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RESEARCH ARTICLE

Acceptability of Covid-19 Vaccination During the Pandemic in Garoua, Cameroon (Sub-Saharan Africa)

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Abstract

Background: Community perception of a vaccine is a key factor in its acceptance. The aim of this study was to assess the acceptability of the COVID-19 vaccine in Garoua II.

Materials and methods: A cross-sectional study after three-stage multi-stratified sampling was carried out in January 2021. The information collected focused on knowledge, attitudes, practices, and acceptability of the COVID-19 vaccine. Logistic regression was used to identify the determinants.

Results: Of the 1000 heads of households surveyed, with a median age (25th-75th percentile) of 46 (35-58) years, 33.9% were women. Half of our population had a low level of education and 73% were married or in a relationship. For knowledge, 98.6% had already heard of COVID-19 and 76% were aware of the barrier measures. As for the practice, 39.6% had a device for washing and 48.5% recently attended a gathering of more than 50 people. Only 54.2% were in favor of vaccination against COVID-19.

The main reason for the non-acceptability vaccine was distrust in this vaccine at 90.7%. The determinants [Odds ratio (95% CI)] of vaccine non-acceptability were university level of education [1.577 (1.003-2.480), p = 0.048]; the presence of a hand washing device in the yard [1.513 (1.157-1.978), p = 0.002]; and supply of running water [2.499 (1.215-5.140), p = 0.013].

Conclusion: The anti-COVID-19 vaccination is accepted by half of the population of Garoua II. The determinants of non-acceptability of the COVID-19 vaccine are university level of education, presence of a hand washing device and supply of running water.

Keywords: COVID-19, Vaccination, Acceptability, Garoua, Cameroon.

1. Introduction

The World Health Organization (WHO) reported in media the first cases of "SARS Cov 2 viral pneumonia" in Wuhan, China on December 31, 2019 [1]. The first case of Coronavirus 2019 Disease (COVID-19) was reported in Africa on February 25, 2020 [1]. The COVID-19 pandemic is having profound impacts on the health of populations, the economy, industries and global transportation [2]. Infection with SARS-CoV-2 has been associated with a wide spectrum of illnesses ranging from asymptomatic, mild cases to severe and deadly cases [3]. Workplace prevention measures have been established to reduce risk, including appropriate guidelines and capacitation to promote and enable standard COVID-19 preventive measures in terms of physical distancing, hand washing, wearing a mask and monitoring the temperature [4,5]. In Cameroon, there has been the creation of health centers,

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decentralization of the biological test for the detection of SARS-CoV-2, supply of drugs to the regions, including Hydroxychloroquine and Azithromycin, sensitization of the population, implementation of hand washing and the wearing of masks in the public areas[5].

Despite these measures, the number of new cases is increasing every day in Cameroon since the arrival of variants of COVID-19 [6,7]. In Cameroon, from 3 January 2020 to 5:45pm CEST, 22 October 2021, there have been 100 289 confirmed cases of COVID-19 with 1 600 deaths, reported to WHO. As of 21 October 2021, a total of 490 604 vaccine doses have been administered and 1.85 total doses administered per 100 population[8].

Faced with the resurgence of the COVID-19 pandemic and the number of deaths recorded, vaccines appear to be the option that will bring about salvation since vaccination, which is a widely used and commonly accepted public health intervention [9] has shown its proof in the fight against infectious diseases in general and viral in particular. However, to control an epidemic like COVID-19, an adequate number of people would need to be vaccinated [10]. Thus, in less than a year, several vaccines have been introduced, including an innovation with mRNA vaccines. As of February 18, 2021, at least 7 different vaccines have been made available to countries through three platforms [11].

The experience of infectious disease control in Africa has identified a wide range of barriers that can interfere with vaccine acceptance and thus lead to failure of disease control. Since the vaccination started on the 12 April 2021, only 0,9% of Cameroonian in the North region had been vaccinated after 6 months[12]. So in this context of a pandemic disease, we carried out this study, that the aim was to assess the acceptability of the COVID-19 vaccine in a community of Garoua II in the North region of Cameroon.

2. Materials and Methods

2.1 Study Type and Population

We carried out a cross-sectional study from January 11 to 22, 2021 in the community of Garoua II, a district of the North Region in Cameroon. The questionnaire administered face to face by second year medical students focused on socio-demographic characteristics, knowledge of barrier measures, attitude, and practice on COVID-19 on the one hand and on the other hand the perception and acceptability of the COVID-19 vaccine. The barrier measures were observed by those students of the Faculty of Medicine and Biomedical Sciences of Garoua, when administering the questionnaire.

Inclusion criteria were all households that agreed to answer the questions. We excluded households in which the household head refused to give their consent and those in which adults were absent.

2.2 Data Collection

The choice of the District of Garoua II was made on the basis of convenience and thereafter three-stage random sampling was carried out. The first stage consisted in the random choice of two health areas out of the 5 in this district, then in the second stage, five neighbourhoods were drawn at random in each of these 2 areas and finally households were selected randomly using a poll of five for the third degree.

The sociodemographic characteristics were age, sex, income, neighborhood, type of housing, profession, knowledge, attitudes and practices of barrier measures were on awareness, existence and location the hand washing device and/or alcohol-based hand sanitizer, participation in a gathering of more than 50 people. As for the perception and acceptability of the vaccine, participants had to give their reasons for non-adherence to the COVID-19 vaccine.

The prevalence used was that of Congolese favorable to vaccination, p = 56% (10). Thus the sample size was calculated using OpenEpi, version 3 according to the formula: n = [DEFF * Np (1-p)] / [(d2 / Z21-α / 2 * (N-1) + p * (1-p)] For a 99% confidence level, the calculated minimum sample size was 654 participants.

2.3 Data Analysis

Data were analyzed using SPSS software for Windows version 23 (SPSS Inc., Chicago, IL). Qualitative variables were presented as numbers and proportions. Continuous variables were expressed by their mean [standard deviation (SD)] when the distribution was normal; otherwise, they were summarized by their median [interquartile range (IIQ)].

Chi-square test and Fisher's exact probability test were used for comparison of proportions, and Student's test or its nonparametric equivalent (Mann-Whitney U test) was used for comparison of means. The characteristics of patients accepting the COVID-19 vaccine were compared with those of patients refusing the COVID-19 vaccine. Logistic regression was used to determine independent associated factors for the unacceptability of the COVID-19 vaccine. A difference was considered significant if $p < 0.05$.

3. Results

3.1 General Characteristics of the Study Population

Of the 1000 households surveyed, 339 (33.9%) of the respondents as the head of the family were women. The mean age (SD) was 46.41 (15) years and median age (IQR) at 45 (23) years, with a minimum at 18 years and a maximum at 99 years. With regards to marital status, 73% were married or in a couple, 14.9% were single and 11.9% were widowed. Half of our population had a low level of education as well: 24.9% had no education, 25% had a primary level of education, 31.8% a secondary level of education and 17.4% had gone to university (Table 1). Also, more than half of these heads of households had an unstable job, that is to say 25.9% were unemployed and 33.1% worked in the informal private sector.

Table 1. *Sociodemographic characteristics of the study population in Garoua II.*

Characteristics	Number (n = 1000)	Percentage
SEX		
Male	661	66.1
Female	339	33.9
MARITAL STATUS		
Married	730	73.0
Single	149	14.9
Widow/Widower	119	11.9
Divorced	2	0.2
LEVEL OF EDUCATION		
Primary	254	25.4
Secondary	318	31.8
University	174	17.4
None	249	24.9
PROFESSION		
Civil servant	122	12.2
Private formal	288	28.8
Private informal	331	33.1
Unemployed	259	25.9

3.2 Knowledge, Attitude and Practice

Data on knowledge of COVID-19 show that 98.6% of respondents have already heard of COVID-19, 76% are aware of barrier measures, 83.6% on wearing of a mask, 77.7% on washing of hands and 54.3% on social distancing as a means of preventing COVID-19. Regarding attitude and practice, 39.6% have a device for washing or disinfecting hands in theircourtyards and 48.5% recently attended a gathering of more than 50 people in the 3 months preceding the survey (Table2).

Table 2. *Knowledge, attitudes and practices in the fight against COVID-19 in Garoua II.*

Characteristics	Number n = 1000 (%)
Have you ever heard of COVID-19?	
Yes	986(98.6)
No	14 (1.4)
Presence of device for washing hands in your courtyard	
Yes	396(39.6)
No	604 (60.4)
Source of water supply	
Well	13 (1.3)
Water borehole	251 (25.1)
CAMWATER	641 (64.1)
Springs	2 (0.2)
Others	53 (5.3)
Mineral water	40 (4.0)

Knowledge of barrier measures	
Yes	760(76.0)
No	240 (24.0)
Wearing a face mask as a means of protection	
Yes	836(83.6)
No	156 (15.6)
Washing hands as a means of prevention	
Yes	777(77.7)
No	201 (20.1)
Social distancing as a means of prevention	
Yes	543(54.3)
No	421 (42.1)
Acceptance ofCOVID-19 vaccine	
Yes	542(54.2)
No	458 (45.8)
Reason for not accepting COVID-19 vaccine	
Distrust	416 (53.4)
Side effects	86 (11.0)
Others (fear, religion, uselessness, non-existence of COVID-19)	277 (35.6)
Knowledge of a COVID-19 patient	
Yes	78 (7.8)
No	922 (92.2)

COVID-19: Coronavirus disease 2019, CAMWATER: Cameroon Water Utilities Corporation

3.3 Acceptance of the Covid-19 Vaccine

With regards to vaccine acceptance and perception, 542 (54.2%) heads of families were in favor of vaccination against COVID-19. Table 3 compares the characteristics of patients refusing and accepting COVID-19 vaccination, after univariate analysis. We found a statistically significant association between level of education and acceptability of vaccination; the lower the level of education of the population, the more favorable they were to vaccination (p = 0.034). Likewise, the unemployed population and private informal workers were also ready to receive the COVID-19 vaccine unlike civil servants and those working in the formal sector (p = 0.028).

The majority of the population who had a device for washing of hands or alcohol-based hand sanitizers (43.5%) agreed to be vaccinated when compared to those (34.9%) who did not have these (p = 0.006).

Table 3. *Factors associated with the acceptance of the COVID-19 vaccine in Garoua II after univariate analysis.*

Characteristics	**Acceptance of COVID-19 vaccine Univariate analysis**		
	YES N = 542 (%)	NO N = 458 (%)	p
Sex			
Male	362(66.8)	299(65.3)	0.616
Female	180(33.2)	159(34.7)	
Level of education			
None	144(26.8)	105(22.9)	
Primary	146(27.2)	108(23.6)	0.034
Secondary	169(31.5)	149(32.5)	
University	78(14.5)	96(21.0)	
PROFESSION			
Civil servant	56(10.3)	66(14.4)	
Private formal	145(26.8)	143(31.2)	0.028
Private informal	197(36.3)	134(29.3)	
Unemployed	144(26.6)	115(25.1)	

Source of drinking water supply			
CAMWATER	373(68.8)	268(58.5)	<0.001
Well	542 (54.2)	542 (54.2)	
Water boreholes	129(23.8)	122(26.6)	
Spring	2(0.4)	0(0)	
Other	17(3.1)	36(7.9)	
Mineral water	13(2.4)	27(5.9)	
Presence of device for washing hands			
Yes	236(43.5)	160(34.9)	0.006
No	306(56.5)	298(65.1)	
Prevention through washing of hands			
Yes	415(78.3)	362(80.8)	0.335
No	115(21.7)	86(19.2)	
Prevention by wearing a face mask			
Yes	452(83.7)	384(85.0)	0.590
No	88(16.3)	68(15.0)	
Prevention by observing social distancing			
Yes	299(56.6)	244(56.0)	0.836
No	229(43.4)	192(44.0)	
Reason for not accepting the vaccine			
Side effects	51(15.3)	35(7.9)	<0.001
Distrust	52(15.6)	364(87.5)	
Others (fear, religion, uselessness, non-existence of COVID-19)	231(69.2)	46(10.3)	
Household income			
<35000	144(27.1)	132(29.3)	0.486
35000 – 50000	163(30.7)	123(27.3)	
>50000	224(42.2)	195(43.3)	
Participation in a ceremony with more than 50 people present			
Yes	264(48.7)	221(48.3)	0.886
No	278(51.3)	237(51.7)	

COVID-19: Coronavirus disease 2019, CAMWATER: Cameroon Water Utilities Corporation

3.4 Perception of the Covid-19 Vaccine

The reasons for the non-acceptability of the vaccine as obtained from those who do not agree to be vaccinated are distrust in this vaccine in 87.5% of cases, side effects linked to the vaccine in 7.9% of cases and others in 10. 3% of cases, namely fear, religious beliefs, the uselessness of vaccination, belief in the non-existence of COVID-19. Likewise, the source of the water supply also influences the perception of the vaccine. In fact, households with a running water source from the Cameroon Water Utilities Corporation (CAMWATER), a companythat distributes running water; were more favorable to vaccination against COVID-19 (68.8% versus 58.5%, p <0.001), Table3.

After multivariate analysis (Table 4), the independent determinants [Odd's Ratio (95% Confidence Interval) of acceptance of COVID-19 vaccine were the supply of drinking water through CAMWATER [2.499 (1.215-5.140), p = 0.013] and presence of device of handwashing in the households [1.513 (1.157-1.978), p = 0.002]. The only independent factor for non-acceptance of COVID-19 vaccination was university level of education[1.577 (1.003-2.480) , p = 0.048].

4. Discussion

This study, which is one of the first in Cameroon, allowed us to assess the acceptability of the COVID-19 vaccine in 1000 households in the community in Garoua II.Analysis of the data collected shows that half of households (54.2%) were in favor of vaccination. The acceptability of the COVID-19 vaccine was related to the level of education. The associated factors for acceptance of COVID-19 vaccine were the presence of a device for washing hands in the yard and the supply of running water.

Only half of households (54.2%) were in favor of vaccination in our study. Although the majority of households had heard of COVID-19 except 1.4%, most were familiar with barrier measures, and the measure most mastered was the wearing of masks, followed by washing of hands and the least practiced was social distancing.

The rate of 54.2% found in our study corroborates the meta-analysis carried out by Sallam et al, where a significant number of studies have reported COVID-19 acceptance rates lower than 60%, which would pose a serious problem for efforts to control the current COVID-19 pandemic [11]. The low desire to be vaccinated has also been encountered in the Democratic Republic of Congo (DRC), Russia, Italy and Kowet [13–15].

The existence of a geographical proximity between Congo and Cameroon can justify cultural similarities which can lead to the same perceptions of the evolution of Western science. According to Ditekemena et al those who refused this vaccine believed that it was developed to eliminate the African population or to make them sterile.

The acceptability of the COVID-19 vaccine was related to the level of education. Half of the respondents in our study had a primary at the very highest level of education. Thus, the less educated person is, the more willing they are to receive the vaccine and professionals in the public and formal private sector are less favorable to vaccination. The main reason for refusal was distrust in this vaccine.

The high level of education in our cohort constitutes a handicap for the acceptability of the COVID-19 vaccine. This situation should be given special attention, since the average number of inhabitants per household was 7 people and it is the head of the household who makes the decisions for the whole family. Actually a mathematical modelling study revealed that the most effective vaccination strategy for reducing mortality due to COVID-19 depends on the time course of the pandemic in the population[16].

The literate people naturally have access to information and the media. Misinformation and unfounded rumors about COVID-19 and the SARS-CoV-2 vaccination had already started to emerge on social media platforms, threatening to erode public trust long before the release of an effective vaccine [14,17]. While there were other societal and ethical considerations, now some studies can provide an evidence-based rationale for vaccine prioritization[18].

Samarasekera et al had previously reported that those living in rural areas were more likely to be vaccinated against COVID-19 than those living in urban areas[19]. The unemployed population who are more available to receive immunizations are also those who are less literate and with limited financial means will not have easy access to social media information.

Some studies show that aged based rollout strategies are less effective than strategies that prioritize essential workers in regions where the vaccine supply is limited. In such a setting with a population of 5M, Mulberry et al estimate that vaccinating essential workers sooner prevents over 200,000 infections and over 600 deaths [20].

The acceptance of the COVID-19 vaccine was linked to the existence of a device for disinfecting or washing of hands in the courtyard and the source of water supply by CAMWATER.

We did not found sex as in that study carried out in Congo, where sex was a factor influencing the acceptability of the COVID-19 vaccine [13]. Notice that in our study, most of the respondents were male, married and worked in the informal sector or were unemployed. Moreover, acceptability of COVID-19 vaccination differed according to nationality and employment status, and physicians were more willing than those in other occupations [15].

Table 4. *Independent determinants of the acceptance of COVID-19 vaccine in Garoua II.*

Characteristics	Odd's ratio (95% CI)	p
Male sex	1.175 (0.837-1.650)	0.352
Age	1.007 (0.998-1.016)	0.137
Profession		
Civil servant	0.864 (0.512-1.458)	0.584
Private formal	0.811 (0.545-1.207)	0.302
Private informal	1.229 (0.817-1.848)	0.321
Jobless	Ref	
Level of education		

Primary	1.047 (0.724-1.514)	0.806
Secondary	1.232 (0.854-1.776)	0.264
University	0.634 (0.403-0.997)	0.048
None	Ref	
Water supply		
CAMWATER	2.499 (1.215-5.140)	0.013
Well	3.024 (0.785-11.641)	0.108
Mineral water	Ref	
Device for washing hands		
Yes	1.513 (1.157-1.978)	0.002
No	Ref	

COVID-19: Coronavirus disease 2019, CAMWATER: Cameroon Water Utilities Corporation

The strengths of our study were the prospective design and the large sample size in the community, at the start of the vaccination for COVID-19 in Cameroon. The limits were the low number of variables on the practice of barrier measures during this survey.

5. Conclusion

People of the North region in Cameroon are not in favor of vaccination because of distrust in the vaccine and fear of side effects. The independent determinant factor of the non-acceptability of the COVID-19 vaccine is the university level of education.

The associated factors for acceptance of COVID-19 vaccine were the presence of a device for washing hands in the yard and the supply of running water. Awareness should be geared towards the benefits of vaccination and the risks associated with it in an appropriate and targeted manner. An analysis of vaccines entering Cameroon could also reassure the population.

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