
-	Female	63	2.762	1.266	1.287	-
I cannot sleep because I worry about getting COVID-19.	Male	40	1.850	1.027	0.037	0.970
-	Female	63	1.857	0.895	-	-

(Table 3) contd....

Question	Sex	n	Mean	SD	T	P
My heart beats fast [palpitates] when I think about getting COVID-19.	Male	40	2.075	1.289	-0.114	0.910
	Female	63	2.048	1.128	-	-

Overall, 12% of the sample reported thinking about the virus when they did not want to and 24% noted that disturbing mental images about the virus popped into their minds against their will, refer to Table 4. Seventeen percent had trouble concentrating because of the virus while 19% noted having physical symptoms (pounding heart and/or sweating) when they were reminded about COVID-19.

3.2. HCWs Vaccine Readiness and Vulnerability to COVID-19 Infection

The majority of HCWs responded that they were likely or very likely to become infected with COVID-19 (79.61%). An independent t-test was undertaken to ascertain any differences between the male and female groups in regard to their perceptions of the likelihood of contracting COVID – 19.

The majority of HCWs responded that they were likely or very likely to become infected with COVID-19 (79.61%). An independent t-test was undertaken to ascertain any differences between the male and female groups in regard to their perceptions of the likelihood of contracting COVID – 19.

Males and females were equally likely to believe they would contract COVID-19, $t [101] = 0.66, p = .51$.

The majority of HCWs (80.5%) reported that they were likely or very likely to have the vaccination and booster for COVID-19. An independent t-test was undertaken to ascertain any differences between the male and female groups in regard to their likelihood of having the COVID-19 vaccination and boosters. Males were more likely than females to indicate they were likely to take the COVID-19 vaccine, $t (101) = 2.41, p = .02$.

Table 5 looks at the relationship between the age of the HCW and their family structure, fear of COVID-19 and any chronic disease such as hypertension and diabetes.

The majority of the sample were single or single with a child and aged between 20 to 30 years. Younger persons 20 – 30 years were less likely to be afraid or show symptomology associated with fear and stress, in terms of COVID-19, than those in older age groups. Age groups from 40 – 79 years of age were also more likely to have chronic disorders such as high blood pressure and diabetes.

Table 4. Independent t-test results for COVID-19 stress scale for HCWs.

Question	Sex	n	Mean	SD	t	P
I have trouble sleeping because I worry about the virus.	M	40	1.630	0.949	-0.257	0.798
	F	63	1.603	0.871	-	-
I have bad dreams about the virus.	M	40	1.825	1.059	-2.180	0.032*
	F	63	1.444	0.713	-	-
I think about the virus when I don't want to.	M	40	1.500	0.877	0.240	0.811
	F	63	1.540	0.779	-	-
Disturbing mental images about the virus pop into my mind against my will.	M	40	1.875	1.159	-1.034	0.304
	F	63	1.667	0.880	-	-
I have trouble concentrating because I keep thinking about the virus.	M	40	1.725	1.086	-1.236	0.219
	F	63	1.492	0.821	-	-
Reminders of the virus cause me to have physical reactions, such as sweating or a pounding heart.	M	40	1.850	1.210	-1.1303	0.195
	F	63	1.587	0.835	-	-

Note: *= significant result at the 0.05 level.

Table 5. Significant Pearson Product moment results [N=103].

		r [x, y]	P
Age	Family Structure	0.44	0.000*
Age	Fear of COVID-19		
	Do you know anyone who has died from the COVID-19 disease	0.23	0.021**
	I am very afraid of COVID-19.	0.45	0.000*
	My hands start to sweat when I think about COVID-19.	0.26	0.009*
	I am afraid of losing my life because of COVID-19.	0.36	0.000*
	When watching news and stories about COVID-19 on social media, I become nervous or anxious.	0.37	0.000*
	I cannot sleep because I worry about getting COVID-19.	0.36	0.000*
	My heart beats fast [palpitates] when I think about getting COVID-19.	0.26	0.009*
Age	Chronic disorder	0.27	0.006*

Note: *= significant at the 0.01% level.

**=significant at the 0.05% level.

4. DISCUSSION

The COVID-19 pandemic has been a major stressor for HCWs worldwide particularly women [11]. Results in this research, to some degree, support this finding as female HCWs are more likely to have bad dreams about the virus and reported knowing more people who had contracted the virus. Age appears as a protective factor against the fear of the disease with younger HCWs being less likely to show fear and anxiety in relation to COVID-19 than older ones [12]. This finding is supported by research results in this research which indicate an association between fear of COVID-19 and age, with younger persons being less prone to fear and anxiety related to the virus. It is likely that psychological illnesses such as depression and anxiety are more likely to be found in older HCWs [11]. Older HCWs also reported more chronic disorders such as high blood pressure and diabetes. Proper support for HCWs who have chronic illnesses, and are thus at high-risk of contracting the virus, must be provided to ensure they have minimal exposure to COVID-19 [16]. Wiysonge [18] reported that vaccine hesitancy is high in Cape Town, South Africa amongst HCWs. The results in this study do not support that finding, albeit with a smaller sample. Most of the HCWs in the present study would be likely to have the vaccination (80.5%). Although this is a high proportion of the sample it still means that 19.5% would not be likely to be vaccinated which infers there is still vaccine hesitancy amongst some HCWs as reported by Daniel [19] and the rise of the anti-vax movement in the country [23]. Moreover, 79.61% of the sample responded that they were likely to become infected with COVID-19 which indicates they may not have adequate protection against the virus [9]. The findings of the present study suggest that mental healthcare intervention for HCW's during a pandemic should be a priority in order to protect the psychological well-being of the healthcare community. It is further advocated that healthcare managers be involved in the development of guidelines and policies aimed at maintaining mental health and the overall well-being of HCWs.

5. LIMITATIONS

On the other hand, the study has limitations; it had a purposive sample thus results cannot be generalised. It was also a cross-sectional survey that measured responses at one moment in time thus correlational data could only be measured. Additionally, the data looked at HCWs generally and did not consider differences in groups [medical professionals, nurses, etcetera]. The length of service of the HCWs was not asked in the questionnaire which, on reflection, should have been asked.

6. IMPLICATIONS

The results of this study indicated that older HCWs are more likely to suffer fear, which will likely result in psychological distress. Female HCWs were also more likely than males to be fearful about COVID-19. It is apparent that the psychological well-being of HCWs needs to be protected during pandemics as, although the majority may not be fearful or overly stressed, those that may suffer burnout or depression. As the majority of HCWs have direct contact with patients with the virus support for them should be made readily available and easily accessible, more so for the older HCWs who are more vulnerable to the disease.

7. RECOMMENDATIONS FOR FUTURE RESEARCH

A larger sample of HCWs should be recruited to validate the results of this study. Furthermore, much more research should be conducted to explore the long-term effects of 1) treating and nursing COVID-19 patients and 2) the effects of long COVID on HCWs. Additionally, a larger, randomised mixed-methods study exploring vaccine hesitancy and stigmatisation of COVID-19 amongst HCWs should be conducted.

CONCLUSION

Healthcare professionals across all categories have, arguably, suffered more anxiety and psychological stressors than any other part of the community. The present research found that fear, anxiety, and stress exist amongst a portion of HCWs although the majority appear to be coping with stressors. It appears that being female and older is more likely to be associated with psychological distress. Older HCWs were more likely to have a chronic illness and thus be more vulnerable to COVID-19. Those over 40 years of age are likely to have more experience in a clinical setting and are thus more aware of the risks of contracting an infectious disease, and the consequences thereof. This group, especially females and those with comorbid disorders should be prioritised in terms of both medical and psychological interventions. However, all HCWs require ongoing support. Continuing information sessions and briefings about the virus and efficacy of vaccinations against COVID-19 should take place. These timely psychological counselling and intervention sessions should be implemented for HCW's to alleviate and mitigate their anxiety and stress in a crisis as well as improve their mental health.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

Ethical clearance was given from the University of Limpopo's Research Ethics Committee (TREC) number TREC/459/2020: IR

HUMAN AND ANIMAL RIGHTS

No animals were used for studies that are the basis of this research. All the humans were used in accordance with the ethical standards of the committee responsible for human experimentation (institutional and national), and with the Helsinki Declaration.

CONSENT FOR PUBLICATION

The written informed consent form was taken from the participants.

STANDARDS OF REPORTING

STROBE guidelines were followed.

AVAILABILITY OF DATA AND MATERIALS

The data supporting the findings is available within the article.

FUNDING

The study was not externally funded.

CONFLICT OF INTEREST

The authors declare no conflict of interest, financial or otherwise.

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Declared none.

REFERENCES

- [1] Pan KY, Kok AAL, Eikelenboom M, *et al.* The mental health impact of the COVID-19 pandemic on people with and without depressive, anxiety, or obsessive-compulsive disorders: a longitudinal study of three Dutch case-control cohorts. *Lancet Psychiatry* 2021; 8(2): 121-9. [http://dx.doi.org/10.1016/S2215-0366(20)30491-0] [PMID: 33306975]
- [2] World Health Organization (WHO). Continuity of essential health services: COVID-19 Assessment Tool. 2020. Available from: <https://www.who.int/emergencies/diseases/novel-coronavirus-2019/technical-guidance-publications>
- [3] Taquet M, Luciano S, Geddes JR, Harrison PJ. Bidirectional associations between COVID-19 and psychiatric disorder: retrospective cohort studies of 62 354 COVID-19 cases in the USA. *Lancet Psychiatry* 2021; 8(2): 130-40. [http://dx.doi.org/10.1016/S2215-0366(20)30462-4] [PMID: 33181098]
- [4] Gan Y, Ma J, Wu J, Chen Y, Zhu H, Hall BJ. Immediate and delayed psychological effects of province-wide lockdown and personal quarantine during the COVID-19 outbreak in China. *Psychol Med* 2022; 52(7): 1321-32. [http://dx.doi.org/10.1017/S0033291720003116] [PMID: 32787981]
- [5] Holmes EA, O'Connor RC, Perry VH, *et al.* Multidisciplinary research priorities for the COVID-19 pandemic: a call for action for mental health science. *Lancet Psychiatry* 2020; 7(6): 547-60. [http://dx.doi.org/10.1016/S2215-0366(20)30168-1] [PMID: 32304649]
- [6] Eccles AM, Qualter P, Madsen KR, Holstein BE. Loneliness in the lives of Danish adolescents: Associations with health and sleep. *Scand J Public Health* 2020; 48(8): 877-87. [http://dx.doi.org/10.1177/1403494819865429] [PMID: 31969070]
- [7] Killgore WDS, Cloonan SA, Taylor EC, Dailey NS. Loneliness: A signature mental health concern in the era of COVID-19. *Psychiatry Res* 2020; 290: 113117. [http://dx.doi.org/10.1016/j.psychres.2020.113117] [PMID: 32480121]
- [8] Rosenberg M, Luetke M, Hensel D, Kianersi S, Herbenick D. Depression and loneliness during COVID-19 restrictions in the United States, and their associations with frequency of social and sexual connections. *MedRxiv* 2020; 2020: 20101840. [http://dx.doi.org/10.1101/2020.05.18.20101840]
- [9] De Kock JH, Latham HA, Leslie SJ, *et al.* A rapid review of the impact of COVID-19 on the mental health of healthcare workers: implications for supporting psychological well-being. *BMC Public Health* 2021; 21(1): 104. [http://dx.doi.org/10.1186/s12889-020-10070-3] [PMID: 33422039]
- [10] Robertson LJ, Maposa I, Somaroo H, Johnson O. Mental health of HCWs during the COVID-19 outbreak: a rapid scoping review to inform provincial guidelines in South Africa. *SAMJ* 2020; 110(10): 101-1019.
- [11] Msomi N. SA health workers have been experiencing burnout long before COVID-19 pandemic. 2021. Available from: <https://www.news24.com/health24/mental-health/mental-health-in-sa/a-healthcare-workers-been-experiencing-burnout-long-before-covid-19-pandemic-20210318-2>
- [12] Tomlin J, Dalgleish-Warburton B, Lamph G. Psychosocial support for healthcare workers during the COVID-19 pandemic. In: *Front Psychol*. 2020; 11: p. 1960. [http://dx.doi.org/10.3389/fpsyg.2020.01960]
- [13] Department of Health South Africa [DoHSA]. Psychosocial support for healthcare workers during the COVID-19 response 2020. Available from: <http://www.kznhealth.gov.za/mental/covid19/Guidelines/psychosocial.pdf>
- [14] World Health Organisation [WHO]. Only 1 in 4 African HCWs fully vaccinated against COVID-19. 2021. Available from: <https://www.afro.who.int/news/only-1-4-african-health-workers-fully-vaccinated-against-covid-19>
- [15] Wiysonge CS, Alobwede SM, de Marie C Katoto P, *et al.* COVID-19 vaccine acceptance and hesitancy among healthcare workers in South Africa. *Expert Rev Vaccines* 2022; 21(4): 549-59. [http://dx.doi.org/10.1080/14760584.2022.2023355] [PMID: 34990311]
- [16] Daniel L. By mid-December 47% of South Africans said they'd refuse a coronavirus jab – up sharply from Oct.2021. Available from: <https://www.businessinsider.co.za/>
- [17] Sanews.gov.za. More than 60% of public HCWs vaccinated.2021. Available from: <https://sanews.gov.za>
- [18] Callaghan T, Moghtaderi A, Lueck JA, *et al.* Correlates and disparities of intention to vaccinate against COVID-19. *Soc Sci Med* 2020; 2020: 113638. [http://dx.doi.org/10.1016/j.socscimed.2020.113638] [PMID: 33414032]
- [19] Jolley D, Cookson C. Coronavirus anti-vaxxers: one in six British people would refuse a vaccine – here's how to change their minds. *The Conversation* 2020. Available from: <https://theconversation.com/coronavirus-anti-vaxxers-one-in-six-british-people-would-refuse-a-vaccine-heres-how-to-change-their-minds-142207>
- [20] Zietsman G. The rise of the anti-vax movement in the age of coronavirus. *Health24* 2020. Available from: <https://www.news24.com/health24/Medical/Infectious-diseases/Coronavirus/the-rise-of-the-anti-vax-movement-in-the-age-of-coronavirus-20200728-2>
- [21] Schmidt T, Cloete A, Davids A, Makola L, Zondi N, Jantjies M. Myths, misconceptions, othering and stigmatizing responses to Covid-19 in South Africa: A rapid qualitative assessment. *PLoS One* 2020; 15(12): e0244420. [http://dx.doi.org/10.1371/journal.pone.0244420] [PMID: 33351852]
- [22] Cooper S, van Rooyen H, Wiysonge CS. COVID-19 vaccine hesitancy in South Africa: how can we maximize uptake of COVID-19 vaccines? *Expert Rev Vaccines* 2021; 20(8): 921-33. [http://dx.doi.org/10.1080/14760584.2021.1949291] [PMID: 34252336]
- [23] Ramaphosa C. President Cyril Ramaphosa: South Africa's progress in national effort to contain coronavirus COVID-19 pandemic. *South African Government* 2020. Available from: <https://www.gov.za/speeches/president-Cyril-Ramaphosa-South-Africa-a-response-coronavirus-COVID-19-pandemic-28-Dec-2020>
- [24] Duan L, Zhu G. Psychological interventions for people affected by the COVID-19 epidemic. *Lancet Psychiatry* 2020; 7(4): 300-2. [http://dx.doi.org/10.1016/S2215-0366(20)30073-0] [PMID: 32085840]
- [25] Dye TD, Alcantara L, Siddiqi S, *et al.* Risk of COVID-19 related bullying, harassment, and stigma among healthcare workers: an analytical cross-sectional global study. *BMJ* 2020; 10(12): e046620. [http://dx.doi.org/10.1136/bmjopen-2020-046620] [PMID: 33380488]
- [26] Bhanot D, Singh T, Verma SK, Sharad S. Stigma and discrimination during the COVID-19 pandemic. *Front Public Health* 2021; 8: 577018. [http://dx.doi.org/10.3389/fpubh.2020.577018] [PMID: 33585379]
- [27] Joshi A, Kaur M, Kaur R, Grover A, Nash D, El-Mohandes A. Predictors of COVID-19 Vaccine Acceptance, Intention, and Hesitancy: A Scoping Review. *Front Public Health* 2021; 9: 698111. [http://dx.doi.org/10.3389/fpubh.2021.698111] [PMID: 34485229]
- [28] Ahorsu DK, Lin C-Y, Imani V, Saffari M, Griffiths MD, Pakpour AH. The Fear of COVID-19 Scale: Development and initial validation. *Int J Ment Health Addict* 2020; 20(3): 1537-45. [http://dx.doi.org/10.1007/s11469-020-00270-8] [PMID: 32226353]
- [29] Duy CD, Nong VM, Van A, Thu TD, Thu ND, Quang TN. Covid-19 related-stigma and its association with mental health of health-care workers after quarantine. *Psychiatry Clin Neurosci* 2020; 74(10): 566-8.
- [30] Taylor S, Landry CA, Paluszek MM, Fergus TA, McKay D, Asmundson GJG. Development and initial validation of the COVID Stress Scales. *J Anxiety Disord* 2020; 72: 102232. [http://dx.doi.org/10.1016/j.janxdis.2020.102232] [PMID: 32408047]
- [31] Roy D, Tripathy S, Kar SK, Sharma N, Verma SK, Kaushal V. Study of knowledge, attitude, anxiety & perceived mental healthcare need in Indian population during COVID-19 pandemic. *Asian J Psychiatr* 2020; 51: 102083. [http://dx.doi.org/10.1016/j.ajp.2020.102083] [PMID: 32283510]