

Nigerian Journal of Scientific Research (NJSR) ISSN-0794-0378



EVALUATING COVID-19 KNOWLEDGE, ATTITUDE AND PRACTICES AMONG PEOPLE WITH NON-COMMUNICABLE DISEASES IN NIGERIA: A MULTICENTER CROSS-SECTIONAL STUDY

MOHAMMED, N.U.^{1,4}*, BALA, W.², UMAR, N.³, DANJUMA, M.U.¹ AND BALA, M.F.¹

¹Pharmacy Department, Ibrahim Badamasi Babangida Specialist Hospital, Minna, Nigeria, ²Department of Medicine, Renal Unit, Ibrahim Badamasi Babangida Specialist Hospital, Minna, Nigeria, ³Centre for Trans-Sahara Disease, Vaccine and Drug Research, Ibrahim Badamasi Babangida University, Lapai, Nigeria ⁴Department of Clinical Pharmacy and Pharmacy Practice, Amadu Bello University, Zaria, Nigeria

ABSTRACT

A cross-sectional study was conducted by collecting data through consecutive sampling techniques using a self-reported questionnaire, from 560 enrolled patients across three selected hospitals in Niger State, Nigeria, between 1st September 2020 and 30th October 2020, to evaluate their knowledge, attitude, and practices towards COVID-19. The finding suggest that patients have high level of knowledge about COVID-19, but attitude and practices towards the pandemic was poor. Thus, targeted health literacy interventions should be directed at patients with NCDs, to positively change their attitudes and practices towards COVID-19.

Keywords: COVID-19, KAP, non-communicable diseases, pandemic ***Correspondence:** mohndagi@gmai.com, 07030154610

INTRODUCTION

In December 2019, the world was shocked by the news of an outbreak of a pneumonia-like illness that was popularly known as COVID-19. This virus was a ribonucleic acid (RNA) virus [1, 2], which was first traced to a seafood market in Wuhan, Hubei Province, China, from where it was rapidly spread to more than 210 countries worldwide [3]. Due to its widespread, it was declared a global pandemic by the World Health Organization (WHO), in March 2020, after infecting more than 100,000 people in more than 100 countries [3, 4]. The virus was reported to be similar to Severe Acute Respiratory Syndrome (SARS-CoV) and Middle Eastern respiratory syndrome coronavirus (MERS-CoV) [5]. Human COVID-19 infection was primarily contracted through air droplets, close contact with infected individuals, particularly mucous secretions from the nose, mouth, or eyes, and contaminated surfaces [5-11]. Scores of studies reported that most fatal cases and serious illnesses associated with COVID-19 might be attributed in people with underlying noncommunicable diseases (NCDs) such as hypertension, diabetes mellitus, respiratory disease(s), arthritis, and chronic kidney disease [3-6, 12, 13], leading to increased cases of morbidity and mortality. However, during the pandemic, most of these studies targeted healthcare workers and no attempt was made to evaluate

the knowledge, attitude, and practices (KAP) of COVID-19 among people with these NCDs. Hence, this study was aimed at assessing KAP level among people with NCDs, by evaluating how people with NCDs differ in their knowledge and behavior regarding COVID-19. Understanding KAP in people with NCDs will allow policymakers to formulate educational interventions against future pandemics and offer targeted strategies to protect vulnerable groups.

MATERIALS AND METHODS

Study setting

This study was conducted by collecting data from patients in three different hospitals in Niger State, Nigeria, between September and October 2020. The hospitals were General Hospital Minna, General Hospital Suleja, and Ibrahim Badamasi Babangida (IBB) Specialist Hospital, Minna. The two general hospitals attend to a large number of patients from all the political zones of the State, and the specialist hospital is a referral Centre with specialists in several fields of medicine like nephrology, orthopedic surgery, bones and plastic, and internal medicine.

Study design

A prospective cross-sectional two-arm study was conducted among the eligible participants with either NCDS or no NCDs during the period of the study.

Study population

All patients with NCDs (hypertension, diabetes mellitus, heart failure, arthritis, asthma, and chronic kidney disease) were categorized as the NCDs group and those without NCDs (other patients in the study setting) as the control group of the study.

Description of the research instrument

The study questionnaire was adopted and modified from a published version of a World Health Organization (WHO) KAP document [15] and previously published surveys on COVID-19 KAP [7-9]. The questionnaire has a total of 27 items consisting primarily of four sections; section 1 consists of 7 items: Sections 2, 3, and 4 consist of 10, 8, and 5 items each to assess information on the knowledge, attitude, and practices of the patients towards COVID-19. Questions in the knowledge section were answered as yes/no/I don't know and each correct response was scored 2 points and a wrong response scored 0. The total score for the knowledge section ranged from 0-21, and a score of 0 to \leq 16 was categorized as "poor knowledge" and scores 17 > as "good knowledge". The attitude section was also responded to on a five-point Likert scale of strongly disagree (1) disagree (2), neutral (3), agree (4), and strongly agree (5) respectively. The total score for the attitude section ranged from 0-36, and a score of 0 to <27 was categorized as "poor attitude" and $27 \ge as$ "good attitude". Responses in the practice section were also on a five-point Likert scale of 'never', 'rarely', 'often', 'sometimes', and 'always'. Never was scored 0, while 'Rarely', 'Often', 'Sometimes', and 'Always' were scored 1, 2, 3, and 4, respectively. The total score for this section also ranged from 0-21, and a score of 0 to ≤ 16 was categorized as "poor practice" and a score of 17 >as "good practice". All the sections of the questionnaire containing series of items were assessed for internal reliability using Cronbach's α coefficient set at a value of ≥ 0.7 for good internal reliability. The questionnaire was pilot-tested among 20 patients in IBB specialist Hospital Minna. The feedbacks from this pilot enabled slight changes in some of the questions which served as a measure for reliability and validity of the research instrument. These 20 participants were excluded in the final sample.

Sample size and sample technique

A minimum sample size of 377 participants was determined using the Raosoft online sample size calculator [14], assuming a response rate of 50%, confidence interval (CI) of 95%, Z as 1.96, and margin of error d as 5%. We Considered an additional 10%

(n=37) for any error in questionnaire filling, or incomplete response, and a final sample size of 414 participants were adopted for patients with NCD and 188 for those with no NCDs (ratio of 2:1). A Consecutive sampling method was used to recruit patients for the study.

Inclusion and exclusion criteria

All patients from 18 years and above who can read and write in English were eligible to take part in the study. Adults who declined to consent to the study were excluded.

Data collection

A printed version of the questionnaire was selfadministered to each patient that met the inclusion criteria. This was done at the general outpatient department (GOPD) daily, where all patients assemble for their clinics. This was the best time to recruit these patients because they are grouped based on disease conditions. Consent was sought from all participants after the background and objectives of the survey were clearly explained to each patient, indicating that participation is voluntary and optional.

Data analysis

The data generated from the questionnaires were categorized as variables, coded, and entered into Microsoft Excel. The coded data were then exported to STATA version 14 for analysis, using descriptive statistics, and summarized by frequency, percentage, and mean. Univariable and multivariable logistic regression analyses were used to assess the differences in scores and identify predictors of knowledge, attitude, and practices toward COVID-19 among the two categories of patients. The strength of the association of predictive factors with KAP was demonstrated by computing the crude odds ratio (COR) and the adjusted odds ratio (AOR) with a 95% confidence interval (CI). Finally, the analyzed data were organized and presented in tabular and narrative forms respectively by two authors with expertise in data analysis and triangulation. P-value <0.05 was considered statistically significant.

Ethical clearance

Ethical clearance was obtained from the research and ethics committee of the Niger State Ministry of Health office of the Director of Medical Services. An ethical research approval number STA/495/VOL/149 was issued. Participation in the study was voluntary and patient's data were kept as anonymous.

RESULTS

A total 560 respondents were enrolled in the study, more females participated than males, aged \leq 44 years. Most are married with tertiary education, and majority were

either self-employed or work for the government as shown in table 1

Variable	All (n =560)	NCD (n = 398)	No NCD	<i>P</i> -value
			(n = 162)	
Age (mean \pm SD)	45.2±13.6	50.2±12.1	33.6±9.2	< 0.0001
Age (years)				
\leq 44	265 (48.5)	123 (32.0)	142(87.7)	
45-64	229(41.9)	213(55.5)	16(9.9)	< 0.001
≥ 65	52(9.5)	48(12.5)	4(2.5)	
Gender				
Male	257(45.9)	192(48.2)	65(40.1)	0.08
Female	303(54.1)	206(51.8)	97(59.9)	
Marital status				
Married	439(78.4)	308(77.4)	131(80.9)	
Single	41.0(7.3)	10(2.5)	31(19.1)	< 0.001
Widowed	57(10.2)	57(14.3)	0.0(0.0)	
Divorced	23(4.1)	23(5.8)	0.0(0.0)	
Educational status				
No formal	53(9.5)	44(11.1)	9(5.6)	
Primary	47(8.4)	20(5.0)	27(16.7)	< 0.001
Secondary	149(26.6)	111(27.9)	38(23.5)	
Tertiary	311(55.5)	223(56.0)	88(54.3)	
Employment status				
Unemployed	60(10.8)	45(11.4)	15(9.3)	
Govt employee	142(25.5)	115(29.1)	27(16.7)	
Private employee	94(16.9)	77(19.5)	17(10.5)	< 0.001
Self-employed	179(32.1)	112(28.4)	67(41.4)	
Farmer	30(5.4)	19(4.8)	11(6.8)	
Student	26(4.7)	26(6.6)	0.0(0.0)	
Retired	26(4.7)	1(0.3)	25(15.4)	

Table 1: Socio-demographic characteristics of participants (n = 560)

NCD-Non-communicable diseases

Table 2 shows that a good knowledge score among the patients indicated a better understanding of COVID-19. However, the attitudes and practices of these patients were generally suboptimal.

Table 2:	Knowledge,	attitude, and	practices of	participants	towards	COVID-19

	Presence of NCI)		
Variable	Yes (n = 398)	(n = 162)	All (n=560)	<i>P</i> -value
Knowledge				
Good n(%)	215(54.0)	92(56.8)	307(54.8)	0.550
Poor n(%)	183(46.0)	70(43.2)	253(45.2)	
Knowledge score(mean±SD)	16.13±3.70	16.52 ± 2.37	16.2±3,37	0.217
Attitude				
Good n(%)	83(90.2)	9(9.9)	92(16.4)	< 0.001
Poor n(%)	315(67.3)	153(32.7)	468(83.6)	
Attitude score(mean±SD)	22.32 ± 4.59	20.34 ± 5.27	21.75 ± 4.87	< 0.0001
Practice				
Good n(%)	185(47.0)	78(48.2)	263(47.3)	0.798
Poor n(%)	209(53.1)	84(51.9)	293(52.7)	
Practice score(mean±SD)	15.33±4.28	15.83 ± 3.58	15.48 ± 4.09	0.187

SD-standard deviation, NCD-non-communicable diseases

Variable	Unadjusted OR	<i>P</i> -value	Adjusted OR	<i>P</i> -value
Age	()3/001)		()3/0(1)	
< <u>44</u>	1.00(reference)		1.00(reference)	
45-64	0.87(0.61-1.24)	0.428	0.939(0.59-1.47)	0.753
> 65	2 45(1 25-4 79)	0.420	4 24(1 79-10.02)	0.001
Gender	2.15(1.25 1.77)	0.007	1.2 ((1.7) 10.02)	0.001
Male	1.00(reference)		1 00(reference)	
Female	0.68(0.49-0.95)	0.026	0.77(0.52-1.16)	0.213
Marital status	0.00(0.1) 0.20	0.020	0.17(0.02 1.10)	0.215
Single	1.00(reference)		1.00(reference)	
Married	1.02(0.53-1.94)	0.961	1.79(0.77-4.18)	0.179
Widowed	0.49(0.22-1.11)	0.088	0.71(0.24-2.15)	0.550
Divorced	1.22(0.43-3.45)	0.711	2.12(0.59-7.60)	0.249
Educational status	((((((((((((((((((((((((((((((((((((•
No formal education	1.00(reference)		1.00(reference)	
Primary	0.63(0.28-1.42)	0.267	0.40(0.15-1.03)	0.059
Secondary	1.14(0.61-2.13)	0.692	0.67(0.31-1.48)	0.326
Tertiary	1.76(0.98-3.16)	0.059	1.27(0.58-2.76)	0.553
Employment status			· · · · ·	
Unemployed	1.00(reference)		1.00(reference)	
Gov't employed	1.06(0.58-1.93)	0.855	0.74(0.34-1.61)	0.444
Private employed	3.27(1.63-6.56)	0.001	3.07(1.35-6.99)	0.007
Self-employed	0.88(0.49-1.59)	0.680	0.76(0.38-1.53)	0.449
Farmer	0.88(0.36-2.10)	0.766	0.91(0.32-2.57)	0.853
Student	1.12(0.46-2.93)	0.743	0.39(0.12-1.26)	0.116
Retired	2.25(0.85-5.96)	0.103	2.47(0.74-8.26)	0.142
No NCD	1.00(reference)		1.00(reference)	
Presence of NCD	0.89(0.62-1.29)	0.550	0.84(0.51-1.34)	0.496
OR-odd ratio, CI-confide	nce interval, NCD-non-co	mmunicable diseas	ses	

Table 3: Predictors of knowledge of COVID-19 among the sample of patients enrolled in the study

Table 4: Predictors of attitude towards COVID-19 among the sample of patients enrolled in the study

Variable	Unadjusted OR (95%CI)	<i>P</i> -value	Adjusted OR (95%CI)	<i>P</i> -value
Age			. ,	
≤44	1.00(reference)		1.00(reference)	
45-64	2.30(1.41-3.76)	0.001	1.85(1.03-3.35)	0.041
≥ 65	1.02(0.40-2.59)	0.964	0.92(0.32-2.64)	0.871
Gender				
Male	1.00(reference)		1.00(reference)	
Female	0.74(0.47-1.16)	0.187	1.02(0.60-1.74)	0.934
Marital status				
Single	1.00(reference)		1.00(reference)	
Married	1.58(0.60-4.15)	0.354	0.61(0.18-1.99)	0.409
Widowed	0.54(0.14-2.16)	0.387	0.13(0.03-0.68)	0.015
Divorced	1.52(0.36-6.32)	0.568	0.27(0.05-1.58)	0.146
Educational status				
No formal education	1.00(reference)		1.00(reference)	
Primary	1.14(0.31-4.22)	0.841	0.93(0.22-3.95)	0.918
Secondary	2.01(0.74-5.59)	0.171	1.33(0.40-4.38)	0.641
Tertiary	2.11(0.80-5.54)	0.130	1.25(0.38-4.08)	0.711
Employment status				
Unemployed	1.00(reference)		1.00(reference)	

Gov't employed	1.39(0.59-3.28)	0.454	0.84(0.30-2.41)	0.759
Private employed	3.05(1.29-7.21)	0.011	2.07(0.75-5.73	0.160
Self-employed	0.77(0.32-1.87)	0.566	0.61(0.23-1.64)	0.324
Farmer	1.30(0.39-4.38)	0.672	1.12(0.29-6.4.72)	0.815
Student	1.10(0.32-4.33)	0.801	0.89(0.20-3.99)	0.889
Retired	-	-	-	-
No NCD	1.00(reference)		1.00(reference)	
Presence of NCD	4.49(2.19-9.15)	< 0.001	3.04(1.33-6.92)	0.008
OP add ratio CI confi	donce interval NCD non	communicable dia	00505	

OR-odd ratio, CI-confidence interval, NCD-non-communicable diseases

Variable	Unadjusted OR (95%CI)	<i>P</i> -value	Adjusted OR (95%CI)	<i>P</i> -value
Age(years)				
≤44	1.00(reference)		1.00(reference)	
45-64	1.06(0.74-1.51)	0.742	0.10(0.63-1.58)	0.994
≥ 65	0.62(0.33-1.14)	0.123	0.40(0.18-0.89)	0.024
Gender				
Male	1.00(reference)		1.00(reference)	
Female	1.25(0.89-1.74)	0.194	1.83(1.23-2.74)	0.004
Marital status				
Single	1.00(reference)		1.00(reference)	
Married	0.91(0.48-1.73)	0.783	1.23(0.57-2.83)	0.560
Widowed	0.63(0.28-1.44)	0.275	0.49(0.17-1.43)	0.194
Divorced	0.34(0.11-1.02)	0.055	0.37(0.10-1.39	0.141
Educational status				
No formal education	1.00(reference)		1.00(reference)	
Primary	1.01(0.46-2.23)	0.980	0.75(0.29-1.90)	0.550
Secondary	0.49(0.25-0.93)	0.029	0.26(0.11-0.58)	0.001
Tertiary	0.93(0.51-1.68)	0.810	0.74(0.34-1.65)	0.468
Employment status				
Unemployed	1.00(reference)		1.00(reference)	
Gov't employed	0.97(0.52-1.83)	0.936	0.97(0.44-2.14)	0.932
Private employed	2.13(1.09-4.16)	0.028	3.33(1.47-7.55)	0.004
Self-employed	1.69(0.92-3.10)	0.089	2.33(1.14-4.78)	0.021
Farmer	1.87(0.77-4.56)	0.169	3.59(1.25-10.33)	0.018
Student	2.23(0.87-5.72)	0.095	6.22(1.91-20.21)	0.002
Retired	1.40(0.55-3.58)	0.479	2.33(0.72-7.52)	0.158
No NCD	1.00(reference)		1.00(reference)	
Presence of NCD	0.95(0.66-1.37)	0.798	1.38(0.84-2.26)	0.204

Table 4: Predictors of practices towards COVID-19 among the sample of patients enrolled in the study

OR-odd ratio, CI-confidence interval, NCD-non-communicable diseases

DISCUSSION

A considerable number of studies have been conducted in Sub-Sahara Africa, and around the world on COVID-19 knowledge, attitudes, and practices, particularly targeting the general public [7, 11-14] and health professionals [8, 9, 15, 16]. This study found that a significant number of the participants (over half of patients in both arms) had adequate knowledge about COVID-19. The lack of significant statistical difference between patients with NCDs and those without NCDs might be attributed to the fact that these patients shared the same hospital clinics and might have interacted adequately or shared opinions during the pandemic. This is in congruence to the findings of some studies [4, 15, 17, 18] that concluded that a good knowledge of COVID-19 was a determinant of appropriate attitude and improved practices. Furthermore, studies in Pakistan [19] and Ethiopia [3] also reported higher levels of knowledge among their respondents. In

addition, many NCD patients in this study may have believed that the disease was a 'white man's disease' that could never spread to them and thus refused to take serious measures against the disease. Patients who were females had lower odds of having adequate knowledge and were 1.8 times more likely to demonstrate poor practices towards COVID-19. This may be attributed to cultural norms, literacy level, and gender roles that may influence women's attitude towards seeking information about the pandemic. This could be responsible for the poor practices shown by women in this study. Patients age from 65 years and above have been shown to influence knowledge of COVID-19 as portrayed in a study carried out in Saudi Arabia [7]. Older patients take NCDs more seriously and spend more time learning more about COVID-19 and other pandemics.

However, studies conducted in Egypt [20] and Uganda [15] revealed contrary results indicating that young adults are likely to have optimal knowledge of COVID-19 and future pandemics compared to older adults. Furthermore, logistic regression analysis showed a significant statistical difference (p < 0.05) between the attitudes of patients with NCDs and those with no NCDs. High risk of poor attitude observed among patients with NCDs was in congruent of the finding of a study in Uganda where respondents reported a negative attitude toward COVID-19 [15]. The possible rationale for this could be due to the less serious COVID-19 awareness in the study area. Secondly, there was high speculation regarding who is immune to the disease, as many, including those with NCDs, may have believed that the 'black race' was immune to COVID-19. Although the reasons for this speculation were undoubtedly because most of the early reported cases in Nigeria were from people who had a history of travelling from endemic countries. A similar result was reported by another study in the United States of America (US) [21], where black adults with chronic diseases were less likely to believe that they might become infected, and were less worried about the pandemic.

In addition, age, marital status, and private employment were also significant predictors of poor attitude in this study. These findings were in agreement with the results of surveys conducted in China [18] and Saudi Arabia [7]. Age, gender, educational status, and employment status were significant predictors of poor COVID-19 practices. This is consistent with the results of a German study of people with Parkinson's disease [23], in which only 27% of patients took preventive contact reduction measures. Our study has some limitations. We adapted and modified previously published tools for assessment of KAP among the general public and healthcare professionals, and a KAP document published by WHO. Secondly, only NCD patients in Niger State, Nigeria were surveyed and the results of this study may not reflect the KAPs of patients

with NCDs in the entire country. However, this is the first study to assess KAP towards COVID-19 in Minna, Niger State, Nigeria.

CONCLUSION

This study highlighted that the people enrolled in this study had good knowledge of COVID-19 brought to the limelight what they believed and practiced towards the pandemic. The study found that although more than half of patients with NCDs had good knowledge about COVID-19, this knowledge was low compared to those with no NCDs. Gender and age were found to be significant predictors of COVID-19 knowledge.

ACKNOWLEDGEMENT

The authors would like to extend tremendous appreciation to all the patients who responded to our survey, to the research and ethics committees of the Niger State ministry of health, Minna, Nigeria for providing approval to conduct this study.

REFERENCES

- 1. SMITH, T., BUSHEK, J., LECLAIRE, A. & PROSSER, T. (2020). COVID-19 Drug Therapy What's been updated: *Elsevier Highlights*. http://repository.phb.ac.id/776/1/COVID-19-Drug-Therapy_5.14.2020.pdf
- WANG, D., HU, B., HU, C., ZHU, F., LIU, X. & ZHANG, J. (2020). Clinical Characteristics of 138 Hospitalized Patients with 2019 Novel Coronavirus-Infected Pneumonia in Wuhan, *China. JAMA – Journal of American Med Assoc.* 323(11): 1061–9.
- 3. AKALU, Y., AYELIGN, B. & MOLLA, M.D. (2020). Knowledge, attitude, and practice towards COVID-19 among chronic disease patients at Addis Zemen Hospital, Northwest Ethiopia. *Infectious Drug Resistance*, **13**: 1949–60.
- 4. PAL, R., YADAV, U., GROVER, S., SABOO, B., VERMA, A. & BHADADA, S.K. (2020). Knowledge, attitudes, and practices towards COVID-19 among young adults with Type 1 Diabetes Mellitus amid the nationwide lockdown in India: A cross-sectional survey. Diabetes *Research in Clinical Practice* [*Internet*]; (166): 108344. Available from: https://doi.org/10.1016/j.diabres.2020.1083 44
- 5. ZHANG, J., WANG, X., JIA, X., LI, J., HU, K. & CHEN, G., (2020). Risk factors for disease severity, unimprovement, and mortality in COVID-19 patients in Wuhan, China.

Clinical Microbiology and Infection, volume and page numbers

6. BIRTHDAY, H. & ROOM, E. (2019). Chronic Disease and COVID-19: What You Need to Know Managing Your Chronic Disease to Prevent COVID-19. https://chronicdisease.org/resource/resmgr/ website.

2020/covid/factsheet_covid19cd.pdf

- AL-HANAWI, M.K., ANGAWI, K., ALSHAREEF, N., QATTAN, A.M., HELMY, H.Z. & ABUDAWOOD, Y. (2020). Knowledge, Attitude, and Practice Toward COVID-19 Among the Public in the Kingdom of Saudi Arabia: A Cross-Sectional Study. *Frontiers in Public Health*, 8(5): 1–10.
- 8. GIAO, H., LE AN, P., THI, NGOC., HAN, N., VAN KHANH, T., KIM NGAN, V., VAN TAM, V. (2020). Knowledge and attitude toward COVID-19 among healthcare workers at District 2 Hospital, Ho Chi Minh City. *Asian Pac J Trop Med* [Internet]; **13**(March): 6–11. Available from: http://www.apjtm.org
- SAQLAIN. (2020). Knowledge, attitude, practice and perceived barriers among healthcare professionals regarding COVID-19: A Cross-sectional survey from Pakistan. *Trab Infant.*, 53(9):1689–99.
- 10. ASSOCIATION, W.M., 10.1001@Jama.2013.281053. 2013;2013–6. Available from: https://jamanetwork.com/journals/jama/fulla rticle/1760318
- 11. ISAH, M.B., ABDULSALAM, M., BELLO, A., IBRAHIM, M.I., USMAN, A. & NASIR, A. (2020). Coronavirus Disease 2019 (COVID-19): Knowledge, attitudes, practices (KAP) and misconceptions in the general population of Katsina State, Nigeria; 2019: *Journal of Microbiology Research*, 6(1): 1– 27
- REUBEN, R.C., DANLADI, M.M.A., SALEH, D.A. & EJEMBI, P.E., Knowledge, Attitudes, and Practices Towards COVID-19: An Epidemiological Survey in North-Central Nigeria. (2020) Journal of Community Health, 46: 457–470 https://doi.org/10.1007/s10900-020-00881-1
- 13.TEFERI, S.C. (2020). A Review on Knowledge, Attitude, and Practice during the COVID-19 Pandemic in Ethiopia. **5**(2): 40–4. *Archives of Clinical Microbiology*, **12**(2): 145
- 14. ERFANI, A., SHAHRIARIRAD, R., RANJBAR, K., MIRAHMADIZADEH, A. &

MOGHADAMI, M. (2020). Knowledge, Attitude and Practice toward the Novel Coronavirus (COVID-19) Outbreak: A Population-Based Survey in Iran. *Bulletin of World Health Organization* [Internet]; 30 March 2(March). Available from: http://dx.doi.org/10.2471/BLT.20.256651

- 15. OLUM, R. & BONGOMIN, F. (2019). Coronavirus Disease-2019: Knowledge, Attitude, and Practices of Health Care Workers at Makerere University Teaching Hospitals Uganda. Frontiers in Public Health, 8(4): 1– 9.
- 16. ZHOU, M., TANG, F., WANG, Y., NIE, H., ZHANG, L. & YOU, G. (2020). Knowledge, attitude, and practice regarding COVID-19 among healthcare workers in Henan, China. *Journal of Hospital Infection, The Healthcare Infection Society*; Available from:

https://doi.org/10.1016/j.jhin.2020.04.012

- 17. ABDELHAFIZ, A.S., MOHAMMED, Z., IBRAHIM, M.E., ZIADY, H.H., ALORABI, M. & AYYAD, M. (2020) Knowledge, Perceptions, and Attitude of Egyptians Towards the Novel Coronavirus Disease (COVID-19). Journal Community Health Springer US; Available from: https://doi.org/10.1007/s10900-020-00827-7
- 18. ZHONG, B.L., LUO, W., LI, HM., ZHANG, Q.Q., LIU, X.G. & LI, W.T. (2020). Knowledge, attitudes, and practices towards COVID-19 among Chinese residents during the rapid rise period of the COVID-19 outbreak: a quick online cross-sectional survey. *International Journal Biological Science*, 16(10): 1745–52.
- 19. SAQLAIN, M.M., AHMED, A., GULZAR, A., NAZ, S., MUNIR, M.M. & AHMED, Z. (2020). Public Knowledge and Practices regarding COVID-19 A cross-sectional survey from Pakistan. Medrxiv [Internet]; (June):1–24. Available from: http://medrxiv.org/cgi/content/short/2020.0 6.01.20119404
- 20. HAGER, E., ODETOKUN, I.A., BOLARINWA, O., ZAINAB, A., OKECHUKWU, O. & AL-MUSTAPHA, A.I. (2020). Knowledge, attitude, and perceptions towards the 2019 Coronavirus Pandemic: A bi-national survey in Africa. *PLoS One*; **15**(7 July): 1–13. Available from: http://dx.doi.org/10.1371/journal.pone.0236 918

- 21. WOLF, M.S., SERPER, M., OPSASNICK, L., O'CONOR, R.M., CURTIS, L. & BENAVENTE, J.Y. (2020). Awareness, Attitudes, and Actions Related to COVID-19 Among Adults with Chronic Conditions at the Onset of the U.S. Outbreak: A Crosssectional Survey. Annals Internal Medicine, **173**(2): 100–9.
- 22. ANGAMO, M.T., MELESE, B.H., AYEN, W.Y. (2013) Determinants of Glycemic Control among Insulin Treated Diabetic Patients in Southwest Ethiopia: Hospital Based Cross-Sectional Study. *PLoS One*; 8(4). e61759
- 23. ZIPPRICH, H.M., TESCHNER, U., WITTE, O.W.
 & SCHÖNENBERG, A. (2020). Knowledge, Attitudes, Practices, and Burden During the COVID-19 Pandemic in People with Parkinson's Disease in Germany. *Journal of Clinical Medicine*, 29(6): 1643. doi: 10.3390/jcm9061643. PMID: 32486074; PMCID: PMC7355903