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Level of Acceptance of COVID-19 Vaccine and Its Determinants among High Risk Groups for Severe COVID-19 Infection Living in Mogadishu Somalia

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Abstract

The severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) pandemic, which is widely referred to as "COVID-19", has been infecting more than 5.5 million over 144 countries. A vaccine is considered to be the most awaiting intervention and hundreds of global R&D institutions engaged in unprecedented speed to develop the vaccine. The availability of COVID-19 vaccines may not translate into its uptake. Although governments will provide the vaccines, their uptake is voluntary. **Objective:** This study was carried out to evaluate the level of acceptance of COVID-19 vaccine and it's determinants among high risk groups for severe COVID-19 infection living in Mogadishu Somalia. **Methods**: The study was cross-sectional, descriptive analysis conducted to obtain reliable information about the acceptance of COVID-19 vaccine and it is determinants among high-risk groups living in Mogadishu, Somalia. The calculated sample size was 404 using Cochran's formula = $Z^2p(1-p)/d^2$ and addition of 5% non-respondent rate. According to PESS population estimate in 2020, there are 17 districts. We grouped them into 2 strata and through simple random sampling one district was selected from each strata. After randomly selecting the two districts, three sub districts were randomly selected from each and then every second house (1, 3, 5) in the main roads will be selected. If target population were not found in the second selected house, the next house will be taken until sample size is obtained. **Results:** 59.4% of respondents were willing to accept and take vaccination while

40.6% of them were not accepting the vaccination. Being afraid of the side effect was the most common reason for not accepting the vaccine **Conclusion:** More than one third of respondents (40.6%) were not willing to accept the vaccination, knowledge towards COVID-19 was strongly associated with acceptance level of COVID-19 vaccine. **Recommendation:** Multi-sector organized awareness campaigns involving FMH as well as local authorities and civil society to enhance level of knowledge of community towards COVID-19.

Keywords

COVID-19, Vaccine, Acceptance, High Risk Group, Severe COVID-19 Infection, Knowledge, Comorbidities

1. Introduction

1.1. Background

The severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) pandemic, which is widely referred to as "COVID-19", has been infecting more than 5.5 million over 144 countries [1] [2] [3]. The pandemic poses a significant threat to the public health system, including catastrophic economic consequences around the world [4].

A vaccine is considered to be the most awaiting intervention; numerous studies have shown several factors responsible for vaccine acceptance when a new vaccine is introduced [5]. These include the safety and efficacy of the vaccine, adverse health outcomes, misconceptions about the need for vaccination, lack of trust in the health system, lack of knowledge among the community on vaccine-preventable diseases [6]. Misinformation leading towards vaccine hesitancy could put public health at risk in responding to the current crisis [7].

The availability of COVID-19 vaccines may not translate into its uptake. Although governments will provide the vaccines, their uptake is voluntary [8]. Indeed, several studies have demonstrated that not all health care workers are ready to accept COVID-19 vaccines when made available in their country [8] [9].

In Somalia, an online survey showed about one quarter of respondents may refuse to be vaccinated for COVID-19 when the vaccine eventually becomes available in Somalia [10].

1.2. Statement Problem

Countries must come together and avoid the temptation of "vaccine nationalism," because the health of people and the economy will not be safe until everyone, everywhere has access to the tools necessary to end this pandemic [11].

The availability of COVID-19 vaccines may not translate into its uptake. Although governments will provide the vaccines, their uptake is voluntary [12]. In-

deed, several studies have demonstrated that not all health care workers are ready to accept COVID-19 vaccines when made available in their country [8] [9].

In Somalia, an online survey showed about one quarter of respondents may refuse to be vaccinated for COVID-19 when the vaccine eventually becomes available in Somalia [10].

There is a need for generalized community level data regarding the acceptance level of COVID-19 vaccine as well as it is determinants among high-risk group for sever COVID-19 infection.

1.3. Objective

1.3.1. General Objective

To assess level of acceptance of COVID-19 vaccine and its determinants among high risk groups for severe COVID-19 infection living in MOGADISHU SOMALIA.

1.3.2. Specific Objective

1) To identify the demographic determinants that are associated with level of acceptance of COVID-19 vaccine among high risk groups for severe COVID-19 infection living in MOGADISHU SOMALIA.

2) To determine the level of knowledge of towards COVID-19 vaccine among high risk groups for severe COVID-19 infection living in MOGADISHU SOMALIA.

3) To find-out the level of acceptance of COVID-19 vaccine among high risk groups for severe COVID-19 infection living in MOGADISHU SOMALIA.

2. Literature Review

COVID-19 erupted in the City of Wuhan in China around the date 31st December 2019. The situation became critical due to numerous infected cases in the "Huanan Seafood Market" [13].

Since its outbreak in Wuhan province of China in December 2019, the coronavirus pandemic has rapidly spread throughout the world, hampering economic activities, causing changes in the patterns and modes of social interaction, affecting political processes, such as by forcing governments of some countries to postpone election activities, and above all, causing the deaths of millions of people [14].

Although countries have been taking various intervention measures to prevent the rapid spreading of the virus, including travel bans and economic lockdowns, declaring states of emergencies to enforce compulsory wearing of face masks, keeping social/physical distance, prohibition of public gatherings, and closure of schools, community spread together with pandemic fatigue have rendered some of these interventions less effective and the need for vaccines is more evident than ever [15].

A vaccine for COVID-19 should be viewed as a global public good. For this

reason, public institutions should identify and address any potential gaps and barriers, such as the risk of corruption in distribution and allocation processes, to ensure that populations have equitable access to vaccines [16].

Addressing corruption is a priority in times of crisis. This notion was reinforced in the Statement on Corruption in the Context of COVID-19 issued by the Secretary-General in October 2020 when António Guterres underscored that, "(corruption) is even more damaging in times of crisis—as the world is experiencing now with the COVID-19 pandemic." He also noted that the pandemic is creating new opportunities for corruption [17].

The availability of COVID-19 vaccines may not translate into its uptake. Although governments will provide the vaccines, their uptake is voluntary [8]. Indeed, several studies have demonstrated that not all health care workers are ready to accept COVID-19 vaccines when made available in their country [8] [9]. For example, a study conducted in the Democratic Republic of Congo found that approximately 28% of health care workers were willing to receive the COVID-19 vaccine if available [18]. Reasons for hesitancy to accept COVID-19 vaccines have been identified to include concerns over vaccine safety and side effects and speed of vaccine development/approval [19].

As vaccines are being distributed around the world, there is a debate on who should receive vaccination first [20]. The US Centers for Disease Control and Prevention (CDC) suggested that frontline healthcare workers and groups that are most at risk, such as those aged 60 and above, and persons with certain medical conditions should be prioritized [21]. This should rapidly decrease hospitalizations and deaths, allowing societies to reopen and regain a sense of normalcy. Albeit aiming for herd immunity, there are reports showing hesitancy in accepting the vaccination.

In Somalia, an online survey showed about one quarter of respondents may refuse to be vaccinated for COVID-19 when the vaccine eventually becomes available in Somalia [10].

3. Methodology

3.1. Study Site and Design

The study will be conducted in Mogadishu, the capital of Somalia. It is a coastal city in east Africa. It is home to over a 2 million inhabitants according to PESS Somalia population estimate 2020. A cross-sectional analytic study design conducted to obtain reliable information about the acceptance of COVID-19 vaccine and it is determinants among high-risk groups for severe COVID-19 infection.

3.2. Target Population and Sample Size Calculation

The target population is all high-risk groups for Severe COVID-19 according to WHO and Somalia Vaccine eligibility guideline (over 50 years and those with medical comorbidities such as Diabetes, hypertension, obstructive or restrictive lung diseases, renal failure, organ transplant HIV and other acquired or conge-

nital Immunodeficiency syndromes), that are living in Mogadishu Somalia. Since the target population is unknown using Cochran's formula ($Z^2p(1-p)/d^2$) and addition of 5% non-respondent rate the calculated the sample size was 404.

3.3. Sampling Procedure

According to PESS population estimate in 2020, there are 17 districts in Mogadishu, which are grouped into two strata and through simple random sampling one district was selected from each strata. After randomly selecting the districts (Hodan and Wadajir) three sub districts were randomly selected from each (Xaawa-taako, Tima cade, Jeneral daa'uud form Wadajir and Kacaan, Taleex and October from Hodan) and then every second house (1, 3, 5) in the main roads will be selected. If target population were not found in the second selected house, the next house will be taken until sample size is obtained

3.4. Inclusion Criteria and Data Collection Method

All high-risk groups for severe COVID-19 infections that are living in Mogadishu who are willing to participate voluntarily in our study are included. Those cannot or denied to participate are excluded.

Structured questioner was utilized and carried out by trained research assistances, with the help and guide of the researcher.

3.5. Assessment of Level of Acceptance COVID-19 Vaccine

In the assessment of acceptance of the vaccine, we developed a scoring system in accordance with response of the participants to level of acceptance of COVID-19 vaccine section in the questioner. Respondents with minimum of 60% score were considered to be accepting and willing to take the vaccination while those with less score percentage were considered to be unwilling to take the vaccination.

3.6. Data Analysis and Processing

The raw data was entered to the SPSS program of statistics version 20, in order to analyses data. After data entry, the data was processed and the required information was obtained through the SPSS program. A comparison between the groups was made using the Pearson chi square, a descriptive statistics, association between dependent and independent variables was analyzed by calculating the Odd ratios and 95% confidence level. The processed information was presented through tables and charts.

3.7. Ethical Consideration

Ethical approval for the study was obtained from the researchers and ethics committee of Ministry of health.

3.7.1. Informed Consent

To get signed letter of informed consent of the respondent, the researcher assis-

tances introduced themselves to the participants and the study was explained to the participants on the procedure. They were also informed about the criteria of being selected to participate in the study, procedures to follow and any risks and benefits, which may be, involve during the study. They also being informed about the duration of the study, and they were assured that confidentiality was ensured.

3.7.2. Anonymity

In this study, we used identity numbers instead of names in order to protect participant's identity.

4. Results and Findings

4.1. Demographic Characteristics

Respondents with co-morbidities were the least accounting for 21% (404) of participants while 79% (404) of them were over 50 year.

Speaking of gender male participants were only 24.5% (404) making female to be the majority of respondents 75.5% (404).

Participants were mostly from Hodan district compared to Wadajir in accordance with their total population and sample proportion.

More than quarter of participants 26.3% (404) were having an average monthly income of less than $50 a month while only 38.2 % (404) of them were having an average income of more $150 a month.

According to level of education, more than one third of participants 39.3% (404) had only informal education while only 1% (404) of respondents were postgraduates.

Speaking of living condition majority of participants were living with their family 97% (404) leaving only 3% (404) of participants that were living alone.

The demographic characteristics of respondents are described in Table 1 below.

4.2. Level of Knowledge towards COVID-19

35.6% (404) of participants think that COVID-19 can't cause death and 24.5% (404) think it's disease of disbelievers while 60.4% (404) of them believe that COVID-19 is contagious respiratory disease while only 3.2% (404) of participants did not have any knowledge about COVID-19.

21.8% (404) of respondents think that COVID-19 is not transmittable or contagious disease while majority 78.2% (404) know that COVID-19 is contagious transmittable respiratory disease.

Among those know that COVID-19 is contagious disease 27.5% (316) of them think that it's transmitted through fecal-oral route.

Regarding the knowledge towards common symptoms of COVID-19 78.72% (404) know that it's common symptoms include dry cough, fever, body ache, running nose.

Table 1. Determines the demographic characteristics of the participants.

Variables		Frequency	Percentage
High risk group	Over 50 years	319	79% (404)
	Co-morbidities	85	21% (404)
	Total	404	100% (404)
Gender	Male	99	24.5% (404)
	Female	305	75.5% (404)
	Total	404	100% (404)
District	Hodan	247	61.1% (404)
	Wadajir	157	38.9% (404)
	Total	404	100% (404)
Marital Status	Single	22	5.4% (404)
	Married	260	64.4% (404)
	Divorced	95	23.5% (404)
	Widowed	27	6.7% (404)
	Total	404	100% (404)
Average Monthly income	<$50	149	26.3% (404)
	>$50 - 150	178	35.5% (404)
	>$150	77	38.2% (404)
	Total	404	100% (404)
Living condition	Alone	12	3% (404)
	With family	392	97% (404)
	Total	404	100% (404)
Employment status	Un employed	289	71.5% (404)
	Employed	115	28.5% (404)
	Total	404	100%
Level of education	Informal	159	39.3
	Primary	124	30.7
	Secondary	88	21.8
	University	29	7.2
	Postgraduate	4	1%
	Total		

More than one third of respondents think that COVID-19 is not vaccine preventable disease 45.8% (404) while 52.8% of them know that COVID-19 is vaccine preventable disease.

In assessing the level of knowledge of respondents towards COVID-19 response of the participants with their percentage is described in Table 2.

Score of knowledge

In the assessment of knowledge, seven questions were utilized. Participants who give the correct answer to minimum of 6 question were considered to having Good knowledge while those who get the correct response in 4 to 6 of the questions are having average knowledge and those with less than or equal to 3 questions were considered to be having poor knowledge towards COVID-19.

Table 2. Describes the level of knowledge towards COVID-19.

Knowledge towards COVID-19	Frequency	(%)
COVID-19 is		
Disease of disbelievers	99	24.5% (404)
Contagious respiratory disease	244	60.4% (404)
Disease caused by the evil	48	11.9% (404)
I don't know	13	3.2% (404)
COVID-19 can cause death		
Yes	246	60.9% (404)
No	144	35.6% (404)
I don't know	14	3.5% (404)
COVID-19 is transmittable		
Yes	316	78.2% (404)
No	88	21.8% (404)
If yes it's transmitted trough		
Respiratory droplets or contacts with infected surface	217	68.7% (404)
Fecal-oral route	87	27.5% (404)
I do not know	12	3.8% (404)
COVID-19 is manageable		
Yes	268	66.3% (404)
No	136	33.7% (404)
Common symptoms of COVID-19		
Dry cough, fever, body ache, running nose	318	78.72% (404)
Diarrhea, Vomiting, and loss of appetite	85	21.04% (404)
I do not know	1	0.24% (404)
COVID-19 is vaccine preventable		
Yes	219	54.2% (404)
No	185	45.8% (404)

Respondents with good knowledge towards COVID-19 were the least among the participants accounting for only 25.7% (404) while majority 43.6% (404) had average knowledge regarding COVID-19.

Figure 1 presents the score of knowledge towards COVID-19 among respondents.

4.3. Level of Acceptance of COVID-19 Vaccine

In the assessment of Acceptance of COVID-19 vaccine three questions were utilized with different scoring. The right answer to the last question gives the participants a score of 60 points while the remaining two give 20 points each , the last question determines where the respondent is ready to take the vaccine and the first two will measure how ready for.

Only 24.5% of participants were willing to even pay to get vaccinated against COVID-19 and 27% (404) were ready to look for vaccine if told that there might COVID-19 Vaccine available in the country.

Only 59.4% (404) of participants were accepting and willing to take the vaccine while 40.6% (404) of them were not the vaccine at all.

Over half of those that are not accepting the vaccine 52.4% (164) were doing so because they were afraid of the side effects while 18.9% of them believed that the vaccine is ineffective.

Assessment of level of accepting of COVID-19 vaccine is described in Table 3.

Reasons for not accepting the vaccine were formulated using literature articles as well as pilot test to acquire the most common reasons for not accepting the vaccine.

Bivariate analysis

In this, section the association between the determinant factors and the acceptance of COVID-19 vaccine was evaluated.

A chi square test showed that there is no statistically significant association between risk group and the level of acceptance of COVID-19 vaccine since the P value is greater than 0.05 (0.756).

While in the assessment of monthly income a chi square test shows there is a strong statistical significant association between average monthly income and

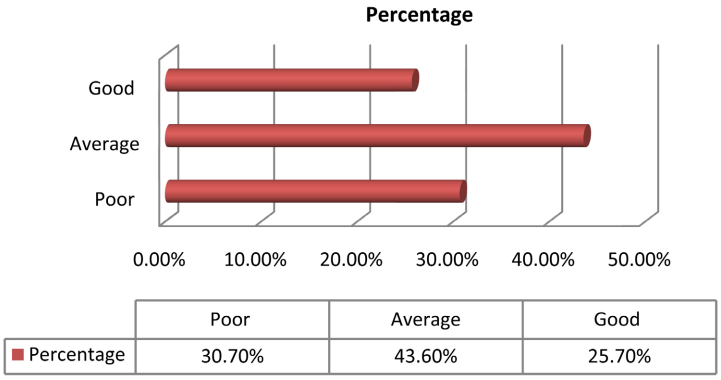

Figure 1. Describes score of knowledge towards COVID-19.

Table 3. Demonstrates level of acceptance of COVID-19 vaccine.

Level of Acceptance of COVID-19 vaccine	Frequency	(%)
Would you pay to get vaccinated against COVID-19		
Yes	43	24.5% (404)
No	361	60.4% (404)
If you were told that there might COVID-19 Vaccine available in the country would you look for it		
Yes	109	27% (404)
No	295	73% (404)
Would you take COVID-19 Vaccine if made available to you		
Yes	240	59.4% (404)
No	114	28.2% (404)
Maybe	50	12.4% (404)
If no why		
I don't believe in vaccinations	47	28.7% (404)
Afraid of side effect	86	52.4% (404)
Being ineffective	31	18.9% (404)
Score of Acceptance		
≥60% (Accepting and willing)	240	59.4% (404)
<60% Not accepting at all	164	40.6% (404)

the level of acceptance of COVID-19 vaccine since the P value is less than 0.05 (0.01). Respondents with average monthly income of less than $50 are 5.6321 times more likely to not accept the vaccination with a confidence level of 95%.

In the assessment of association test between score of knowledge towards COVID-19 chi square test shows that there is a strong statistical significant association between the score of knowledge and level of acceptance of COVID-19 vaccine with a P value of less than 0.05 (0.0002). The respondents with good knowledge score, were 12.69 times more likely to accept the vaccination with a confidence level of 95%.

Table 4 details the bivariate association between the variable with the significance level of the association.

5. Discussion

Despite the free delivery of COVID-19 vaccine the level of Acceptance and willing to take the vaccine is low since almost half (40.6%) of participants were not accepting or willing to take the vaccine while 59.4% (404) of them were accepting and willing to take the vaccine.

Table 4. Details the association test between the determinants and level of acceptance.

Determinants of level of acceptance of COVID-19 vaccine	Association test	
	Sig or P-value	Chi square
High risk group	0.756	1.36
Over 50 years		
Co-Morbidities		
Gender: Female to male	0.187	4.162
District	0.943	0.8765
Hodan		
Wadajir		
Marital status:	1.006	
Single		
Married		
Divorced		
Widowed		
Average monthly income	0.01	5.6321
<$50		
$50 - $150		
>$150		
Living condition	0.670	1.4352
Alone		
With family		
Level of education	0.006	3.691
Informal		
Primary education		
Secondary education		
University level		
Postgraduate		
Employment	0.0892	2.07
Employed		
Un employed		
Score of Knowledge:	0.0002	12.69
Good		
Average		
poor		

In Contrast to our study finding an online survey conducted through social media showed about one quarter of respondents may refuse to be vaccinated for COVID-19 when the vaccine eventually becomes available in Somalia [10].

This is much less than our findings in level of acceptance of COVID-19 vaccine, since our data was community based and the online survey was conducted through snowballing using social media platforms in which university level students were their most participants.

The most common reasons for not accepting the vaccine was being afraid of the side effect which emphasis the effect of misleading information regarding the vaccine.

A study conducted in the Democratic Republic of Congo found that approximately 28% of health care workers were willing to receive the COVID-19 vaccine if available [8] [9]. Reasons for hesitancy to accept COVID-19 vaccines have been identified to include concerns over vaccine safety and side effects and speed of vaccine development/approval [11].

In the evaluation of the determinants of level of acceptance of the vaccine and association with acceptance level a chi square test showed that score of knowledge towards COVID-19 has the strongest statically association with level of acceptance of COVID-19. Furthermore as shown in the univariate section only 25.7% of participants had good level of knowledge of towards COVID-19. After the assessment we introduce the right knowledge of COVID-19 to the participants which had boosting effect on their accepting level of COVID-19 vaccine suggesting a strong association between knowledge towards COVID-19 and Acceptance of the vaccine as just like the statically analysis shown.

The struggle to survive or low monthly income have shown to have significant association with level of accepting if COVID-19 vaccine since respondents with average monthly income of less than $50 are 5.6321 times more likely to not accept the vaccination.

6. Conclusions

Almost half of respondents were not accepting or willing to take COVID-19 vaccine, being afraid of the side effects was the most common reason followed by not believing in the vaccines at all.

Knowledge towards COVID-19, average monthly income and level of education were shown to have significant association with level of acceptance of COVID-19 vaccine among respondents.

7. Recommendation

1) Multi-sector organized awareness campaigns involving FMH as well as local authorities and civil society to enhance level of knowledge of community towards COVID-19.

2) Dissemination of scientific based information regarding the COVID-19 vaccine to overcome the miss leading and biased information about the vaccine that

is widely spread and misleading the community.

3) Easily accessible vaccine distribution with technical and logistic responsibility and accountability to ensure safe and accessible vaccine delivery. This will certainly help the low-income sociality to have easy access vaccine.

4) More in-depth investigation as well broader geographic area with qualitative data to find-out the factors behind the low acceptance level of COVID-19 vaccine.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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Questioner

This research is meant for purely academic purposes. You are kindly requested to provide answers to these questions as honestly and precisely as possible. Responses to these questions will be treating as confidential

Demographic characteristics		Tick √
High-risk group	Over 50 years	
	Under lying medical condition	
Gender	Male	
	Female	
District	Wadajir	
	Hodan	
Marital Status	Single	
	Married	
	Divorced	
	Widowed	
Average Monthly income	<$50	
	>$50 - 150	
	>$150	
Living condition	Alone	
	With family	
Level of education	Informal	
	Primary Education	
	Secondary Education	
	University level	
	Postgraduate	
Employment status	Un employed	
	Employed	

Knowledge towards COVID-19		Tick √
Ever heard of COVID-19	Never heard before	
	Heard from the news and social media	
	Read or learnt about it	
What is COVID-19	Disease of disbelievers	
	Contagious respiratory disease	
	Disease caused by the evil	
	I don't know	

Continued

COVID-19 is serious disease that can lead to death	Yes No I don't know	
COVID-19 can spread from one person to another	Yes No I don't know	
If Yes COVID-19 is transmitted through	Blood transfusion Respiratory droplets (coughing and sneezing) I don't know	
COVID is un manageable condition	Yes No I don't know	
Sign and symptoms of COVID-19 include	Dry cough and fever Productive cough without fever Abdominal pain Body ache and lose of test and smell I don't know	
COVID-19 is Vaccine preventable disease	Yes No I don't know	

Level of Acceptance of COVID-19 Vaccine		Tick √
Would you pay to get vaccinated against COVID-19	Yes No	
If you were told that there might COVID-19 Vaccine available in the country would you look for it	Yes No Maybe	
Would you take COVID-19 Vaccine if made available to you	Yes No	
If no why	I don't believe in vaccinations Afraid of side effect Being ineffective	
Score of Acceptance	Good Average Not Accepting at all	