

Knowledge, attitudes, practices and epidemiological profile of Muslim faithful receiving Covid-19 vaccines in Yaounde, Cameroon

AMANI Adidja^{1,2}, Yauba SAIDU^{3,4} EFIETNGAB ATEMBEH-Noura⁵, CHEUYEM LEKEUMO Fabrice Zobel², TANDJEU NENEDA HILLARY Nellie Gladys⁶, EBOGO BELOBO Jean Thierry⁷, Moussa SOUAIBOU⁸, Georges NGUEFACK-TSAGUE², Joseph KAMGNO²

Abstract

In the response strategy against the Covid-19 pandemic, Cameroon has used until July 2021, two types of vaccine namely: Sinopharm, Covishield/AstraZeneca. The objective of this study was to determine the KAP and the epidemiological profile of Muslim faithful receiving the Covid-19 vaccine at Mosque Biyem-Assi, Yaoundé-Cameroon. Data on COVID-19, vaccination, and clinical characteristics were collected. A total of 58 participants took part in the first survey and equally received their first dose of the COVID-19 vaccine of their choice. The majority of the participants were females (n =32, 55.2%), 37.9% were 50 years and over and 43.1% had a university degree. Overall score was 78.41% for knowledge, 92.8% for perceptions and 48.3% for practices. Despite the availability and gratuity only half of the Participants reported to have carried out their COVID-19 test ever since the pandemic started. Out of 40 (69.0) participants who have heard stories concerning the vaccines, 39.7% suggested that they COVID-19 vaccines can protect us from the disease. Also, out of the 58 participants who received their first dose of the anti-COVID-19 vaccine, 36 of them came for their second shot amounting for a 62% complete vaccination rate. Headache, pain and heaviness of the injected arm were the most frequently reported side effects following participants first shot. Bringing the vaccines to the communities, in their milieu could be the best solution to increase vaccine uptake in Cameroon.

Keywords: Vaccination, Covid-19 Vaccines, KAP, Cameroon

Introduction

The severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) responsible for the Coronavirus disease (COVID-19) is a deadly virus which continues to affect many countries in the world [1]. In Cameroon, between February 25 and March 3, 2021, the occurrence of a new wave of contaminations coupled with the re-emergence of Covid-19 cases were registered. These happenings occurred when the scientific community had a new response to this pandemic, which is the vaccination that is being introduced in many countries. The World Health Organization (WHO), in collaboration with other partners and Governments have supported global efforts which have resulted in the rapid development of effective vaccines against Covid-19. The COVAX facility was thus established in order to guarantee equitable access to these vaccines to all countries of the world. At the regional level, the African Union initiative was also created with the ambition to cover at least 60% of the African population by 2022 thanks to

Affiliation:

¹Sub-Directorate of Vaccination, Directorate of Family Health, Ministry of Public Health, Cameroon.

²Faculty of Medicine and Biomedical Sciences, University of Yaounde I, Yaounde, Cameroon.

³Clinton Health Access Initiative inc., Cameroon

⁴Institute for Global Health, University of Siena, Italy

⁵Medical Research Centre, Institute of Medical Research and Medicinal Plants Studies, Yaounde, Cameroon.

⁶Institut Saint Jean

⁷Institute of Medical Research and Medicinal Plants Studies

⁸National Institute of Statistics, Yaoundé, Cameroon.

*Corresponding author:

Adidja Amani, Faculty of Medicine and Biomedical Sciences, University of Yaoundé I, Yaounde, Cameroon. 3Clinton Health Access Initiative inc., Cameroon.

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a mechanism of pooling of costs and requests for vaccines between States members. At the national level, Cameroon has taken advantage of bilateral cooperation with other state partners and international institutions for better access to funding and vaccine doses.

Cameroon received her first batch of the COVID-19 vaccines: 200,000 doses Sinopharm and 391,200 doses of AstraZeneca on April 11 and 17, 2021 respectively. Subsequently, Cameroon received doses of the additional vaccines from the COVAX facility and the African Union Initiative which now allows it to meet the current demand for vaccines by relying on subsequent increasing allocations. In the initial phase of vaccination, priority target groups consisting of health workers, people living with comorbidities and people aged 50 and over were exclusively targeted. Subsequently, the Government decided to expand the offer of vaccination to people aged 18 and over, without changing the above-mentioned order of priority. To this end, 244 vaccination centers were selected to offer daily vaccination services in all 190 health districts and, two rounds of the vaccination intensification campaign with the deployment of mobile teams in all regions were organized. As of September 10, 2021, 438,000 doses have been administered representing 40% of the allocation of vaccines received for the period, 358,000 people have received at least one dose of vaccine, about 2.8% of the population aged 18 and over (target population) and 104,200 people have completed their vaccination schedule, exactly 0.7% of the target population.

The observation of the implementation of the vaccine strategy to date confirms the management of vaccine hesitancy as the major challenge to be taken up. This vaccine hesitancy, largely fueled by the proliferation of rumors and disinformation messages conveyed through social networks, was the main cause of the slowness of vaccination, including among health workers. Moreover, the lessons learned from the introduction phase of vaccination showed that the most effective service offer approach in the Cameroonian context remains the periodic organization of vaccination intensification campaigns to strengthen the daily supply in vaccination centers that should be extended to all the 1939 Health Areas. Vaccine administration strategies have been diversified with the switch to routine vaccination in all health areas, periodic intensification through campaigns with deployment of mobile teams, and the establishment of large health centers. vaccination with logistical means adapted for mobile sessions in urban areas. It is in this light that the Biyem assi mosque has requested a mobile team from the Ministry of Public Health to vaccinate the worshipers. Our study aimed at determining the Knowledge Attitude and Practices KAP and the epidemiological profile of Muslim faithful receiving the anti-Covid-19 vaccines at the Biyem-Assi Mosque, Yaoundé-Cameroon and evaluate the association between the demographics and KAP of Covid-19.

Methodology

Study setting

The Republic of Cameroon is a lower-middle income country of Central Africa with a population estimated at 29,321,637 (2022 est.). The country is divided in 10 regions among which the centre's Region, which is home to Yaoundé, the capital and major urban area. The sex ratio at birth is 1.03 male(s)/female and for the total population 0.99 male(s)/female (2022 est.) Muslims comprise roughly 24.4% of the inhabitants of Cameroon according to the 2022 CIA factbook. This cross-sectional study was carried out from June to July 2021, in the Biyem-Assi health district precisely at the Central Mosque premises. Biyem-Assi is the headquarters of the Yaoundé VI Sub-division in the Mfoundi Division, Centre Region of Cameroon. It is located at latitudes 11°29'12" East and longitude 3°50'25" North. Biyem-Assi constitutes one of the most populated sub-divisions of the Mfoundi Division with about 300,000 inhabitants. It is a very vast zone that englobes several neighbourhoods like Rond-point Express, Accacias, Carrefour Biyem-Assi, Maison Blanche, Montee des Soeurs, Montee Jouvence, Superette, Tam-Tam and TKC. Yaoundé VI has an equatorial climate with four seasons: two rainy seasons (a long one from March to June and short one which lasts from September to October) and two dry seasons (the long dry season runs from November to March and a short one which lasts from July to August).

Study design

Data on COVID-19 was collected using a well-structured questionnaire established following items based on previous literature and administered face to face to all consenting participants. It covered four sections (demography, knowledge, perceptions/attitudes and practices). The questionnaire had 41 questions: 18 on knowledge, 3 on perception, 7 on practices, 11 on demographics, and 2 others (source of information and feedback information during the second dose vaccination). Questions were answered on a Yes/No/I don't know basis. Also, Always/Occasional/Never were answer items provided for questions on practices and some open-ended questions were equally asked. Also, health parameters (temperature, BMI, blood pressure) and rumours about the vaccines were equally registered for each participant. The relations between the demographics and KAP were assessed.

Study population and eligibility criteria

Adults from all works of life aged 18 and above who come for the COVID-19 vaccination and who agreed to participate in the study, completed the survey form.

Study size

In this study, the sample size was calculated following the formula proposed by Lorentz,

stated as: $N = [z^2 \times p(1-p)] / e^2$

Where; **N**: sample size, **z**: 1.96 (value of the 95% confidence interval), **p**: standard deviation (prevalence) taken at 50% and **e**: margin of error taken at 5%.

Therefore, $N = [1.96^2 \times 0.5(1-0.5)] / 0.05^2 = 384.16$. However, our population size was 58.

Statistical methods

Data analyses of this study were performed using Microsoft Excel 2019 and Statistical Package for the Social Sciences (SPSS), version 25. Descriptive analysis was used to study demographics such as age, gender, education, profession as well as socio-economic status. The mean, standard deviation and range were calculated for quantitative parameters. Also, associations between demographics and KAP were studied. The statistical significance level was set at $p < 0.05$.

Ethical Consideration

The study was approved by the Regional Ethics Committee and was conducted following the ethical principles of the World Medical Association Declaration of Helsinki. Patients' personal identities and other private information were anonymized; an informed consent was requested in accordance with local legislation and national guidelines. A go ahead from the Ministry of health through a service note and full approval of this study was also granted by the religious leader (IMAM) of the Biyem-Assi Muslim community. Finally, every member signed an informed consent form before they were included in the study.

Results

Socio-demographic characteristics

Out of 92 muslims faithful who were requested to participate to the study 58 accepted to take part in the first survey and equally received their first dose of the anti-COVID-19 vaccine of their choice. The mean age of participants was 46 ± 15 years with 37.9% aged 50 years and over. Majority of the study participants were females ($n = 32$; 55.2%), and 43.1% had a university degree. Majority of respondents live in houses with more than 6 inhabitants (Table I).

Source of information regarding the COVID-19 vaccines and participants health status

Concerning the source of information regarding COVID-19 vaccines, 89.7% of the study population answered yes to have heard about the vaccines on television followed by social media platforms accounting for 75.9% yes rate, followed by the radio (72.4%), religious leaders (51.7%) and from family members and friends (46.6%) (Figure 1). Table 2 gives a clear outline of our participants' health status. We could consider our study population to be generally of good

Table I: Demographic characteristics of participants

Characteristics		Frequency (%) (n=58)
Gender		
	Male	26 (44.8)
	Female	32 (55.2)
Age-group (years)		
	18-35	15 (25.9)
	36-50	21 (36.2)
	>50	22 (37.9)
Marital status		
	Single	1 (3.6)
	Married	26 (99.2)
	divorced	1 (3.6)
Education		
	Have never been to school	10 (17.2)
	Primary	8 (13.8)
	Secondary	15 (25.9)
	University	25 (43.1)
Profession		
	Healthcare worker	3 (5.2)
	Public service worker	17 (29.3)
	Private sector worker	4 (6.9)
	Teacher/lecturer	2 (3.4)
	Retired	6 (10.3)
	Student	5 (8.6)
	Others	21 (36.2)
Weight status		
	Underweight	2 (4.3)
	Normal weight	17 (36.2)
	Overweight	17 (36.2)
	Obese	11 (23.4)
Standard of living		
	Poor	28 (48.3)
	Average	19 (32.8)
	Rich	11 (19.0)
Number of people in households		
	01-Mar	9 (15.5)
	04-Jun	11 (19.0)
	>6	38 (65.5)
Others include: religious leaders, taxi drivers, unemployed, housewives		

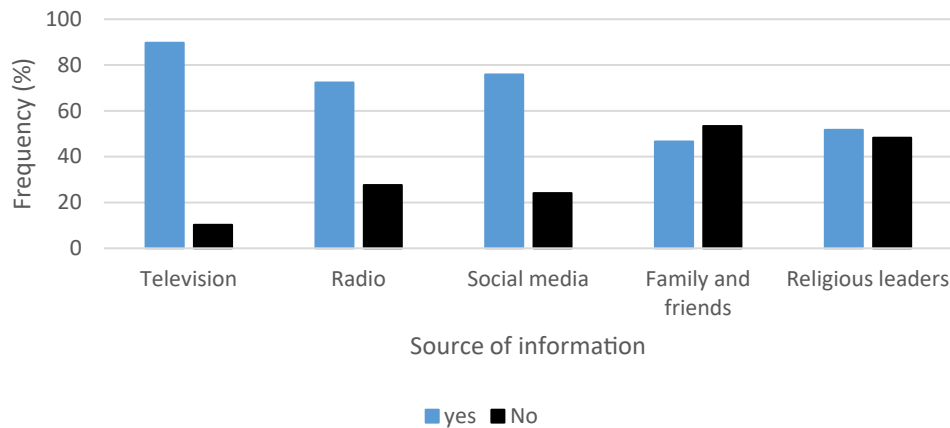


Figure 1: Source of information on COVID-19 vaccines

Table II: Description of participants health status

Characteristics	Frequency	Percentage
How often do you go for a health check-up?		
Once in 3 months	8	13.8
Once in 6 months	7	12.1
Once a year	9	15.5
Only when needed	28	48.3
Never go for one	6	10.3
Do you have any chronic diseases		
Yes	13	22.4
No	45	77.6
Type		
Asthma	4	33,3
headache	1	8,3
Diabetes	1	8,3
Glaucoma	1	8,3
Hypertension	4	33,3
Lower back pain	1	8,3

health judging from the 48.3% who only go for medical checkups when need arises. Twenty-two percent of the participants had chronic diseases, with hypertension and asthma accounting for 33.3 % each.

Knowledge of participants related to COVID 19

Almost all (96.6%) of the study participants new about

the coronavirus and 91.4% could correctly define it. With respect to the mode of transmission, 74.1% reported that the disease could be contracted through respiratory droplets of an infected person, 81% when in close contact with an infected person and 65.5% said through contact with infected surfaces or objects (Table 3). Overall, our results show that 78.41 (13.33/17*100) had high knowledge score of the disease (mean COVID-19 knowledge score:13.33 ± 2.2, range: 10-17) (Table IV).

Perceptions of participants towards COVID 19

Regarding participants' impression about the COVID 19 test kits, 91.4% thought they were reliable, 96.6% considered getting tested as important while 86.2% esteemed the available vaccines as effective (Table 3). Overall, 92.8% of respondents had a high perception score (Table V).

Reported practice of participants towards COVID 19

Participants' practices toward COVID-19 are shown in Table 3. 32 (55.2%) participants reported to have carried out their COVID-19 test ever since the pandemic started. Results show that only 8.6% of the population always wore their face masks while 15 (25.9%) of them had the habit of always washing their hands with soap and clean water. Generally, the practice score was 48.3% (Table VI). Practice score was however significant for women (p=0.018).

Rumors/stories about the COVID-19 vaccines

Out of 40 (69.0) participants who have heard stories concerning the vaccines, 39.7% suggested that they COVID-19 vaccines can protect us from the disease while some 22.4 said the vaccines have too many side effects like blood clotting, 17.2% suggested that the vaccines are not effective, 15.5% vaccines are to control humanity, 3.4% can cause sterility and 1.7% said it was a means to kill the African population (Table VII).

Table III: Knowledge, attitudes, and practices of study participants

	Questionnaire items	Responses (N = 58)		
		Yes (n, %)	No (n, %)	I don't know (n, %)
	About Covid-19			
	Have you heard about COVID-19	56 (96.6)	2 (3.4)	-
Knowledge	COVID-19 is a contagious disease caused by the coronavirus (True)	53 (91.4)	5 (8.6)	-
	Covid19 is a disease caused by bacteria (False)	9 (15.5)	49 (84.5)	-
	Covid19 is a fatal disease in the absence of treatment (True)	9 (15.5)	49 (84.5)	-
	Can everyone get infected with COVID-19? (True)	47 (81.0)	11 (19.0)	-
	Can COVID-19 be prevented? (True)	58 (100.0)	-	-
	Mode of transmission			
	COVID-19 can be contracted through contact with or consumption of wild animals (False)	49 (84.5)	9 (15.5)	-
	COVID-19 can be contracted through respiratory droplets of an infected person (True)	43 (74.1)	15 (25.9)	-
	COVID-19 can be contracted when in close contact with an infected person (True)	47 (81.0)	11 (19.0)	-
	COVID-19 can be contracted through contact with infected surfaces or objects (True)	38 (65.5)	20 (34.5)	-
	Symptoms of COVID-19			
	Fever	47 (81.0)	11 (19.0)	-
	Cough	57 (98.3)	1 (1.7)	-
	Headaches and general fatigue	48 (82.8)	10 (17.2)	-
	Difficulty in breathing	48 (82.8)	10 (17.2)	-
	Have a flu	30 (51.7)	28 (48.3)	-
	About anti-COVID-19 vaccines			
	Have you heard about anti-COVID-19 vaccines?	55 (94.8)	3 (5.2)	-
	Sinopharm is an anti-COVID-19 vaccine available in the country?	44 (75.9)	10 (17.2)	4 (6.9)
	AstraZeneca is an anti-COVID-19 vaccine available in the country?	46 (79.3)	8 (13.8)	4 (6.9)
Perceptions	Do you think the Covid-19 test kits are reliable?	53 (91.4)	3 (5.2)	2 (3.4)
	In your opinion, is it important to get tested for Covid-19?	56 (96.6)	2 (3.4)	-
	Do you think the vaccines are effective?	50 (86.2)	8 (13.8)	-
	Have you taken a Covid-19 test before?	32 (55.2)	26 (44.8)	-
	Respect of barrier measures	Always	Occasional	Never
	Wearing of face mask	5 (8.6)	23 (39.6)	30 (51.7)
	Handwashing with soap and clean water	15 (25.9)	13 (22.4)	30 (51.7)
Practices	Use of hand sanitizers	1 (1.7)	21 (36.2)	36 (62.1)
	Respect of social distancing	-	23 (39.7)	35 (60.3)
	Coughing into a flex elbow	9 (15.5)	15 (25.8)	34 (58.6)
	Taking home made concoctions	-	11 (19.0)	47 (81.0)

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Table IV: Associations between some background characters (sex, age, education) of participants and knowledge score of COVID-19/ COVID-19 vaccines

Variables		Number of participants (%)	Knowledge score	p-value
			(Mean ± standard deviation)	
Overall		58 (100)	13.33 (2.2)	-
Sex	F	26 (44.8)	13,1 (2.1)	0.446
	M	32 (55.2)	13.5 (2.3)	
Age	18-35	15 (25.9)	13.4 (2.4)	0.582
	36-50	21 (36.2)	13.7 (1.8)	
	>50	22 (37.9)	13.0 (2.6)	
Education	Have never been to school	10 (17,2)	13.0 (2.7)	0.137
	Primary	8 (13.8)	11.8 (3.3)	
	Secondary	15 (25.9)	13.8 (2.0)	
	University	25 (43.1)	13.7 (1.5)	

Table V: Associations between some background characters (sex, age, education) of participants and perception score of COVID-19/ COVID-19 vaccines

Variables		Number of participants (%)	Perception score	p-value
			(Mean ± standard deviation)	
Overall		58 (100)	4.64 (0.7)	
Sex	F	26 (44.8)	4.6 (0.6)	0.55
	M	32 (55.2)	4.7 (0.7)	
Age	18-35	15 (25.9)	4.7 (0.6)	0.98
	36-50	21 (36.2)	4.6 (0.7)	
	>50	22 (37.9)	4.6 (0.7)	
Education	Have never been to school	10 (17,2)	4.4 (0.7)	0.086
	Primary	8 (13.8)	4.4 (1.2)	
	Secondary	15 (25.9)	5.0 (0.0)	
	University	25 (43.1)	4.6 (0.6)	

Table VI: Associations between some background characters (sex, age, education) of participants and practice score of COVID-19/COVID-19 vaccines

Variables		Number of participants (%)	Practices score (Mean ± standard deviation)	p-value
Overall		58 (100)	2.9 (1.5)	
Sex	F	26 (44.8)	3.5 (1.6)	0.018*
	M	32 (55.2)	2.6(1.5)	
Age	18-35	15 (25.9)	2.7 (0.9)	0.482
	36-50	21 (36.2)	2.9 (1.5)	
	>50	22 (37.9)	3.3 (2.0)	
Education	Have never been to school	10 (17,2)	3.7 (1.6)	0.082
	Primary	8 (13.8)	3.9 (1.6)	
	Secondary	15 (25.9)	2.8 (1.4)	
	University	25 (43.1)	2.6 (1.5)	
Statistically significant at $p < 0.05$				

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Table VII: Rumors/stories about the COVID-19 vaccines

Characteristics	Yes (%)	No (%)
Have you heard any rumors about the available COVID-19 vaccines	40 (69.0)	18 (31.0)
If yes, what did you hear?		
The vaccines are a means to infect Africans	1 (1.7)	-
The vaccines are not effective	10 (17.2)	-
The vaccines have been made to control humanity	9 (15.5)	-
The vaccines have too many side effects like blood clotting	13 (22.4)	
The vaccines can cause sterility	2 (3.4)	
The vaccines can protect us against COVID-19	23 (39.7)	-

Table VIII: Feedback from participants during the second dose

Questionnaire items About Covid-19 vaccine	Responses (N = 61)	
	Yes	No
	(n, %)	(n, %)
Have you received the COVID-19 vaccine?	36 (59)	25 (41)
Did you experience any side effects after your COVID-19 vaccine?	11 (18)	50 (82)
What were the side effects?		
Headache	5 (8.2)	56 (91.8)
Dizziness	1 (1.6)	60 (98.4)
Pain at the site of injection	6 (9.8)	55 (90.2)
Heaviness of the injected arm	5 (8.2)	56 (91.8)
Other	2 (3.3)	59 (96.7)
Did you experience any difficulties when attending your COVID-19 vaccine appointment?	1 (1.6)	60 (98.4)

Discussion

Over the years, immunization has played a fundamental role in reducing the burden of infectious diseases. Consequently in 2001, some 33,000 deaths and 14 million diseases were prevented [2]. In order to halt the ongoing pandemic, several COVID-19 vaccines have been approved and are currently being administered worldwide. In Cameroon, as of October 18, 2021, exactly 189 days (half a year) after the start of the vaccination, 490,604 doses have been administered or approximately 2,600 doses on daily basis. The most used vaccine being AstraZeneca with nearly 307 674 doses administered. Within a target population of 13 944 491, 2.9% received at least one dose of vaccine and 1.1% were fully immunized (MINSANTE np). Despite the numerous immunization centers in Cameroon, COVID-19 roll-out still poses a problem. This has raised doubts about the general population's knowledge, perceptions and practices towards the COVID-19 vaccine.

In this study, knowledge about COVID-19 vaccine and vaccination was high among study participants. Knowledge score did not vary significantly with gender, age and education. This finding is similar with other studies demonstrating no

significant sex, age and education differences in knowledge regarding COVID-19 [3–5]. Nevertheless, our results differ from studies concerning knowledge towards COVID-19 carried out in Bangladesh which reported that males had marginally higher scores in knowledge regarding COVID-19 than females [6]. The good knowledge score registered in our study on COVID-19 vaccines and vaccinations is possibly due to high exposures to information or publicity on COVID-19 vaccinations following the numerous vaccination campaigns organized by the government. Also, the fact that the study was carried out in an urban area, could explain the increase in awareness due to regular access to electricity and internet which are necessary tools to connect to media platforms resulting in regular access to COVID-19 related information shared here [7]. Hence, the increase knowledge about COVID-19, transmission pathways, barrier measures and information on the available vaccines in the country.

Participant's perception score was high 4.64 (0.7). This can be translated into the amount of knowledge they have regarding the COVID-19 vaccines effectiveness and safety. The use of porcine components, in some vaccines has raised concerns in some countries, where Sinopharm was qualified as halal, while AstraZeneca COVID-19 vaccine was

considered Haram by the Indonesian council for example. Although religious reasons may impact vaccine uptake, the Halal issue seemed not to pose a challenge amongst Muslim populations interviewed in Biyem-Assi. Also, the fact that the vaccination team was invited by the Muslim community of Mosque Biyem-Assi clearly showed the amount of influence and trust that reigns in the religious arena. Adherence to preventive practices such as the washing of hands was very appreciable compared to practice of other barrier measures. This could primarily be attributed to the Muslim religion which entails the washing of hands and feet before prayers coupled with the government order to put on face masks and washing of hands at every public place. The laxity in the respect of barrier measures could be attributed to the presence of available traditional concoctions esteem as being effective against the disease [3].

Amongst the chronic diseases reported by participants, hypertension and asthma were the most prevalent (33.3%) in respondents. This could be highly risky for these participants given that, some studies on coronavirus death rate tendency have been reported to be recurrent in persons with pre-existing comorbidity such as Hypertension, Chronic respiratory disease, cardiovascular disease, Diabetes and Cancer [8,9]. Respondents did not report any severe side effects after vaccinations. Out of the 58 participants who received the first dose, 36 of them came back for their second shot accounting for of 62% of fully vaccinated. This results may suggest to bring the vaccines closer to the communities could be one of the best solution at the moment to increase vaccine uptake in Cameroon.

Limitations

The main limitation of this study is the small sample size and limited sample representativeness which does not permit us draw a suitable conclusion regarding KAP. Another potential limitation is related to the fact that the study was conducted amongst those who come for the prayer but accepted to receive the COVID-19 vaccination; which means that the attitudes and practices of those who have come for the vaccine may have potentially be different from those who were not coming for the vaccines.

Conclusion

Overall, our analyses revealed that bringing the vaccines closer to the communities could be effective in the COVID-19 vaccines's uptake. This paper also revealed that the Muslim community of Mosque Biyem-Assi have a good knowledge of the disease but portrayed poor practices of barrier measures which might be a potential risk given the low vaccination rate of the country. Hence, the need to intensify health education programs to increase individual protection and vaccine's acceptance.

Author Contributions

Conceptualization: Adidja Amani, Efietngab Atembeh-Noura. Yauba SAIDU

Data curation: Efietngab Atembeh-Noura, Jean Thierry Ebogo Belobo

Formal analysis: Adidja Amani, CHEUYEMLEKEUMO Fabrice Zobel, Efietngab Atembeh-Noura, Moussa Souaibou

Investigation: Adidja Amani, Efietngab Atembeh-Noura, Moussa Souaibou, Joseph KAMGNO, Bissek Anne Cécile.

Methodology: Adidja Amani, Efietngab Atembeh-Noura, Joseph KAMGNO, Yauba Saidu

Project administration: Adidja Amani, Efietngab Atembeh-Noura, Joseph KAMGNO

Supervision: Adidja Amani, Efietngab Atembeh-Noura.

Validation: Adidja Amani, Yauba SAIDU, Georges NGUEFACK-TSAGUE

Visualization: Adidja Amani.

Writing – original draft: Adidja Amani, Efietngab Atembeh-Noura, Jean Thierry Ebogo Belobo, Hillary Tandjeu.

Writing – review & editing: Adidja Amani, Efietngab Atembeh-Noura, Hillary Tandjeu, Jean Thierry Ebogo Belobo, Moussa Souaibou, Joseph KAMGNO

Competing interests

The authors declare no competing interest

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Declaration of interest statement

No potential conflict of interest was reported by the authors

References

1. Pal M, Berhanu G, Desalegn C, Kandi V. Severe Acute Respiratory Syndrome Coronavirus-2 (SARS-CoV-2): An Update 12 (2020).
2. Zhou F, Santoli J, Messonnier ML, Yusuf HR, Shefer A, Chu SY, et al. Economic evaluation of the 7-vaccine routine childhood immunization schedule in the United States, 2001. Arch Pediatr Adolesc Med 159 (2005): 1136-44.
3. Ngwewondo A, Nkengazong L, Ambe LA, Ebogo JT, Mba FM, Goni HO, et al. Knowledge, attitudes, practices of/towards COVID 19 preventive measures and

- symptoms: A cross-sectional study during the exponential rise of the outbreak in Cameroon. *PLoS Negl Trop Dis* 14 (2020): e0008700.
4. Akwa TE, Ning TR, Maingi JM. Assessing the Perceptions and Awareness of COVID-19 (Coronavirus) in Cameroon. *Electron J Med Educ Technol* 13 (2020): em2007.
 5. Ferdous T, Kabir ZN, Wahlin A, Streatfield K, Cederholm T. The multidimensional background of malnutrition among rural older individuals in Bangladesh--a challenge for the Millennium Development Goal. *Public Health Nutr* 12 (2009): 2270–8.
 6. Hossain MA, Jahid MIK, Hossain KMA, Walton LM, Uddin Z, Haque MO, et al. Knowledge, attitudes, and fear of COVID-19 during the Rapid Rise Period in Bangladesh. *PLOS ONE* 15 (2020): e0239646.
 7. Akalu Y, Ayelign B, Molla MD. Knowledge, Attitude and Practice Towards COVID-19 Among Chronic Disease Patients at Addis Zemen Hospital, Northwest Ethiopia. *Infect Drug Resist* 13 (2020): 1949–60.
 8. Epidemiology Working Group for NCIP Epidemic Response, Chinese Center for Disease Control and Prevention. [The epidemiological characteristics of an outbreak of 2019 novel coronavirus diseases (COVID-19) in China]. *Zhonghua Liu Xing Bing Xue Za Zhi Zhonghua Liuxingbingxue Zazhi* 41 (2020): 145–51.
 9. Report of the WHO-China Joint Mission on Coronavirus Disease (2019).