

Sociodemographic and Clinical Determinants of Adherence to Covid-19 Vaccination among Health Personnel of the Cite Verte Health District in Yaounde Cameroon

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Abstract

Purpose: The aim of this study is to identify the socio-demographic and clinical determinants of adherence to Covid-19 vaccination among health personnel of the Cite-verte health district.

Problem: With daunting health challenges caused by the Covid-19 pandemic disease, it is surprising to see that many health personnel have not adhered to a preventive therapy that will assist in reducing its spread. Despite strategies put in place by the World Health Organization and the Ministry of Public Health of Cameroon in making available vaccines, the population seem not to adhere.

Methods: We used a quantitative cross-sectional prospective study for descriptive purposes from April to November 2021. Data was collected among 247 health personnel using structured questionnaires.

Results: Analysis revealed that the mean age of health personnel in our study was 36.76 years and a median of 37.00 ± 1.009 years. 12.6% are completely vaccinated, 14.6% incompletely vaccinated and 72.8% are not vaccinated. Also, age and religion influences adherence levels to Covid-19 vaccination at the 5% confidence level.

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Everything else being equal, health personnel aged 50 years and more are 12.33 [95%, 1.89-30.49, P-value=0.009] times more likely to be fully vaccinated than not vaccinated, compared to their 30–39-year-old counterparts. This chance decreases to 8.66 [95%, 1.38-24.22, P-value=0.021] times when comparing incompletely vaccinated to unvaccinated cases. Also, health personnel following other religions (Pentecostal, Atheist and Jehovah witness), are 95% less likely to be fully vaccinated than their Christian counterparts [RR=0.05; 0.002-0.89; P-value=0.042]. To add, clinical determinants such as history of respiratory problems, and comorbidities did not influence adherence levels to Covid-19 vaccination as the plus value was 0.558 (fully vaccinated) and 0.987 (incompletely vaccinated).

Conclusion: We can conclude that health personnel are aware of the necessity of vaccination, but age and religious beliefs greatly impacts on adherence despite efforts from the government in improving on vaccination coverage.

Keywords: sociodemographic determinants; clinical determinants; adherence; Covid-19 vaccination; health personnel; Cameroon.

1. Introduction

The Covid-19 pandemic has succeeded in ravaging millions throughout the world. In order to find solutions to their health problems, people suffering from one disease or symptoms of a disease, often turn to different routes for different reasons. They usually do so in order to attain the best possible treatment for their health problem. According to the World Health Organization (WHO), collective immunity against the Covid-19 virus is supposed to be obtained by vaccination and not from exposing one another to the pathogenic agent responsible for the disease [1]. Vaccines are therefore an essential new weapon in the fight against Covid-19, to break the chain of viral transmission and ensure herd or group immunity [2]. Working as fast as possible, scientists around the world have collaborated and are innovating to provide vaccines that together will save lives and end the pandemic.

Nevertheless, preventive immunization has given room for debates as to if these vaccines are safe like any other routine vaccine given its time frame for the production. Vaccines protect billions of people around the world as evidence shows no single intervention other than implementing mandatory Covid-19 vaccination policies [3]. It is no news that vaccine hesitancy hinders the real progress the world has made in fighting vaccine-preventable diseases. In 2019, the WHO listed "vaccine hesitancy" as one of the 10 threats to global health. Vaccination currently prevents 2-3 million deaths each year, and a further 1.5 million could be avoided if global coverage is improved [4].

Reports from WHO encourages aged persons as of 65 years to get massively vaccinated [5]. In developed countries, an approximate 70% of persons in 57 countries have already received at least a dose of a Covid-19 vaccine, as this rate nevertheless is low among low income countries [6]. Health personnel who are a target population need to adhere massively to this preventive therapy but trends reveal an inverse relationship [7]. We therefore aim to identify the socio-demographic and clinical determinants of adherence to Covid-19 vaccination

among health personnel of the Cite-verte health district.

Our general population for the study consists of all health personnel living or working in the Cite-verte health district, having Cameroonian nationality and are exercising as health personnel within the time of data collection. Our observations could give rise to the idea of individual determinants (socio-demographic and clinical) that influence adherence to Covid-19 vaccination. This work will be divided into a methodology, results, discussion, conclusion as well as limitations of the study.

2. Materials and methods

2.1. Research type

This was a quantitative prospective cross-sectional study, for descriptive purposes, which aimed at identifying the sociodemographic and clinical determinants of adherence to Covid-19 vaccination among health personnel of the Cite-verte health district Yaoundé Cameroon.

2.2. Inclusion and Exclusion

This study was carried out from April to November 2021. With the exhaustive list of health facilities in this given health district, we chose systematically certain health facilities to take part in our study. Health personnel of these selected health facilities constituted the target population of this study as only those within the selected health facilities who accepted to participate by signing a written consent form were included. Health personnel in these health facilities who did not accept to participate were excluded from our study.

2.3. Data Collection and analysis

This study was conducted after approval by the Institutional Ethics Committee for Research in Human Health (CEIRSH) of the School of Health Sciences of the Catholic University of Central Africa. Also, the Cite-verte health district head, as well as the directors of the health facilities in which data collection took place gave us their authorization to carry out this research in their institution.

Data collection was carried out with structured interviews using self-administered questionnaires among 247 health personnel working in the Cite-verte health district Yaoundé, and who agreed to participate in this study. We made use of Cspiro 7.5 to build our data entry mask for the questionnaire. All the 247 questionnaires were coded with restricted codes so as to keep discretion in the responses of the participants. Three types of data analysis software were used. These were SPSS 25, STATA 13 and Excel. The first software was used to do the flat sorting of the variables, their recoding, the bivariate analyses and to transfer the data to STATA. The second software was used to run the multinomial logistic regression model. The Excel software was used to visualize the data in the form of tables and graphs.

Analyses using logistic regression was important in order to highlight the net effect of independent variables (socio-demographic and clinical determinants) on the adherence of health personnel to Covid-19 vaccination. The choice of multinomial logistic regression was motivated by the fact that the dependent variable “adherence

to Covid-19 vaccination” is polytomous, i.e., it has three modalities: complete dose, incomplete dose and not vaccinated. Not vaccinated is our reference modality.

3. Results

3.1. Socio-demographic characteristics of the participants

In our study, missing values were marked nd (not determined). It also provided information on the quality of data. To this end, when the non-response rate of a variable exceeded 5%, the data were of poor quality. In the impossibility of correcting or performing amputations, the said variables were re-coded in the rest of the analysis (bivariate or multivariate).

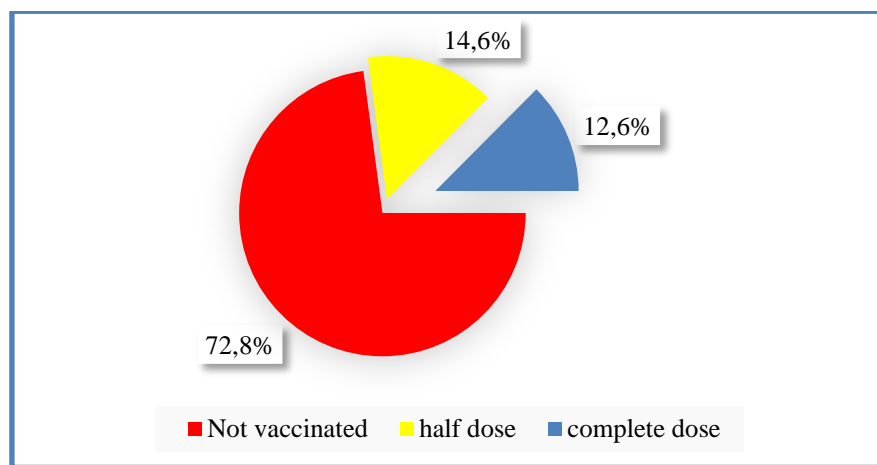


Figure 1: Proportion of vaccination coverage among health personnel

It can be seen from this figure above that only 12.6% (n=31) of the respondents in our study have received a complete dose of a Covid-19 vaccine type. This very small proportion of health personnel are those who are truly immunized against Covid-19. Also, 14.6% (n=36) have taken just a single dose of the 02 dose vaccines like AstraZeneca and Sinopharm, while 72.8% have not taken any vaccine type at all.

3.2. Univariate analysis

Health personnel in our study ranged in age from 18 to 68 years old, with those aged 37 being the most represented in the sample. We observed an average age of 36.76 years with a standard deviation of 1,009. The sample was dominated by health personnel having an age between 30 and 39 years (40.5%), followed by 18-29 years (24.7%). There are more female health personnel (59.1%) than male (40.9%), with a sex ratio of 0.69. Most of them are single (40.9%), followed by married (36.4%). It is also seen that most of these health personnel have an education qualification at least up to the university level (81.8%). From the data obtained from this survey, 65.6% of the respondents are of the Christian religion and 25.5% are Muslims. The proportion of those who have another religion different from Christianity (Catholics and protestants) and Islamism is low (8.9%). Health personnel from the Centre (19.0%), North (13.8%) and West (13.4%) regions are the most represented in the sample. Most of them live far from a Covid-19 vaccination center (34.8%) followed by

another majority who live near a vaccination spot (32.0%) (See table 1 below).

Table 1: Distribution of health personnel according to their socio-demographic determinants

Sociodemographic determinants	Effective (N= 247)	Percentage (p = 100%)
Age (in years)		
18-29	61	24,7
30-39	100	40,5
40-49	53	21,5
50-59	29	11,7
60 and more	4	1,6
Sex		
Masculine	101	40,9
Feminine	146	59,1
Marital status		
Married	90	36,4
Single	101	40,9
Divorced	12	4,9
widow/widower	15	6,1
Free union	29	11,7
Educational Qualification		
Primary	9	3,6
Secondary	36	14,6
University	202	81,8
Religion		
Christian	162	65,6
Muslim	63	25,5
Others	22	8,9
Region of origin		
Adamaoua	13	5,3
Centre	47	19,0
East	13	5,3
Extreme-North	26	10,5
Littoral	24	9,7
North	34	13,8
North-West	26	10,5
West	33	13,4
South-West	13	5,3
South	18	7,3
Distance of residence to a Covid-19 vaccination point		
very far (more than 10km)	51	20,6
far (5-10km)	86	34,8
near (1-5km)	79	32,0
very near (less than 1km)	31	12,6

A history of respiratory problems and antecedent of comorbidities was identified among 22.7% of health personnel in our sample. We could also identify from the 27.2% vaccinated that, Astra Zeneca is the vaccine most health personnel received (14.6%) followed by Sinopharm (8.1%) and then Johnson & Johnson (4.5%) (See table 2 below).

Table 2: Distribution of health personnel by Clinical characteristics

Clinical variables	Effective (N = 247)	Percentage (p = 100%)
Antecedent of respiratory problems and comorbidities		
YES	56	22,7
NO	191	77,3
Vaccine type received		
Sinopharm	20	8,1
AstraZeneca	36	14,6
Johnson & Johnson	11	4,5
Nd*	180	72,8

3.3. Bivariate analysis

Table 3: Sociodemographic determinants significantly associated to adherence of Covid-19 vaccination

Socio-demographic determinants	Adherence to Covid-19 Vaccination				P-value	Vcramer
	Complete dose	Incomplete dose	Not vaccinated	Total		
	n (%)	n (%)	n (%)	N (%)		
	31 (12,6)	36 (14,6)	180 (72,8)	247 (100,0)		
Age group (in years)						
18-29	8 (13,1)	4 (6,6)	49 (80,3)	61 (100,0)	0,007***	0,189
30-39	9 (9,0)	13 (13,0)	78 (78,0)	100 (100,0)		
40-49	6 (11,3)	9 (17,0)	38 (71,7)	53 (100,0)		
50 and more	8 (24,2)	10 (30,3)	15 (45,5)	33 (100,0)		
Religion						
Christian	26 (16,0)	18 (11,1)	118 (72,8)	162 (100,0)	0,007***	0,168
Muslim	4 (6,3)	10 (15,9)	49 (77,8)	63 (100,0)		
Others****	1 (4,5)	8 (36,4)	13(59,1)	22(100,0)		

Socio-demographic determinants were not fully associated with Covid-19 vaccine adherence. Age ($\chi^2=0.007$) and religion ($\chi^2=0,007$) were significantly associated at the 5% threshold, unlike other variables, such as gender ($\chi^2=0.753$), marital status ($\chi^2=0.120$), education level ($\chi^2=0.661$), region of origin ($\chi^2=0.634$),

and distance between home and hospital ($\chi^2=0.179$). Specifically, 54.5% (24.2%+30.3%) of health personnel aged 50 years and older tended to be more likely to take at least one dose of Covid-19 vaccine compared to their 18–29-year-old counterparts. Nevertheless, the strength of this association is weak ($V_{\text{cramer}} = 0.189$). With regards religion, 27.1% (16.0%+11.1%) of Christian health personnel were more likely to take at least one dose of Covid-19 vaccine compared to their Muslim counterparts (22.2%) and other religion (40,9%). It is important to note that the intensity of this association is weak ($V_{\text{cramer}} = 0.168$).

Table 4: Clinical determinants versus adherence to Covid-19 vaccination

Clinical determinants	Adherence to Covid-19 Vaccination				P-value
	Complete dose	Incomplete dose	Not vaccinated	Total	
	n (%)	n (%)	n (%)	N (%)	
	31 (12,6)	36 (14,6)	180 (72,8)	247 (100,0)	
	Antecedent of respiratory problems and comorbidities				
Yes	8 (14,3)	11 (19,6)	37 (66,1)	56 (100,0)	0,385
No	23 (12,0)	125 (13,1)	143 (74,9)	191 (100,0)	

History or antecedent of respiratory problems as well as comorbidities ($\chi^2=0,385$) is not significantly associated with adherence to Covid-19 vaccination.

3.4. Multivariate analysis

Table 5: Significant influence of sociodemographic determinants on adherence to Covid-19 vaccination

Sociodemographic Determinants	Adherence to Covid-19 vaccination					
	Not vaccinated (reference category)					
	Complete dose			Incomplete dose		
	Relative Risk (RR)	CI. (95%)	P- Value	Relative Risk (RR)	CI. (95%)	P- Value
Age group (in years)						
18-29	2,13	0,51-8,88	0,300	0,23	0,04-1,47	0,122
40-49	1,74	0,33-9,18	0,514	0,48	0,10-2,32	0,358
50 and more	12,33	1,89-30,49	0,009**	8,66	1,38-24,22	0,021**
30-39	(Ref.)			(Ref.)		
Religion						
Muslim	0,27	0,05-1,60	0,149	1,73	0,41-7,27	0,457
Others****	0,05	0,002-0,89	0,042**	1,70	0,30-9,72	0,553
Christian	(Ref.)			(Ref.)		

****= Significant at 5%; ***= significant at 1%; *= significant at 10%, ****Atheist, Pentecostal, Jehovah witness**

Age and religion influences adherence levels to Covid-19 vaccination at the 5% confidence level. Everything else being equal, health personnel aged 50 years and more are 12.33 [95%, 1.89-30.49, P-value=0.009] times more likely to be fully vaccinated than not vaccinated, compared to their 30–39-year-old counterparts. This chance decreases to 8.66 [95%, 1.38-24.22, P-value=0.021] times when comparing incompletely vaccinated to unvaccinated cases. Also, health personnel following Muslim and other religions are respectively 73% [OR= 0.27; 95%, 0.05-1.60; P-value=0.149] and 95% [RR= 0.05; 95%, 0.002-0.89; P-value=0.042] less likely to be fully vaccinated than their Christian (Catholic and Protestant) counterparts. However, only the difference between the other religions (Atheist, Pentecostal and Jehovah witness) and Christian category was significant for complete dose. This means that other religions turn not to adhere fully to Covid-19 vaccination.

It is important to note that, in this study, history of respiratory problems and antecedents of comorbidities did not influence adherence levels to Covid-19 vaccination at the 5% confidence level, as the plus value was 0.558 (fully vaccinated cases) and 0.987 (incompletely vaccinated cases).

4. Discussion

In this study, we aimed at identifying the sociodemographic and clinical determinants of adherence to Covid-19 vaccination among health personnel in the Cite verte health district Yaounde Cameroon. This study carried out in a time where the disease remains an international burden as Africa is still behind in the vaccine acceptance queue. We were able to bring out the following.

From our study, vaccination coverage among health personnel in the Cite-verte health district is 27.2%; with 12,6% fully vaccinated while 14,6% have taken at least a dose of a multidose vaccine (incompletely vaccinated). Our results are almost similar to those of WHO on vaccination rate in September 2021, which proved a vaccination coverage of 27% among health personnel in Africa. A majority of health personnel in Africa are still missing out on vaccines and remain dangerously exposed to severe Covid-19 infection, with a high risk of spreading it by passing through their patients and then to the general public.

Seeing the shortage of health personnel with approximately 1 per 1000 patients to deliver essential health services in Cameroon, efforts need to be made to improve on immunization among this high priority group. Any loss of this essential group to Covid-19 due to illness or death heavily impacts on health care accessibility and provision, thus, weakening the health system.

4.1. Sociodemographic determinants to Covid-19 vaccination adherence

4.1.1. Age

The results of our study show that, age of health personnel in the Cite-verte health district is significantly associated ($\chi^2 = 0.007$) to vaccine adherence. This clearly shows in our study that health personnel aged 50 and older are 12.33 [95%, 1.89-80.49, P-value=0,009] times more likely to adhere to Covid-19 vaccination than other age groups who are much younger. Our study ties to a study carried out among health care workers in Australia which revealed that among those from 70 years and above, 91.09% have already received a first dose of the Covid-19 vaccine, while 71.26% have received a complete dose. Also, 84.21% of persons aged 50-69

have received a first dose while 62.35% have received a second dose, contrary to 68.48% of those between age 16-49 who have received a first dose of a Covid-19 vaccine, while 43.24% have received a complete dose [8]. We can see the increase in the adherence rate as age increases. This can be explained from the fact that many believe the disease affects mostly the aged as CDC recommends older age groups as a priority group due to the high number of deaths (80 times more) among aged than young personnel due to Covid-19 [9].

Our study is contrary to a study carried out on the determinants of vaccine acceptance against Covid-19 in China by Dong and his colleagues (2021) which revealed that citizens aged over 50 years old showed higher refusal of vaccines when compared with young adults [10]. Drawing inspiration from the theory of motivation, Maslow explains a need for a physiological and psychological deficiency requiring satisfaction. Once the younger health personnel from our study are not able to experience this deficiency of the need to get vaccinated, their adherence level will remain low.

4.1.2. Sex

In addition, the present study records a predominance of Covid-19 vaccination cases in health personnel of the female gender. This nonetheless could be due to the slight difference in the number of females (59.1%) to males (40.9%) occurrence in our work, with a sex ratio of 0.69. Still with the cross-sectional study conducted in Australia, more women than men get vaccinated though this difference is not significant [8]. It ties with our study as sex is not significantly associated with vaccine adherence ($\chi^2=0.753$). Nonetheless, our study is contrary to that of a rapid systematic review conducted in China on health care personnel attitudes and perception towards vaccination. Their study revealed that more females turned to refuse vaccination due to certain infertility issues, the rush in vaccine production and other skeptical point of views were noted among others [7].

4.1.3. Marital status

The marital status of health personnel does not influence ($\chi^2=0.120$), adherence to the Covid-19 vaccine. Most of them in our study are single (40.9%), followed by married (36.4%). There is therefore no relationship that can point out to this fact. More research can be carried out in this light to find out if a relationship truly exists in a larger sample size which is more representative than ours, so as to draw up generalized conclusions.

4.1.4. Educational level

Relative to the level of education, we experienced no significant association to vaccine adherence. Most of these health personnel have an education qualification at least up to the university level (81.8%). In the same cross-sectional survey carried out on the determinants of vaccine acceptance against Covid-19 in China by Dong and his colleagues (2021) the biggest survey group hesitating to get vaccinated was actually the highly educated crowd [10].

4.1.5. Religion

In the sample of health personnel surveyed, 65.6% of the respondents are of the Christian (catholic and protestant) religion and 25.5% are Muslims. The proportion of those who have another religion different from Christianity and Islamism is low (8.9%). This other religion includes Pentecostal, Atheist and Jehovah witness. More specifically, 27.1% (16.0%+11.1%) of Christian health personnel tended to be more likely to take at least one dose of the Covid-19 vaccine, compared to their Muslim counterparts who did not (77.8%). It is important to note that the intensity of this association is low (Vcramer = 0.168). This result relates to that of Jiang and his colleagues (2021), where he found that religious convictions are a major factor in the non-adhesion to a given vaccine like Covid-19. Still from our study, other religions (Pentecostal, Atheist and Jehovah witness), are 95% less likely to be fully vaccinated than their Christian counterparts [RR=0.05; 0.002-0.89; P-value=0.042] [11].

This nonetheless can be backed up with the question on the role of religion and cultural beliefs on vaccine acceptance. A key interviewer clearly said that if only the face mask is forbidden in some religions, what about vaccination. We can have a glimpse of the rate at which Covid-19 in general and not only the vaccine has been criticized by many religious beliefs and tradition.

Also, it is worth highlighting that our study was carried out in a locality where Christianity and Islamism are the predominant religions, with Christianity having the upper hand. We therefore need to carry out another study in a well-balanced religion setting in order to clearly draw logical conclusions as to if religion can significantly influence vaccine adherence in a population.

4.1.6. Region of origin

Region of origin in our study was not statistically significant ($\chi^2=0.634$), to vaccine adherence. Our results are contrary to that of Gozum and his colleagues (2021) where culture which could be translated into the region of origin, had a vital role to play in the choice of accepting a vaccine or not [12]. Though we clearly did not focus on culture but on the region of origin, we could liaise this in a diversified country like Cameroon having about 247 ethnic groups scattered about 10 regions. Looking clearly into this fact, every region has its specific way of perceiving and behaving. There are a lot of conspiracy theories put forth. Transposing the theory of planned behavior [13], it is possible to hypothesize a weak behavioral control, which remains the result of a limited rationality in terms of costs / benefits, advantages / disadvantages or even beliefs' deviating from social norms and expectations among health personnel attitudes [7].

4.1.7. Distance to a vaccination center

Social inequity is a problem we are still experiencing in this recent time. The distance from home to a nearest vaccination point in our study varies from one individual to another. Though this variable was not significantly associated in our study, most health personnel live far (5-10km) from a Covid-19 vaccination center (34.8%), while, only 12,6% live very near (<1km) to a Covid-19 vaccination center. A shortage of vaccination points leaves many health personnel unmotivated. Transposing the theory of motivation according to Byrne & Clore, (1970) we are motivated to seek rewarding stimuli which reflect our unmet needs such as financial security, health and others when the solution is closest to us. When the aspect of easy access to a given service (Covid-19

vaccination) is a source of motivation to a given stimuli (getting vaccinated), improving on the points of vaccination will improve vaccine adherence through massive sensitization using these vaccination spots [14].

4.2. Clinical determinants to Covid-19 vaccination adherence

History of respiratory problems or comorbidities ($\chi^2=0.385$) was not significantly associated with adherence to Covid-19 vaccination though, a history of respiratory problems was identified among 22.7% of health personnel in our sample. In the same study on the determinants of vaccine acceptance against Covid-19 in China carried out by Dong and his colleagues (2021) it was revealed that participants with chronic disease were more likely to refuse to be vaccinated. Results from this study could be very contrasting to the normal phenomenon of rushing towards a preventive therapy in search for good health [10].

Mobilizing the theory of the health belief model, the perceived threats and benefits which is the product/sum of severity and susceptibility might be seen as indicative of the level of motivation an individual has to act to avoid a particular outcome. Weighing the dangers of staying without a given preventive therapy like the Covid-19 vaccine while being vulnerable and susceptible is questionable. In understanding behaviors associated with disease prevention among health personnel, three elements: the perception of the threat, the perception of the benefits related to behavior and personal efficiency must be enormous. If all health personnel (22.7%) identified having related comorbidities or history of respiratory problems adhere to a given type of Covid-19 vaccines, then one will have a greater vaccination coverage, hence immunity and reduction in the spread of the virus.

Also, Mangurian & Halley, (2021) demonstrated in their study on caring for the caregivers that, although adopting a policy of prioritizing the caregivers of medically fragile children and adults is good, this should nonetheless replace efforts to directly vaccinate eligible people with chronic disease or disabilities as this approach has wide ranging benefits [15].

4.3. Study limitations

We realized during our analysis that several questions like history of chronic diseases, and influence of colleagues (subjective norms) and attitude towards other vaccines (attitude) were not introduced in our questionnaire. This did not allow us to characterize and better appreciate the clinical and environmental determinant of health personnel to Covid-19 vaccine adherence.

We did not also seek to know the reasons that prompt for the selection of a given vaccine type like AstraZeneca, Sinopharm or Johnson & Johnson. A study can be carried out in this light to understand the choice of vaccine type in the population.

Finally, this study is limited to the health facilities in the Cite-verte health district. Despite the principle of generalization contained in the principle of a probabilistic sampling method, it may be less favorable to extend the results of this study to all health personnel in the 10 regions of the country Cameroon, talk less of Africa and the world.

4.4. Conflicting interest

The author declares that there are no conflicting interests

4.5. Acknowledgments

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5. Conclusion

Putting close attention on the socio-demographic determinants identified, we can put forth religion as this was statistically significant. This study proved that protestant and atheist religions turn not to adhere to Covid-19 vaccination. Seeing that our study was carried out in a context of a predominant Christian religion, this can be explained by the fact that, some churches declare the vaccine as the mark of the end time. This wrong information scares many of them away. Health personnel in our study were mostly represented by those from the Centre, North and West regions as most of them lived far from a Covid-19 vaccination center, followed by those who live near.

Regarding the clinical determinants, a history of respiratory problems was identified among 22.7% of health personnel, as it is important to underline that 77.3% had no history of respiratory problems. We could also identify from the 27.2% vaccinated that Astra Zeneca is the vaccine most health personnel received (14.6%) followed by Sinopharm (8.1%) and then Johnson & Johnson (4.5%) but no clinical determinant was associated to vaccine adherence.

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