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Research Article

COVID-19 Vaccine Acceptance by Patients Attending a Primary Health Care Facility in Durban

Akm Monjurul Hoque^{1*}, Somaya Buckus², Maariyah Hoque³, ABM Mahbub ul Alam⁴, Nisha Singh⁵ and ME Hoque⁶

¹Medical Manager, Kwadabeka Community Health Centre, Kwadabeka, South Africa

²Medical Officer, Kwadabeka Community Health Centre, Kwadabeka, South Africa

³South African College of Applied Psychology, South Africa

⁴Associate Professor, National Institute of Kidney Diseases and Urology, Bangladesh

⁵School of Life Sciences, University of Kwa-Zulu Natal, Kwa-Zulu Natal, South Africa

⁶Senior Research Associate, Management College of Southern Africa, Durban, South Africa

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ABSTRACT

Introduction: There is no specific treatment and vaccine for COVID-19 yet. The prospective vaccine is the primary prevention and is the promising preventive strategy to gain herd immunity. The study aimed to identify COVID-19 vaccine acceptance rate among primary health care attendees at Durban, South Africa.

Method: A questionnaire based cross-sectional study was conducted at the Kwadabeka Community Health Centre, Durban, South Africa. Chi-square test and logistic regression were carried out to identify the factors for COVID-19 vaccine acceptability. P-values <0.05 were reported and considered statistically significant.

Results: Almost two-thirds (61.4%) of the participants reported that they would accept a COVID-19 vaccine. Logistic regression analysis found that respondents' attitude on whether "COVID-19 pandemic will be dealt with successfully" was 2.3 times more likely to accept the vaccine (OR=2.3, 95% CI: 1.3-3.8, p<0.05) and good practice on "use of a face mask to public places were 3 times more likely to accept the vaccine (OR=3.0, 95% CI: 1.5-6.1, P<0.05). On the contrary, knowledge on "only elderly people die from COVID-19 (False)" revealed that 44% were less likely to accept the vaccine (OR=0.56, 95% CI: 0.33-0.95, P<0.05) and practice on social distance "keep a distance of 1-2 m in public places" was 69% less likely to accept the vaccine (OR=0.31, 95% CI: 0.15-0.63, p<0.05).

Conclusion: The COVID-19 vaccine acceptance rate is comparable with other studies. However, community-based studies and a mass educational and communication campaign to promote the COVID-19 vaccination coverage to the general population are recommended.

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Introduction

South Africa (SA) is currently experiencing a rapid increase in COVID-19 cases during the month of August 2020. As of 18 August 2020, there are 589,886 cases (58% being female) and 11,982 deaths reported [1]. At present, there is no specific treatment for the condition, though some drugs are used to treat severely infected COVID-19 patients [2-5]. Primary prevention of COVID-19 using a vaccine is the most promising

strategy for controlling and preventing the pandemic. The present interventions such as social distancing, quarantine, isolation and principles of universal precautions are slowing down the spread of the virus to flatten the epidemic curve in South Africa (SA) [6]. It is believed that herd immunity within the population can be gained by COVID-19 virus infections as well as vaccinations. The pandemic may continue and may destroy the hard-won achievements in human history. The impact of COVID-19 on SA may differ from other countries, as it has a unique

*Correspondence to: Dr. Akm Monjurul Hoque M.B.B.S., M.Sc., M.P.H., Medical Manager, Kwadabeka Community Health Centre, 21 Pitlochry Road, 3629, Westville, South Africa; Tel: +27317143704; Fax: +27317143710; E-mail: mhoque75@gmail.com, monjurul.hoque@kznhealth.gov.za

situation such as having the highest prevalence of HIV (people living with HIV, with a significant proportion of them not on treatment as yet), and the highest burden of tuberculosis in the world [7, 8]. Also, known vulnerable medical conditions such as diabetes, hypertension and other chronic diseases, are highly prevalent in SA [9]. In an earlier study undertaken in SA it was estimated that a vaccine with a 70% efficacy could have the capacity to contain the COVID-19 outbreak with higher vaccination coverage of 94.44%. However, a lower vaccination rate of 66% will suffice with a vaccine of 100% efficacy [6].

Several countries and laboratories are in the process of finalising the development of COVID-19 vaccines [10-14]. It is, therefore, important that high vaccination coverage is achieved as soon as the vaccine become available in SA to halt or stop the pandemic. Successful vaccination among the population is one of the most known critical strategies. However, the mere availability of a vaccine cannot guarantee the uptake in less developed countries. Public perceptions towards COVID-19 vaccine uptake is not known in SA. Earlier studies from other countries on COVID-19 vaccine acceptance had identified several factors responsible for a new vaccine introduction [15-18]. These are namely, the vaccine safety and efficacy, misconceptions of the vaccine, side effects, lack of trust in the health system, and a lack of knowledge among the community on the infection or disease [18, 19]. For example, the vaccine against influenza A H1N1 was offered to 22 European countries in 2009, but vaccination acceptance rates were found between 0.4 to 59% [20].

There are only a few reports available on the acceptance of a COVID-19 vaccine. An Indonesian study found that 93.3% of the respondents would accept a vaccine with 95% efficacy [21]. The acceptance rate is lower (67%) if the effectiveness of the vaccine is lower (50%). Factors found associated with a higher acceptance of a vaccine are; vaccine efficacy, healthcare workers, perception of a high risk of COVID-19 infection, and if the vaccine is offered at no cost [21]. Retired employees are more hesitant than employed ones to accept the vaccine [21]. A study from China concluded that health care workers, people having good knowledge of COVID-19 infection, are associated with a higher acceptance of the COVID-19 vaccine (76.4%) than the general population (72.5%) [22]. A web-based survey conducted in Saudi Arabia reported that 64.7% of the participants would accept the COVID-19 vaccine [23]. A similar acceptance rate (67%) is also observed in the USA [24]. The willingness to accept the vaccine in Saudi Arab is found relatively higher (79.2%) among older age groups (45+ years), among married (69.3%), participants with a postgraduate degree or higher education (68.8%), non-Saudi residence (69.1%), and those employed in the government sector (68.9%).

The World Health Organization (WHO) suggested that to improve vaccination demand and combat hesitancy of the target population identification of individual risk perceptions, attitudes and motivations towards vaccination, access to reliable information with convincing messages and social influences should be determined [25]. The acceptance of a COVID-19 vaccine among the adult USA population was 67% however, acceptance rate was higher among males (72%), older (55 years and older) adults (78%), Asians (81%) and graduate degree holders (75%) [24].

As misinformation about COVID-19 may spread, it is thus important for SA public health officials and politicians to begin planning for effective communication and developing policies on vaccination (priority groups, targets of vaccination etc.) before a vaccine is introduced. The SA Government is found with known struggles with reaching high coverage of influenza vaccine as less than 5% of the adult population vaccinated in 2015 both at private and public sectors [26, 27]. Therefore, vaccination for COVID-19 presents an imminent danger that needs immediate action. The disease and vaccine-related health information and communication must reach all communities, especially the most vulnerable, people of all races, and all areas to prevent future infections, sufferings and deaths from COVID-19.

However, no study has been reported on COVID-19 vaccine acceptance in SA and particularly in this region. The objective was to determine acceptance of a COVID-19 vaccine among the attendees of a PHC facility.

Methods

I Study Design

A questionnaire based cross-sectional study was conducted at the Kwadabeka Community Health Centre (KCHC). This was part of a larger study that also assessed the knowledge, attitudes, practice and psychological impact of patients attending the KCHC. Data was collected from 4 September to 3 October 2020.

II Settings and Subjects

KCHC is situated in the community of Kwadabeka with a residence of almost 130,000 black population. Most of the residences consist of formal and (mainly) informal dwellings and they have a cultural tie with the rural people of KwaZulu-Natal (KZN) and Eastern Cape Provinces. Most of these residences are reliant on public health facilities at KCHC as free of cost. There are over 20,000 headcounts at the out-patient department (OPD) at the KCHC every month. The KCHC provides comprehensive free primary health care (PHC) service package based on national guidelines.

III Sample Size

The sample size was determined using the Epi Info 7 software. As there were no similar studies related to coronavirus vaccine acceptance among the general population, the calculations assumed that the probability of accepting the vaccine was 50.0%, at 95% confidence interval, the limit of precision of 5%, with a design effect of 1.0.

IV Participant Selection and Data Collection

The sample of patients was recruited from those attending the OPD during the study period. All patients that attended during this pandemic were screened for COVID-19 symptoms and if anyone was found positive was isolated for further care in the isolation facility. All patients of 18 years and older who attended the OPD during the study period were asked to participate. Those patients having symptoms of COVID-19 were excluded from the study. A written invitation with the aims and

objectives of the study was explained to participants (in English and or isiZulu) after their consultation, so they were not discriminated against should they refuse to participate. Data were collected using a structured questionnaire by four trained medical officers. The questionnaire was used to measure the respondents' demographics, their knowledge, attitudes and practice and on the acceptance of COVID-19 vaccine once it becomes available in SA. The questionnaire was both in English and the local language, isiZulu.

V Questionnaire

The knowledge questions comprised 13 questions. Six of them were on symptoms and seven true or false questions on other factors. The following specific symptoms of COVID-19 were asked with yes or no answers; cough, sore throat, body pain, fever, difficulty in breathing and loss of smell. The true or false questions were; the virus survives for days outside the body in the open air up to seven days, the virus survives for days on a plastic surface, most people who get COVID-19 become very ill, smokers who get COVID-19 are more likely to get ill than non-smokers, you can have the virus without any symptoms, children get less ill from the virus than adults and only elderly people die from COVID-19. The attitudes of the respondents were measured by five questions with yes or no answers: are you confident that your clinic can handle COVID-19 epidemic, SA government can handle the COVID-19 pandemic, do you think the pandemic will be successfully controlled, do you think COVID-19 is a serious infection, do you think you may get infected with COVID-19? The practice question consisted of the following six questions with yes or no answers; do you use a face mask when you go to public places, do you maintain a social distance of 1-2 meters in public places, do you wash or sanitize your hands once you enter your house coming from outside, would you visit your family or friends during the COVID-19 epidemic and, would you visit a person who is diagnosed and isolated for COVID-19 infection?

VI Measurements

Knowledge, attitudes and practice scores were measured by using a score of one for the correct (1) and zero for incorrect (0) answers or positive (1) and negative (0) statements. Total knowledge, attitudes and practice scores were measured by adding the scores for the correct answers or on positive statements. A total score of 50% or above was considered good knowledge, good practice and a positive attitude.

VII Data Analysis

Data were captured in the Microsoft Excel programme, coded, and transferred to be analysed using SPSS version 22. Descriptive statistics such as mean for continuous variables with standard deviation (SD) and for categorical variables frequency distribution were undertaken. A chi-square test, Pearson correlation test, and binary logistic regression were carried out to identify the factors in COVID-19 vaccine acceptability. P-values <0.05 were considered statistically significant.

Results

A total of 345 patients participated in this study. Almost two-thirds (61.4%) of the participants reported that they would accept a COVID-19 vaccine as soon as it becomes available in SA. Most of the respondents (53.1%) were between the ages of 18 to 37 years and single (64.1%) (Table 1). Only 38.4% and 14% completed 12 years of schooling and higher education respectively. Over half of the study subjects (55.7%) were employed. Over half of them (54.1%) had one or more known comorbid illnesses vulnerable to COVID-19. Furthermore, (Table 1) shows that there was no significant difference in vaccine acceptability among demographic variables of the respondents as p values were >0.05.

Table 1: Cross table of demographic and KAP variables with acceptance of vaccine with Chi-square and p values.

		Will accept COVID-19 vaccine (percent)		Chi-square value	P- value	
		Percent	No			Yes
Gender (n=343)	Male	49	32.5	67.5	1.118	0.290
	Female	51	38.1	61.9		
Age (n=326)	18 to 27 years	22.4	34.2	65.8	0.344	0.952
	28 to 37 years	30.7	35.1	64.9		
	38 to 47 years	17.5	38.9	61.1		
	=>48 years	29.4	34.9	65.1		
Marital Status (n=340)	Single	63.2	34.9	65.1	0.483	0.785
	Married or living together	31.9	34.9	65.1		
	Widow	3.2	20	80		
Highest level of education (n=341)	No schooling	4.9	31.3	68.8	7.087	0.069
	Less than matric	42.0	38.7	61.3		
	Matric	38.0	38.4	61.6		
	Higher education	13.9	18.8	81.3		
Employment Status(n=334)	Employed	53.9	32.6	37.4	1.270	0.260
	Unemployed	42.9	38.6	61.4		
Knowledge (n=345)	Good	29.5	30.7	69.3	1.284	0.157
	Poor	70.5	37.2	62.8		
Practice (n=346)	Good	58.7	33.3	66.7	0.637	0.248
	Poor	41.3	37.6	62.4		

Attitude (n=346)	Good/Positive	59.0	33.2	66.8	1.409	0.494
	Poor/ Negative	41.0	38.1	61.9		

Table 2: Knowledge, attitude and preventive practices of respondents on COVID-19 disease.

Variables	Frequency	Percent
Positive knowledge on symptoms (n= 345)		
Cough	217	62.8
Sore throat	70	20.2
Body pain	31	9
Fever	140	40.5
Breathing difficulty	173	50.1
Loss of smell	36	10.4
The virus can survive outside the body up to 7 days (n=345)	131	39.8
The virus survives for days outside the body on a plastic surfaces (n=345)	150	45
Most people who get COVID-19 get very ill (n=345)	105	31.5
Smokers who get COVID-19 are more likely to get ill than non-smokers (n=345)	265	78.9
You can be infected with the virus without any symptoms (n=345)	209	62.4
On average, children get less ill from the virus than adults (n=345)	180	53.7
Only elderly people die from COVID-19 (n=345)	156	49.8
Mean Knowledge score (number and percent)	5.6 (SD=1.95)	43
Attitude		
Confident that your clinic can handle COVID-19 epidemic (n=344)	217	63.1
SA Government has ability to handle the pandemic (n=344)	166	48.3
Do you think that the pandemic will be successfully controlled (n=344)	91	26.5
Do you think that COVID-19 is not a serious infection (n= 344)	243	70.6
Do you think that you may be infected with COVID-19 (n=344)	213	61.9
Mean attitude score	2.7 (SD= 1.67)	54
Practice		
Covers mouth when sneeze or cough (n=342)	273	79.1
Use a face mask in public places (n=341)	279	81.8
Maintain social distance in public places (n=340)	271	79.7
Wash or sanitize hands coming from outside (n=341)	290	85
Will not visit family or friends during COVID-19 epidemic (n=342)	296	86.5
Will not visit a friend or relative who is COVID-19 positive (n=342)	318	93
Mean practice score	5.0 (SD=1.27)	83.3

Table 3: Logistic regression output for vaccine acceptance with variables.

Variables	B	Wald	df	Sig.	Exp (B)	95% CI for EXP (B)	
						Lower	Upper
Step 4 ^d Do you think COVID-19 pandemic will be dealt with successfully	.837	9.925	1	.002	2.309	1.372	3.885
Only elderly people die from COVID-19. False	-.568	4.581	1	.032	.567	.337	.953
Do you use a face mask when you go to public places E.g. Shops and hospitals	1.118	10.057	1	.002	3.059	1.533	6.104
Do you keep a distance of 10m in public places	-1.147	10.475	1	.001	.318	.159	.636
Constant	.389	1.112	1	.292	1.476		

a. Variable(s) entered on step 1: Do you think COVID-19 pandemic will be dealt with successfully; b. Variable(s) entered on step 2: Do you keep a distance of 10m in public places; c. Variable(s) entered on step 3: Do you use a face mask when you go to public places E.g. Shops and hospitals.

On assessing the mean knowledge of participants, it is found that the mean knowledge score is 5.6 out of a total of 13, which translated to 43%. The mean attitude score was 2.7 (SD=1.95) out of a total score of 5, which translated to 54%. However, the overall practice score is good at 80% as the mean score is 5 (SD=1.27) out of a total of 6.

Logistic regression analysis was undertaken to identify the predictors for acceptance of COVID-19 vaccine and found that respondents with a

good score on the attitude item “Do you think COVID-19 pandemic will be dealt successfully” was 2.3 times more likely to accept the vaccine (OR=2.3, 95%CI 1.3-3.8, p<0.05). Good practice on the use of a face mask in public places was three times more likely to accept the vaccine (OR=3.0, 95% CI 1.53: 6.1, P<0.05). On the contrary, the knowledge on “Only elderly people die from COVID-19 (false)” was 44% less likely to acceptance of the vaccine (OR=0.56, 95% CI: 0.33-0.95, P<0.05). Similarly, practice on social distance “Do you keep a distance of 1-2 m

in public places” was 69% less likely to accept the vaccine (OR= 0.31, 95% CI: 0.15-0.63, $p<0.05$).

Discussion

This study provides insights concerning the demographic variables, levels of knowledge, attitudes towards, and preventive practices of the COVID-19 epidemic and acceptability of the COVID-19 vaccine among patients who attended a local first-level health care facility and thus represented the community at large. This study is unique because it is the first study in SA to describe the acceptability of a COVID-19 vaccine that will protect the general population from COVID-19 infection and its associated morbidity and mortality from a PHC facility in SA. The development of a vaccine, and successful vaccination of the target population, are the most successful achievements in this century in a public health programme that improves the quality of life by preventing numbers of infectious and other diseases [28]. However, policymakers and public health managers always find vaccination programmes have challenges such as vaccination coverage. A vaccination programme is considered to be successful if higher rates of acceptance and good vaccination coverage are obtained. To accomplish optimal vaccination coverage in SA an understanding of the risk perceptions of COVID-19 infection and acceptance of a COVID-19 vaccine among the general population and confidence in the health care provided is vital.

The acceptance rate of a COVID-19 vaccine of 61.4% among the study participants is lower than the rate considered as the required need for vaccination in SA [6]. However, the rate is comparable to the findings of Saudi Arabia (64.7%) and USA (67%) [23, 24]. This is higher than the rate reported from Poland (30%) [29]. The rate is lower than the COVID-19 vaccine acceptance rates among the general population of China (72.5%) and Indonesia (93.3%) [21, 22]. The demographic indicators of our respondents of being single (64.1%), having a low level of education (only 14% of participants completed post-matric education) and a high level of unemployment (42.5%) are indicative of a poor socio-economic condition. Lower levels of vaccine acceptance have been identified from lower socio-economic communities and countries with lower income groups [30]. A report from Poland states that participants being female, of older age, higher educational background and with the presence of chronic illness are some of the socio-demographic factors associated with higher vaccine acceptance [29]. Our study found no significant differences among demographic variables associated with the acceptance of the COVID-19 vaccine. Additionally, employed participants reported a higher rate of acceptance of a COVID-19 vaccine in the USA [31]. This finding demonstrates communities of lower income are disproportionately impacted by COVID-19 and, may lead to more susceptible to a continuation of outbreaks, even if a vaccine becomes available.

Vaccine safety, fear of the vaccine side-effects, vaccine inefficacy, and believing that COVID-19 is not a serious illness, are some of the contributing factors to vaccine hesitancy [30]. We found poor knowledge on “only elderly people die from COVID-19 (false)” 44% less likely and poor practice on social distancing 69% less likely to accept the COVID-19 vaccine among the participants. On the other hand, good attitudes on “Do you think COVID-19 pandemic will be dealt successfully” is 2.3 times more likely to accept the vaccine and good

practice on the use a face mask when in public places are found with three times more likely to accept the vaccine.

The participants of our study had either acute or chronic conditions as they are OPD attendees. More than half of them had known vulnerable co-morbidities and therefore, expected a higher level of risk perceptions of COVID-19 infection and vaccine acceptance but this was not the case. There is no significant difference in vaccine acceptance by participants with vulnerable comorbidities and those without. However, another study reported higher COVID-19 vaccine acceptance rates among people with co-morbidities [30]. The observed acceptance among this group of respondents may be different (higher) than the general population as it has been demonstrated that the vaccine acceptability is highest during a pandemic [31]. It is therefore recommended that population-based vaccine acceptance studies should be conducted in SA.

In any case, the vaccine acceptance in our study is considered low, as SA is required to achieve a higher level of vaccination to obtain herd immunity (66%) or (95%) if the vaccine efficacies are 100% or 70% respectively [6]. In general, there is a mistrust of the government’s effort and response to a pandemic, vaccine safety, and concerns of vaccine efficacy which should be addressed before and during the vaccination programme in SA. A comprehensive public health education programme should include clear, specific and concise information. Education and communication must include the contribution of individual vaccination towards obtaining herd immunity in communities. It should also harness both traditional and social media in attaining this, with a particular focus on involving known social influencers and targeting misinformation about the disease and vaccine, together with the central role of frontline health care workers who would be recommending and providing COVID-19 vaccination to their clients [32]. The COVID-19 vaccine acceptance rate of health care workers is also not known in SA especially among PHC workers. A lesson can be drawn from France when they handled H1N1 influenza pandemic [33]. It was reported that only 8% of the population was vaccinated and this was attributable to the refusal of the authorities to adequately communicate and react early enough on the measures taken for vaccine safety [33].

The findings in this study concur that rural black patients are less likely to accept a potential COVID-19 vaccine as several experts have already warned that there is a worldwide decline in public trust in immunisation and the rise of vaccine hesitancy [34]. The historical oppression of the SA population and existing disparities (black vs other race groups, rural vs urban, poor vs rich, educated vs uneducated) in health care are always linked to mistrust of the healthcare system among some black South Africans that may result in health discrepancies. This observation was made among African Americans who demonstrated the disproportionate burden of the COVID-19 disease [35, 36]. As a means of establishing trust in the health care system, mass public health educational campaigns should enlist the role of traditional and cultural leaders that promote the need for efficient COVID-19 vaccination in a community that has mistrust in its health care system [37]. The cultural environment also needs to be shaped up for the general population to strategize advanced risk communication. It has also been shown that people trust information based on their cultural and traditional expectations and the coalition of medical professionals, traditional health members and technology can

aspire to identify and address vaccination fears among the vaccine users [38].

Study Limitations

Our participants are not randomly selected and are not from households or multiple health centres. Thus, findings may be influenced by possible selection bias which may limit the generalizability of the results. It has been noted that the reporting of vaccine acceptability is the highest concern during a pandemic [31]. This factor may have influenced the result (overestimation) of those who would accept a COVID-19 vaccine. We were unable to check if the participants' responses were true.

Conclusion

A 61.4% acceptance of a COVID-19 vaccine in a PHC setup was found which is comparable with other countries. This is lower than the rate considered as the need for vaccination in SA. However, there were no significant differences between the demographic variables and the acceptance of a vaccine. Before a COVID-19 vaccine is introduced to SA, public health managers and policymakers must prioritize effective COVID-19 vaccine informed messages and mass education for all South Africans.

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Ethical Approval

Ethical approval was obtained from the UMGungundlovu Health Ethics Review Board (reference no. UHERB 006/2020). Permission was obtained from the institutional management. Anonymity and confidentiality of the respondents were maintained at all times. Participation in the study was voluntary. Respondents were allowed to discontinue participating in the study at any time if they wished to without any harm. The information leaflet for the participant contained the purpose, nature and objectives of the study, declaration of confidentiality and anonymity.

Consent

The study acquired an informed consent form from the participants.

Conflicts of Interest

None.

Author Contributions

AM Hoque: Conceptualisation, data collection, analysis, writing and finalising the manuscript; S Buckus: Data collection, data capture, writing and finalising the manuscript; M Hoque: Conceptualisation, data capture, analysis and finalising the manuscript; AMA, NS, MEH: Conceptualisation, data analysis and finalising the manuscript.

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