Original

Community attitudes toward efficacy of standard COVID- 19 preventive measures in Khartoum state

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Abstract:

Background: The emerging COVID-19 is a devastating life-threatening disease, which is characterized by high morbidity, with more than 6 million people worldwide, and a fatality rate ranging between 5-10%. In Sudan, approximately more than 10.000 confirmed cases were reported since the onset of the outbreak. Attitudes and behavior play a major role in preventing the emerging and re-emerging diseases. This study aimed at assessing attitude and behavior of participants towards COVID 19.

Materials & Methods: This is a descriptive cross sectional community based study. It was carried out in Khartoum State (Khartoum, Bahri and Omdurman localities). A total of 1200 participants were randomly interviewed face-to-face using close ended questionnaire. A multistage cluster sampling technique was applied. Statistical Package for Social Science (SPSS) Smart PLS was used. Logistic regression, factor analysis and tree analysis were performed.

Results: Negative attitude was reported in greater than half of the participants[(52.7%,n=632,(95% CI, 49.9% − 55.5%)],whilst positive attitude [(47.3%, n=568, (95% CI, 44.5% − 50.1%)].Regarding behavior, more than the half of the participants [(55.3%,n=663,(95%CI,52.5%− 58.1%)]had poor behavior, whereas [(44.7%, n= 537, (95% CI, 41.9% − 47.5%)] had good behavior. Factor analysis revealed that, three

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factors explain 56% of change occurring attitudes towards COVID 19 of the surveyed participants which were misconceptions about COVID19, infodemics of COVID19, and negative stereotyping. The spectrum of behavior was noted in response to isolation strategy, anticipated stigma, and enacted stigma (61%). Logistic regression showed that, participants that had a monthly income between 2000-2999 SDG a month were 2.25 times more likely to have negative attitudes towards COVID19 (β = 0.809,p<0.001,AOR=2.25, 95% C.I.; 1.48 -3.41,). Education was statistically associated with attitudes towards COVID19 (p<0.001). Males were 0.62 less likely to have poor behavior in comparison with females (β=−0.48,p<0.05,AOR=0.62,95%C.I.;0.43-0.89). Participants with a monthly income ranging from 2000-2999 SDG were 2.83 times more likely to have poor behavior towards COVID19 (β=1.04,p<0.001,AOR=2.83,95%C.I.;1.77-4.52). Tree analysis revealed that attitude was the best predictor of behavior towards COVID19. Locality was the best predictor of negative attitude.

Conclusion: Behavior and attitude comprised have a potential effect on preventing and controlling COVID19.

Keywords: COVID19, Attitudes, Behavior, infodemic, anticipated stigma, enacted stigma.

Introduction

On the 8th of December 2019, the first identified case of human pathogen Severe Acute Respiratory Syndrome Corona virus 2 (SARS-CoV-2) was officially reported in Wuhan, China (1). However, the emerging disease has worldwide become a global health emergency, therefore World Health Organization (WHO) declared SARS-CoV-2 as a pandemic (2).

The globe is now facing a catastrophic massive burden situation from the emergence of corona virus disease 2019 (COVID-19). Corona viruses have varied symptoms ranging from mild to more acute illnesses such as SARS and MERS (3). The symptoms of COVID19 infection include fever, headache, cough, sore throat, nausea, vomiting, diarrhea and dermatological lesions. The vulnerability of COVID19 increases with underlying chronic illnesses, for instance patients with diabetes mellitus and hyper tension are more likely to be infected with COVID are more likely to experience complications, (4)such as heart diseases, respiratory failure, acute respiratory syndrome, or even death (5)·

Many countries have taken extraordinary precautionary measures to curb the spread of COVID19. However, these restrictions; locking down, hand washing, contact a voidance, wearing masks, keeping social distance, travel restrictions, and avoiding crowded places would minimize the risk of infection. COVID19 has led to health crisis which has resulted in many countries to opt for social quarantine in their populations, communication systems have been disinter mediated due to the acceleration of digitization and infodemic.

Since COVID19 affects behavior, many ministries of health should display awareness of protective behaviors against COVID19and develop health-protective attitudes during a health crisis.

Furthermore, behavior and attitude will definitely have direct impact on preventative measures. Thereby, these steps would encourage individuals to take meaningful steps to protect themselves. Healthy behavior and attitude are also crucial in staying healthy during the corona virus pandemic (6).

An attitude is a psychological state of mind. It is the way a person thinks about situations, and it ultimately determines a

person's behavior. It also refers to inclinations to react in a certain way to defined by the actions of a person based on specific stimuli. It refers to personal opinions, beliefs, and feelings about aspects of environment (7,8). Psychological factors are called internal factors, while social factors are called external factors. These factors are linked together, and this interaction impacts the behavior of the individual, which could be positive or negative behavior (9).

In addition, the direct impact of behavior and attitude of COVID 19 on those infected is also significant, and is often precipitated due to increased stigma, social isolation and quarantine. Thus social isolation and movement restrictions due to COVID-19 also jeopardize health as well as access to basic needs, and highlight the need for human rights, which led to many deaths whether by corona virus or other causes.

In Sudan during the13th of March, the first reported case of corona virus was confirmed in Khartoum, a man who was visiting United Arab Emirate in the first week of March, and by 27th of May, a surge of reported cases appeared and death reached a no of 4521 case and 233deaths respectively. Therefore, the Federal Ministry of Health Sudan (MoH) made ongoing awareness campaigns concerning the mode of transmission and the importance of applying protective measures, quarantine and curfew. Although strict measures were taken, the awareness of individuals towards infectious viruses remains the most important factor in controlling and containment of COVID19 (10).

However, during the current outbreak of misleading information, rumors and myth particularly on social media were shared widely, fear and anxiety were apparently manifested and stigmatization was prevailed (11). Furthermore, some individuals' fear of being diagnosed and/or categorized as suspected case created a psychosocial dilemma of access reaching health care to know their status. Moreover, another reason of fear is that Sudan MoH announced that more than 50% of those who returned to their home during the outbreak were pledged incorrect information at airport check to deceive the health workers of being investigated and screened (12).

The ongoing outbreak, propaganda, fear, stigma and discrimination, alongside the fragility of the health

system worsen the situation and led to a dark pathway for triggering COVID19 distribution. Thus, this study attempted to highlight the importance of attitude and behavior of Sudanese participants in bridging gaps of controlling the COVID-19. This study will potentially help policy makers in implementing a comprehensive interventional campaign.

Methodology

This is a cross sectional community based study. It was carried out in Khartoum the capital of Sudan, which encompasses three localities; Khartoum, Bahri and Omdurman.

A multi-stage random sampling was applied. A number of 1200 participants were enrolled randomly. A total of 400 participants were recruited from each locality, whilst half of those were drawn from central and the remaining peripheral sites. The sample size was calculated based on the assumption that the probability of having positive attitude towards preventive measures against COVID19 disease was 50.0%, at 95% confidence interval, limit of precision of 5%, with a design effect of 1.0, the calculated sample size was 384 participants and 5% were added as contingents. Participants answered a yes-no question to confirm their willingness to participate voluntarily. Participants were inquired about their (i) socio-demographic information, (ii) attitude concerning COVID-19 (iii) protective measures (iv) practice behaviors to prevent COVID-19 (v) types of information. However, all participants were directed to complete the self-report survey.

Statistical Analysis

Descriptive statistical methods were used to summarize data on socio-demographic profile and responses to questions concerning attitude and behavior towards COVID-19. Data was displayed as frequencies and percentages (%) for categorical variables. Data was analyzed using Statistical Package for the Social Sciences (SPSS, version 25; IBM, USA), and Smart PLS 3.3.2 version. A P value was considered statistically significant at level of $P < 0.05$. All baseline socio-demographics were described as categorical variables. Multi variable logistic analyses, with Odds Ratios (OR) reported, were used to determine factors associated with preventive behavior of COVID-19. Participants' attitudes and behavior were categorized into two categories: poor and good. For attitudes, the median was 33, while for behavior it was 36. Both of two values considered as

cut-off points when categorizing attitudes and behavior. The moderating and mediating effects are used to explain the relationship between attitude and behavior. More, tree analysis was also applied

Results

Two constructs namely attitudes and behavior towards COVID19 of the sampled members (n=1200) were tested for reliability. The domain of attitudes scored good reliability, since Cronbach Alpha coefficient was between 0.7 to 0.79 while the domain of behaviors scored good reliability, since Cronbach Alpha coefficient was between 0.8 to 0.89 (source), and hence the instrument developed was valid and reliable.

In this study, females were more than males (60.9%, n=731). Majority of the participants (48.8%, n=585) were between 20 to 29 years at the time of data collection, However, 11.2% (N=134) of the participants were 50 years or above at the time of survey. While only 42 (3.5%) participants were uneducated, and (56.6%, n=679) had bachelor/diploma certificate. With regard to marital status, majority of the surveyed persons were single (55.5%, n= 666. Up to 668 participants (55.7%) reported that their families had between 4 to 6 members. Moreover, employed were (57.7%, n=693). Of the 693 participants who were employed, 40% of them work in private sector (39.4%, n= 273), regarding monthly income level greater than a half of the participants (51.2%, n=614) earned 3000 SDG or more a month.

Over all attitude and behavior:

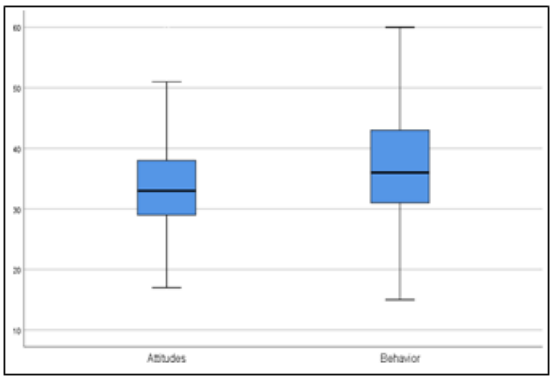


Figure1: Over all attitude and behavior

When attitudes towards COVID 19 were categorized, (median 33) greater than the half of the participants (52.7%, n=632) had negative attitudes (95% CI, 49.9%− 55.5%), while 47.3% of them had positive attitudes (95% CI, 44.5% − 50.1%). Regarding behavior (median36), greater than the half of the participants (55.3%, n=663) had poor behavior (95% CI, 52.5%−58.1%),

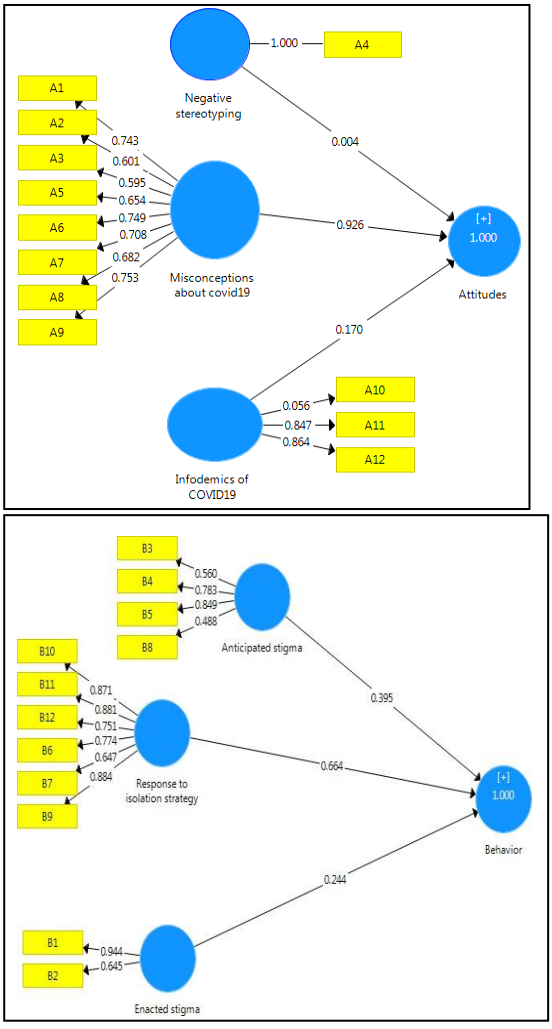
while 44.7% of them had good behavior (95%CI,41.9%− 47.5%).

Factor Analysis for Attitudes and Behavior towards COVID19:

Factor analysis for attitude and behavior towards COVID19 revealed that the Kaiser –Meyer-Olkin Measure of sampling adequacy was 0.857, therefore, this value was considered statistically good according to Kaiser's classifications, and Bartlett's test was significant ($pvalue$< 0.001). Three factors were extracted which explain 56% of change occurring in the attitude towards COVID 19 of the surveyed participants. There were misconceptions about COVID19, infodemics of COVID19, and negative stereotyping. In addition, there were three factors that explain 61%of change occurring in behavior towards COVID19 of the surveyed participants. This was a response to the isolation strategy, anticipated stigma, and enacted stigma.

As Figure 2 and 3 shows misconceptions about COVID19 and infodemics of COVID19, it statistically describes person's attitudes positively (left) (β = 0.926, $p-value$<0.001) and (β = 0.170, $p-value$< 0.001) respectively. However, negative stereotyping showed no role in describing attitudes of the members towards COVID19 (β = 0.004, $p-value$> 0. The Confirmatory factor analysis (CFA) ran using Smart Pls 3.0 indicated that three factors statistically describe the behavior of the participants positively (Right). These three factors were in response to the isolation strategy (β =0.664, $p-value$<0.001), anticipated stigma (β=0.395, $p-value$< 0.001), and enacted stigma (β=0.244, $p-value$<0.001).

Figure 2 & 3: Describe the attitude and behavior.



Main channel of information:

Sources	Responses		Percent of Cases
	N	Percent	
Friends	643	17.7%	53.6%
Family	631	17.3%	52.6%
Radio	341	9.4%	28.4%
Television	980	26.9%	81.7%
Social media	827	22.7%	68.9%
Doctor	191	5.2%	15.9%
Other/select	27	0.7%	2.3%
Total	**3640**	**100.0%**	**303.3%**

Table1: Source of information about the COVID19

Most of the participants (81.7%, n=980) indicated that they heard about COVID19 from the television and this choice represents the mode of the participants' selections with (26.9%) of the total responses. Breakdown of the responses indicated that social media represents 22.7% of the total responses (68.9% of cases). Since there were 3640 and 1200 participants, each participant ticked at least three sources of information about COVID19.

Bivariate analysis of attitude and behavior towards COVID-19:

In the bivariate analysis, using the chi-squared and Fischer's exact tests as Table 2below presents, while work status had no significant association with attitudes and behavior towards COVID19 ($pvalue$> 0.10), gender statistically associated with attitudes towards COVID19 (χ2=5.61, df=1, $pvalue$<0.05) but has no significant association with behavior ($p-value$> 0.10). Concerning locality, age, monthly income, person's education, marital status, and number of family members there was a highly statistical relation between attitudes and behavior towards COVID19 ($pvalue$< 0.001). In regards to sector there was a high statistical association with attitude ($pvalue$<0.001), and statistical association of $pvalue$<0.05 with the behavior.

Multivariate analysis of factors associated with attitudes towards COVID19: Logistic Regression Approach

Multivariate analysis was performed using

the binary logistic regression using the forward stepwise method with a likelihood ratio approach at a p value less than 0.25 in the bivariate analysis using chi-square test and Fisher's exact test was included in the multivariable analysis.

The model obtained is of a better fit than the baseline model, since the -2LL value for the selected model was 814.7. In addition, the Nagelkerke's $R2$ suggests that the model explains roughly 24.4% of the variation in the outcome variable (i.e. attitudes towards COVID19).

Among the 10 factors presented in Table 3, the regression model indicated that three variables have significant effect on attitudes towards COVID19. Monthly income statistically has effect on attitudes towards COVID19 (Wald=17.65, DF=3, p <0.001). Those who earned between 2000-2999 SDG a month were 2.25 times more likely to have negative attitudes towards COVID19 (β = 0.809, p <0.001, AOR=2.25,95% C.I.; 1.48 -3.41,). Educational Level statistically has significant effect on attitudes towards COVID19 (Wald=41.02, DF=4, p<0.001). Those who were uneducated (p value <0.001), had below secondary school certificate (p value <0.001), had secondary school certificate (p value <0.001), and had Bachelor/Diploma certificate (p value <0.05) were more likely to have a negative attitude towards COVID19, regarding marital status those that were single were found to have a negative effect on attitudes towards COVID19 (= −0.783, $pvalue$<0.001). In addition, those who were divorced were 2.39 times more likely to have negative attitudes towards COVID19 in comparison to those who were married (β=0.870, p <0.05, AOR=2.39, 95% C.I.;1.12-5.07).

Multivariate analysis of factors associated with behavior towards COVID19: Logistic Regression Approach

Logistic regression with forward LR method was used. Model obtained was better fit than the baseline model, since the -2LL value for the selected model was 746.3 In addition, the Nagelkerke's $R2$suggests that the model explains roughly 34.4% of the variation in the outcome variable (i.e. behavior towards COVID19).

Five variables have significant effect on behavior towards COVID19. Gender statistically has negative effect on behavior. Males were 0.62 less likely to have poor behavior when being compared with females (β = −0.48, p <0.05, AOR=0.62, 95% C.I.; 0.43 -0.89). Age generally has significant effect on behavior (Wald=25.98, DF=4, p <0.001). Those who were between 40 to 49 years

of age were 2.55 more likely to have poor behavior in comparison with those of older age (β = 0.94, p <0.05, AOR=2.43, 95% C.I.; 1.23-5.28).

Furthermore, monthly income statistically had an effect on behavior towards COVID19 (Wald=20.24, DF=3, p<0.001). Those who earned between 2000-2999 SDG a month were2.83 times more likely to have poor behavior towards COVID19 (β = 1.04, p <0.001, AOR= 2.83, 95% C.I.; 1.77 -4.52). In addition, residential area (locality) statistically has significant effect on behavior (Wald=16.23, DF=2, p <0.001). People in Bahri were 2.36 times more likely to have poor behavior comparing with those who were in Khartoum locality (β = 0.86, p <0.001, AOR=2.36, 95% C.I.; 1.54 -3.64). Participants' who had positive attitudes were 0.2 times less likely to report poor behavior (β=−1.61, p<0.001, AOR=0.20,95%C.I.; 0.14-0.29).

Determinants of behavior: Decision Tree Analysis Approach:

In Decision Tree analysis, the researchers entered ten independent variables and four variables of them namely attitudes, locality, age, and gender were included in the final model. The other six variables did not make a significant contribution to the model, so they were automatically dropped. The tree diagram (graphic representation of the tree model) showed that using the CHAID method, attitudes was the best predictor of behavior towards COVID19. For the negative attitude category, the next best predictor was locality. In Omdurman locality slightly greater than three-quarters of those who had negative attitude showed poor behavior

(75.9%), while in Khartoum locality slightly greater than three fifths of those who have negative attitudes have poor behavior (60.7%). Since there are no nodes below the Bahri locality node, therefore it considered a terminal node.

Furthermore, for Omdurman locality the next best predictor is participants' age. For all categories of age, the percentages of participants who have poor behavior varied between (52.3%) for those who were in 20-29 years and (88.8%) for who were in the next upper categories of age (30-39 and 40-49). Since there are no child nodes below age node, therefore it considered a terminal node. For Khartoum locality, the next best predictor is participants' gender. Proportion of females who reported poor behavior was (68.6%) among the group of females who classified as negative attitudes (n=105), while among the group of males who

classified as negative attitudes (n=68) more than the half of the participants had good behavior (n=35, 51%).

Table2: Chi-square Test results

Characteristic(N=1200)	Dependent variable: Attitudes towards COVID19			Dependent variable: Behavior towards COVID19		
	Chi-square	DF	P value	Chi-square	DF	P value
Locality	21.5	2	0.000	37.6	2	0.000
Gender	5.6	1	0.018	1.2	1	0.278
Age	125.7	4	0.000	94.5	4	0.000
Work status	2.7	1	0.101	0.1	1	0.803
Sector	14.4	2	0.001	7.5	2	0.024
Monthly income	36.9	3	0.000	42.5	3	0.000
Educational level	124.8	4	0.000	62.4	4	0.000
Marital status	97.2	3	0.000	78.1	3	0.000
Number of family members	97.2	3	0.000	10.2	2	0.006
Attitudes	NA	NA	NA	210.0	1	0.000

Explanatory Variables	Q	S.E.	Wald	df	P value	AOR	95% C.I. for AOR	
							Lower	Upper
Monthly Income			17.65	3	0.001			
<1000 SDG	0.374	0.335	1.25	1	0.264	1.45	0.75	2.80
1000-1999 SDG	-0.225	0.271	0.69	1	0.407	0.80	0.47	1.36
2000-2999SDG	0.809	0.214	14.32	1	0.000	2.25	1.48	3.41
Educational Level			41.02	4	0.000			
Uneducated	2.524	0.790	10.19	1	0.001	12.47	2.65	58.72
Below Secondary School	2.328	0.440	27.95	1	0.000	10.26	4.33	24.32
Secondary School	1.284	0.314	16.71	1	0.000	3.61	1.95	6.68
Bachelor/Diploma	0.611	0.242	6.37	1	0.012	1.84	1.15	2.96
Marital status			31.21	3	0.000			
Single	-0.783	0.184	18.12	1	0.000	0.46	0.32	0.66
Divorced	0.870	0.384	5.13	1	0.024	2.39	1.12	5.07
Widowed	0.695	0.839	0.69	1	0.408	2.00	0.39	10.38

Table3: Factors determined attitudes towards COVID-19

Explanatory Variables	B	S.E.	Wald	Df	Sig.	Exp (B)	95%C.I.for EXP(B)	
							Lower	Upper
Gender	-0.48	0.186	6.59	1	0.010	0.62	0.43	0.89
Age			25.98	4	0.000			
Below20years	1.08	0.660	2.66	1	0.103	2.94	0.81	10.71
20-29years	-0.33	0.307	1.19	1	0.275	0.72	0.39	1.31
30-39years	0.38	0.328	1.35	1	0.246	1.46	0.77	2.78
40-49years	0.94	0.371	6.34	1	0.012	2.55	1.23	5.28
Income			20.24	3	0.000			
<1000 SDG	0.68	0.348	3.84	1	0.050	1.98	1.00	3.91
1000-1999 SDG	0.31	0.278	1.23	1	0.267	1.36	0.79	2.35
2000-2999SDG	1.04	0.240	18.78	1	0.000	2.83	1.77	4.52
Locality			16.23	2	0.000			
Bahri	0.86	0.220	15.26	1	0.000	2.36	1.54	3.64
Omdurman	0.26	0.226	1.28	1	0.259	1.29	0.83	2.01
Attitudes	-1.61	0.184	76.70	1	0.000	0.20	0.14	0.29

Table 4: Factors determined behavior towards COVID-19 Logistic Regression

Discussion:

Currently, the widespread of propagating COVID19 outbreak has constituted a major public threat worldwide. Effective prevention and control of COVID-19 is achieved through increasing the populations encourage positive attitude, and behavior towards COVID19. It is believed that this study is a path finder community based study to be carried out in Sudan, which demonstrates attitude and behavior during the COVID-19 outbreak.

According to the findings of this study, among the attitude being investigated, greater than half (56.7%) of the participants have negative attitudes, while 47.3% the remaining have positive attitudes. This result is higher than that of other studies conducted in Saudi Arabia (13), China (14) (81%) and (74%) respectively. Where the majority of participants had an optimistically positive attitude and were confident that the disease is curable and that their country will manage this outbreak. In Saudi Arabia, approximately 81% of participants had high confidence that the virus can be successfully controlled, and 97% are convinced that the Saudi government will control the outbreak. This discrepancy might be attributed by selecting certain stratum from their communities, which did not reflect the actual situation. More, they thought that the capabilities and preparedness health system and rapid response for such outbreaks and also these affluence countries and they have capabilities for prompt interventions.

The results indicate the behavior of participant regarding COVID 19 was categorized in to two; poor was noted in 55% (95% CI,52.5%−58.1%), whilst the good behavior was found in 45%. The results are in coherent with Ethiopian study done by Akalu et al. (15) which was reported poor behavior in (47.3%). This result could be explained by the similarity of social context of the two populations regarding customs, traditions and lifestyle. However, other studies found poor behavior less than what was found in this study. For example, other studies conducted in Nigeria (16) and Uganda (17) reported that poor behavior was seen in 17.7% and 14.7% correspondingly. These discrepancies could be as cribbed to the difference sources of information channels, intensively awareness and panic of COVID19 outbreak.

This study found three factors are negatively affected behavior regarding COVID19 (61%) of the total variance clarified, which were reported in; isolation strategy anticipated stigma and enacted stigma. The over whelming of pessimistically behavior was entirely focused on the isolation strategy, thus refusal to be put in quarantine facility,

besides the most the imagined phantom image of the isolation environment, lack of confidence in health authorities' competency. This may be due to the fact that the health authorities did not take into account the use of effective mechanisms to reflect the ideal image of isolation centers. However, many studies have been conducted among those who had been quarantined found that there is a high prevalence of psychological symptoms (18), emotional disturbance (19), depression (20), stress (21), low mood (22), anger (23), and emotional exhaustion (24).Demographic characteristics show case that males have less likely poor behavior as compared to their females' counter parts (β=−0.48, p<0.05, AOR=0.62,95%C.I.;0.43-0.89). This finding is inconsistent with other authors' findings (25, 26). Further, also corresponding to other epidemiological studies which declared that females prone to poor behavior compared to males (27), this disparity might be attributed to those males who had been exposed to extensive awareness.

This study found that attitude was the best predictor of behavior towards COVID19. While for negative attitudes category, the next best predictor is locality. However, Omdurman locality was found greater than three-quarters of the inhabitants had had negative attitudes and poor behavior (75.9%) compared to other localities. This variance might be attributed to that; Omdurman is more populated compared to others. Further, in one study was conducted in China (28), found that the variability of spatial has a role in behavioral variation. This study reported that, the monthly income played major role in determining the individuals' behaviors, participants earned between 2000-2999 SDG a month were 2.83 times more likely to have poor behavior towards COVID19 compared with those who earned 3000 SDG and above (β=1.04, p<0.001, AOR=2.83, 95%C.I.;1.77-4.52). Furthermore, this result is supported enormous studies carried out in Ethiopia (29), Malaysia (30) and United States (31), which reported that participants with low income have tendency of poor behavior of COVID-19.

This study found that participants aged between 40 -49 years were 2.55 more likely to have poor behavior compared with those who were in the upper class of age (β=0.94, p<0.05, AOR=2.43, 95% C.I.; 1.23 -5.28). This point could be explained by the virulence of the disease because those who are elder are more vulnerable to the infection. This finding was similar to a study conducted in Saudi Arabia (32) that revealed good practicing behavior among both the elderly and young as it affects both; therefore, to avoid getting this infection, their practicing behavior was better.

Previous studies have shown different source of obtaining knowledge. This study was conducted on first months of outbreak. The main source of information in this study was reported in TV (81.7%) followed by social media (68.9) in addition to at least each participant receives information from three different channels. This finding is supported by previous studies performed in Ethiopia (33), and Egypt (34).

These studies represented social media platforms and internet as the most important sources for gathering information. This difference might be due to a difference in study populations' socioeconomic and educational status, and can be explained by the time of data collection was prompt strict lockdown where people were mostly on televisions which implies that there could be more infodemic and various non-official sources of information are available giving the chance of having inaccurate information spread and rumors. In this study, infodemic and misconception were the main contributors in formulating negative attitude. Now, there has been an increase in the internet access and the usage to receive information about infection control (35). Moreover, nowadays internet is widely available and used to gain knowledge on evolving disease by countless people. This has been verified from multiple studies which were published about the disease in China (36). Again, this reflects the effectiveness of the message provided by the different media platforms, which was confirmed by the negative assumptions that media is overstressing the risk (16.8%only thought that media outlets exaggerate the danger of the disease).

Misconceptions about COVID19 statistically describe person's attitudes positively (β=0.926, $p - value<$ 0.001); therefore, misconception was the main contributor informing negative attitude.

Participants perceptions were varied, 28% believed that the disease is a life-threatening danger, potentially fatal and the prognosis was recorded in 31%.Up to 19% of our participants were convinced that the outbreak is a political lie, 42.5 % agreed that the disease is God's punishment and about (18.5%)of participants thought; the infection is associated with stigma. Several prior studies have been conducted are in covenant with this finding (37, 38, 39, 40).

Stigma (anticipated and enacted) was also extracted as factors changing behavior because stigma hurts everyone by creating more fear or anger toward ordinary people instead of focusing on the disease that is causing the problem. Stigma can also make people more likely to hide

symptoms or illness, keep them from seeking health care immediately, and prevent individuals from adopting healthy behaviors. It also makes them practicing certain negative behaviors, such as distancing everyone who has been exposed to illness, even if he was cured, impeding ambulances and rejecting them in their areas. Our finding is in line with enormous authors' results that were conducted elsewhere (41, 42).

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Ethical Statement

Written informed consent was obtained from the individual(s) for the publication of any potentially identifiable images or data included in this article. According to the World Health Organization Guidelines on Ethical Issues in Public Health Surveillance, a surveillance study in emergency outbreak situations is clearly exempted from ethical review and oversight (WHO guidelines on ethical issues in public health surveillance. Geneva: World Health Organization; 2017.Licence: CCBY-NC-SA 3.0IGO

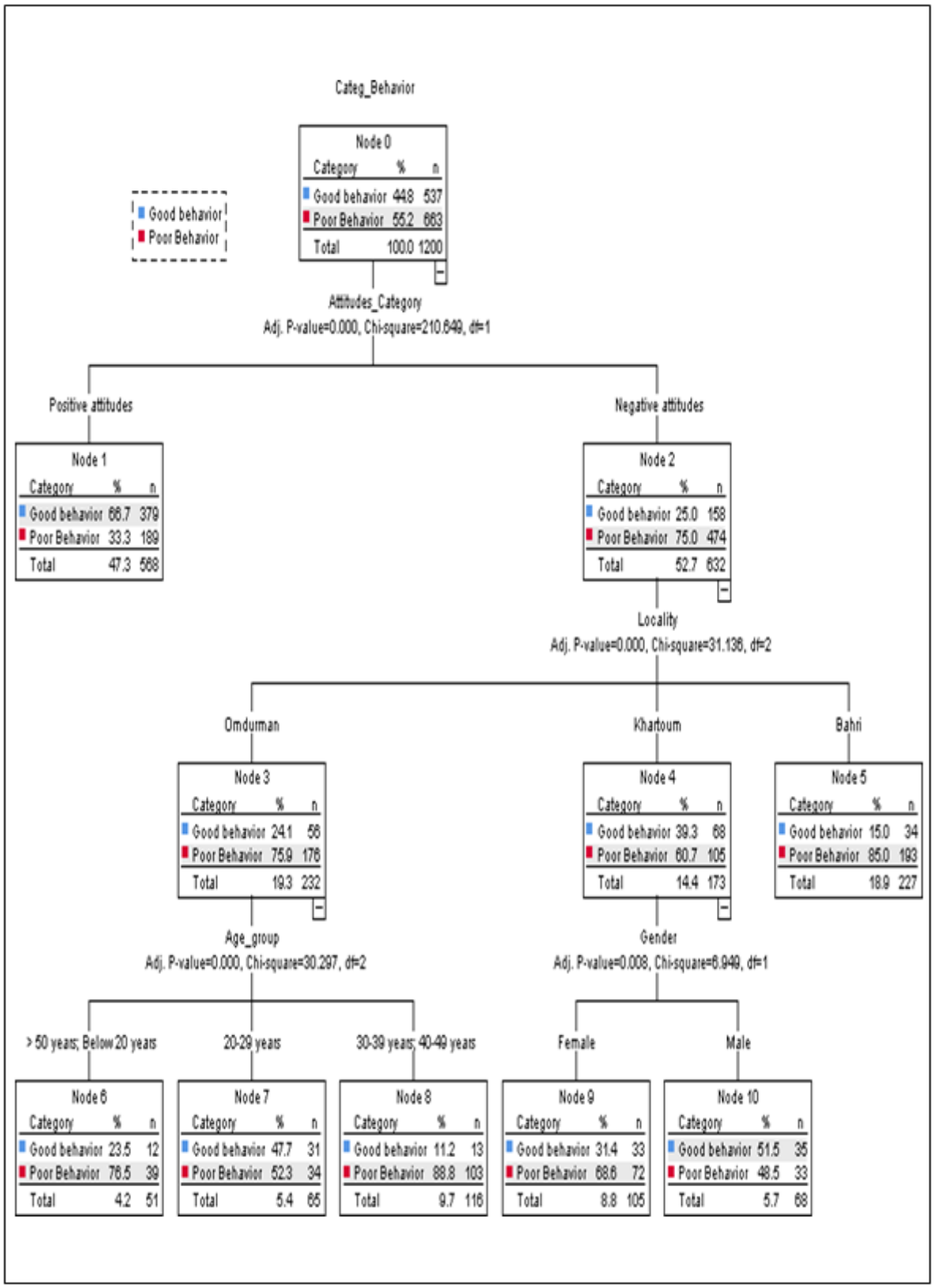

Figure 3: Determinants of Behavior-Decision Tree Map

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