

Sociocultural and Institutional Determinants of Adherence to Covid-19 Vaccination among Health Personnel of the Cite Verte Health District Yaounde Cameroon

Junior Alapa Nkwate Chefor^{a*}, Julienne Louise Ngo Likeng^{b*}, Sonia Ade Lum^c

^{a,b,c} *Catholic University of Central Africa, School of Health Sciences Messa, Yaounde 1110, Cameroon* ^a *Center for Global Health Practice and Impact, 500 First Street NW, Washington DC 20002*

^a *Email: junioralapa@gmail.com*

Abstract

The novel corona virus 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 weapon in the fight against Covid-19, to break the chain of viral transmission and ensure herd or group immunity. The aim of this study was to analyze the sociocultural and institutional determinants of adherence to Covid-19 vaccination among health personnel of the Cite-verte health district. To do this, we used a mixed prospective study (both qualitative and quantitative) for descriptive and analytical purposes. Data was collected among 247 health personnel using structured questionnaires and 08 in-depth interviews using an interview guide. Analysis revealed that 69,6% of health personnel do not have confidence in the various vaccines available. Institutional influence, vaccine confidence and experience of vaccine stock out significantly has an influence on adherence to Covid-19 vaccination at the 5% level. Everything else being equal, health personnel are 37.69 [(95%, 10.04-101.58, P-value=0.000)] times more likely to be fully vaccinated than unvaccinated when the hospital requires them to. In addition, though vaccine confidence [95%, 5.33-33.96, P-value=0.000] influences on being completely vaccinated, vaccine stock out also has a role to play in limiting complete vaccination [95%, 1.79-17.88; P-value=0.005]. Health personnel are aware of the importance of getting vaccinated, but rumors, lack of confidence and vaccine stock out greatly impacts on adherence.

* Corresponding author.

Emphasis should therefore be placed on extending sensitization and communication strategies in order to pass the right messages on matters of Covid-19 vaccination.

Keywords: sociocultural determinants; institutional determinants; adherence; Covid-19 vaccination; health personnel; Cité-verte health district Yaoundé Cameroon.

1. Introduction

The corona virus disease has killed and is still killing millions of people including the target population for vaccination such as health personnel; aged persons; academic guides; taxi drivers and bike riders as well as people with pre-existing comorbidities, both at home and in the hospital since its outbreak until now. In Africa, a lot of concepts and drama on the various vaccines made available has left many doubting on which vaccine is best and whether to take the vaccine or not. Only 1.9% of people in low-income countries have received at least one dose of a Covid-19 vaccine [2].

Shockingly enough, despite the numerous deaths all over the world and even in Cameroon, vaccine hesitancy still remains a major public health problem in a time like this. It is true that vaccines usually take a long time after following several stages of trial before being put forth into the market, but the increase technology and ravaging nature of the Covid-19 disease left no choice than to make available vaccines in a shorter time than expected. The vaccines that have been granted Emergency Use Listing by WHO include; AstraZeneca/Oxford, Johnson & Johnson, Moderna, Sinopharm, Pfizer/BionTech, and Sinovac.

Many are not convinced that these vaccines can prevent both they and their surroundings from developing adverse effects of the disease. Probably, much communication on its safe production, transportation and use has to be clearly explained. Many people turn to their usual informal methods of preventing the disease far from the biomedical sphere. Hence, the aim of this study which is to analyze the determinants of adherence to Covid-19 vaccination among health personnel of the Cite-verte health district.

The interest of this study lies in the fact that, government and health policy makers will be informed on strategies necessary to encourage health personnel who are at high risk of spreading the disease to be able to adhere to any of the Covid-19 vaccine.

The main objective is to analyze the sociocultural and institutional determinants of adherence to a vaccine as important as Covid-19 in a crucial period. It is true that the vaccines are given for free, but is this aspect enough to cause many to get vaccinated, this question remains unanswered.

Indeed, to understand the behavior of individuals and the reasons for the choice of this behavior, even when it concerns their own well-being, requires brainstorming and expertise, but also the involvement of one or more adapted theoretical approaches. These observations give rise to the idea of asking ourselves a few questions, the answers to which could lead to the achievement of the set objectives. The plan of our work will include an introduction, methodology, results, discussion and conclusion.

2. Materials and methods

This was a mixed cross-sectional study, both quantitative and qualitative for descriptive and analytical purposes, which aimed at analyzing the sociocultural and institutional determinants of adherence to Covid-19 vaccination among health personnel of the Cite-verte health district carried out from April to December 2021. With the exhaustive list of health facilities in this 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 who accepted to participate by signing a consent form were included.

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.

As for the quantitative aspect of this study, a prospective data collection was carried out with structured interviews using self-administered questionnaires among 247 health personnel. 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.

With the qualitative part of this study, we made use of the saturation effect in order to get the sample size. Once we conducted as many interviews such that answers kept repeating, we ended and used those who took part in verbally answering the questions. We made use of an open-ended interview guide to carry out the in-depth interviews among 08 health personnel that gave us their verbal consent. These interviews lasted between 10 to 15 minutes, and were recorded with the permission of the participant using a Dictaphone for verbatim transcription. Content analysis was carried out using Word software, in the form of tables, grouping the similarities and differences in the comments of the respondents concerning each of the topics covered.

3. Results

3.1. Quantitative study

3.1.1. Univariate analysis

Among those vaccinated, the satisfaction derived from the vaccine administration was neutral (11.8%), followed by 10.5% of those satisfied. Only a minor proportion of 4.9% were unsatisfied after receiving a vaccine type against Covid-19. Also, the data obtained portrays a majority whose vaccination status was not influenced by their institution (73.7%) while just a few (26.3%) had a vaccination status influenced by their institution of work.

Talking on the confidence health personnel have on the various Covid-19 vaccines, a minor proportion of 30.8% affirm having confidence on the vaccines. The remaining 69.2% of the respondents in our study lacked confidence on the vaccines. Also, 47.8% of the respondent's belief that poor administration of the vaccines can discourage them to get vaccinated, and 52.6% belief that these vaccines may present quality issues such as its color that hinders health personnel from adhering. To add, almost all respondents do not pay to get vaccinated (96.4%) and 19.8% have experienced a stock out of a given preferred vaccine type that has either prevented them from getting vaccinated, or from receiving a second dose of a double dose vaccine.

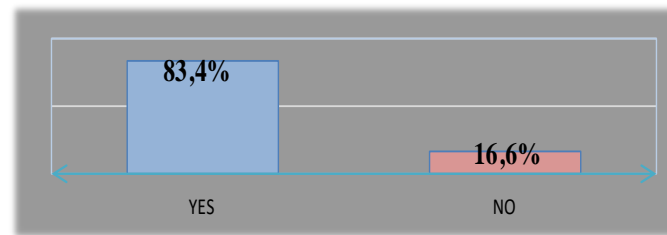


Figure 1: Knowledge on vaccination centers.

Regarding knowledge on vaccination centers, the sample is dominated by health personnel who are aware of a vaccination center where they can get vaccinated against Covid-19 ($p=83.4\%$, $n=206$), while the remaining 41 health personnel in our study did not know the various vaccination centers ($p=16.6\%$, $n=41$). Among health personnel who know a vaccination center ($n=206$), most of them got information through the social media ($p=35.2\%$, $n=87$) and in the hospital where they work ($p=34.4\%$, $n=85$). There is very little sensitization done through the radio and television ($p=13.8\%$, $n=34$).

3.1.2. Bivariate analysis

The institutional variables listed are not significantly associated with adherence to Covid-19 vaccination: administration of the vaccine such that can discourage adherence ($\chi^2=0.066$); vaccine quality problems like its color that hinders vaccination ($\chi^2=0.115$); and payment to get vaccinated against any vaccine type of Covid-19 ($\chi^2=0.426$).

However, other variables were significantly associated with vaccination adherence: vaccine administration after

1st dose ($\chi^2=0.012$), working institution's influence ($\chi^2=0.000$), vaccine confidence ($\chi^2=0.000$) and experience of vaccine stock out ($\chi^2=0.002$). Specifically, 65.9% of incompletely vaccinated health personnel were not satisfied after the first dose of the 02 dose vaccines (AstraZeneca and Sinopharm) or even after vaccination from the single dose vaccine (Johnson & Johnson). It should be noted that the strength of this association was strong ($V_{\text{cramer}}=0.305$). Also, 70.8% ($30.8\%+40.0\%$) of health personnel were more likely to take at least one dose of Covid-19 vaccine after recommendation from working institution, compared to their counterparts who were less likely (88.5%). The same is true for those who trust the vaccines, 46.0% ($26.3\% + 19.7\%$).

Also, 76.8% of health personnel did not take the vaccine because of stock-outs. It is important to note that the strength of this association is strong ($V_{\text{cramer}} = 0.588$; $V_{\text{cramer}} = 0.312$) and moderate ($V_{\text{cramer}} = 0.228$), respectively for the variables institution's influence, vaccine confidence and experience of vaccine stock out.

3.1.3. Multivariate analysis

Table 1: Significant influence of institutional determinants on adherence to Covid-19 vaccination

Institutional Determinants	Adherence to Covid-19 vaccination					
	Not vaccinated (reference category)					
	Complete dose			Incomplete dose		
	Relative Risk (RR)	IC. (95%)	P-Value	Relative Risk (RR)	IC. (95%)	P-Value
Working institution's influence						
Yes	37,69	10,04-101,58	0,000***	1,73	0,41-7,27	0,457
No	(Ref.)			(Ref.)		
Vaccine confidence						
Yes	19,85	5,33-33,96	0,000***	4,90	1,42-17,00	0,012**
No	(Ref.)			(Ref.)		
Experience of vaccine stock out						
Yes	1,66	0,35-7,77	0,520	7,06	1,79-17,88	0,005***
No	(Ref.)			(Ref.)		

= Significant at 5%; *= significant at 1%; *= significant at 10%

Institution's influence, vaccine confidence and experience of vaccine stock out significantly has an influence on adherence to Covid-19 vaccination at the 5% level. Everything else being equal, health personnel are 37.69 [(95%, 10.04-101.58, P-value=0.000)] times more likely to be fully vaccinated than unvaccinated when the hospital requires them to. In addition, those who trusted the vaccines were 19.85 [(95%, 5.33-33.96, P-value=0.000)] and 4.90 [(95%, 1.42-17.00, P-value=0.012)] times more likely to be fully or incompletely vaccinated than unvaccinated, respectively, compared with their counterparts with the opposite views. Also, those who experienced vaccine type stockouts were 7.06 [95%, 1.79-17.88; P-value=0.005] times more likely not to even receive a dose of a vaccine (incomplete vaccination).

3.2. Qualitative study

3.2.1. Socio-cultural determinants

This section focuses on the following aspects: knowledge, perceptions, and meaning of Covid-19 vaccines

surrounding health personnel regarding vaccination.

3.2.1.1. Knowledge about Covid-19 vaccination

Knowledge refers to a relationship of thought to external reality (Covid-19 vaccines). It is a body of information stored through experience or learning (a posteriori) or through introspection (a priori). Knowledge has its starting point in sensory perception, then follows understanding and ends on reason. The process of knowledge has four elements: subject, object, operation and internal representation (the cognitive process).

□ Knowledge of the role of vaccination

In this study, the health personnel believe that vaccination plays a role of prevention and protection against the contamination of Covid-19. This is the example of one respondent (Info3) who thinks that

"The role of vaccination is to prevent us. When we take the vaccine, we are free of the germ and we can walk without contaminating others".

It should also be noted that even if the vaccine does not immunize against the disease, it is important to do so. Transposing the recommendations of the WHO, the info 7 implicitly testifies to the situation:

"A vaccine first provides support to the body to fight infections. For example, with Covid-19, since it is a pandemic disease of recent age, and according to the recommendations of the WHO, in order to reduce the proliferation of this infection, it is good for us to be vaccinated".

The Covid-19 vaccine has therefore the role of preventing, reducing the spread of the disease, fighting against infections, limiting the risks of contamination and consequently reducing mortality rate.

□ Knowledge of vaccine types

Health personnel were asked about the types of vaccines. At the end of the interviews, it was found that very few health staff could name at least two vaccines. These were women, like info 3 (Astra Zeneca, Sinopharm), info 4 (Johnson & Johnson, Pfizer, Astra Zeneca) and one man or info 7 (Sinopharm, Astra Zeneca, Johnson & Johnson). It is important to note that there are staff who are not knowledgeable about the Covid-19 vaccines, as revealed by the following informants:

"In general, (...), I don't know much about the vaccines, but at the moment, I just know that there are vaccines from America, China, Russia and England." (Info 1); "ehm...I don't really have much information specifically about the different types of vaccines" (Info 8).

□ Knowledge of prevention methods

This section highlights all the practices developed to counter the spread of the virus and the plurality of vaccines in Cameroon. All of the personnel interviewed consider barrier measures to be the best prevention methods for Covid-19. With the exception of two respondents (info 4 and info 6), who consider vaccination to be the best method, despite the fact that other methods are not negligible. This is proven by the assertion of respondent 06 who says

"I think that vaccination is still the best method, even if other prevention methods are still important."

On the other hand, the set of barrier measures would be global as according to the respondents; social distancing, hand washing, wearing a mask, without forgetting traditional medicine is still good. These methods also depend on the beliefs and contextual practices of each population, because according to respondent 02

"The use of njinja, lice, and Mgr Cledart medication can also help stop this, because we in Africa know that covid-19 is just a cold that is advanced."

□ Knowledge of the influence of auto medication, religious and cultural beliefs

Socio-cultural determinants are also reflected in the influence of religion and cultural beliefs on vaccine adherence and the role of self-medication on compliance. Indeed, with respect to the influence of religion and cultural beliefs on vaccine adherence, some felt that this influence was remarkable, which did not facilitate access to the vaccine.

According to respondent 7:

"If only the face mask is forbidden in some religions, what about vaccination?"

Following info 4, he had this to say:

"Yes, there is a lot, especially about conspiracy theories, (...) they have used Covid to preach about the end time which is not actually a reality. Majority of health personnel have abandoned health science and are using more of religion to back up their stand, but to me, it is an error, you are not born with religion, we grow up to meet religion."

We can summarize from this that, many have turned towards their pastors, especially Pentecostal churches, in believing myths rather than caring for their health state. Some respondents said that at some point in time, man has to forget their beliefs and religion and take out time to make vital decisions for their health.

In addition, it was noted that many rushed to auto-medication because of the lack of awareness and confidence in the vaccine, and the fear of being stigmatized and quarantined. We justify this with the words of respondent 4

who said:

"Auto medication played a huge role. I remember people buying a lot of anthramycin and iron tablets

just to get well, not only in the cases of hospitals, drugs sold in pharmacies, but also conventional practices, people boiling all kinds of herbs (...) All this in the little lack of confidence in vaccines."

3.2.1.2. Perceptions on Covid-19 vaccination

Perception is a cognitive event in which a stimulus or object present in an individual's immediate environment, is represented to him in his internal psychological activity.

□ Perception of Covid-19 vaccine effectiveness

Health personnel have different point of view on the effectiveness of the Covid-19 vaccines. Some believe in it and others do not. For example, informant 3 said,

"Some of us nurses are not really interested but I know that in a few days, I will receive the full dose. So, I really trust this vaccine."

By reference to the WHO recommendations and the experiences of other vaccines, informant 7 attests to its effectiveness by emphasizing that:

"Yes, we have confidence since the WHO has already accepted these vaccines and many have taken it and have not died."

It is important to note that belief in the efficacy of the vaccine is built on the foundation of perpetual vaccine research, as info 4 states:

"I've done a lot of research on vaccines, it's ethnological. Trust is built over time, and like I said, I was shy at first, (...), for now, the reason I took the vaccine is because I am confident that it will work."

Others, however, are wary. This is evident in the words of one respondent (Info 3), who said,

"There are a lot of things they hide from us like long-term mutations. I don't know why they are forcing us to get vaccinated when they know it will work against our health."

Similarly, Info 5 speaks strongly when he expresses his distrust, as follows:

"If I had trusted the vaccines, I would have been vaccinated (little chicks, smile). So, I still don't trust any of these vaccines."

□ Perception on vaccine confidence

The mistrust of health personnel depends on the appraisal made of the content of his research. Thus, info 8 states that:

"Ehh..., me personally in my humble opinion, I don't trust the vaccine yet. I did my little research at the beginning of the vaccination, and I saw that there will be long term effects and gene mutations, so for me it doesn't encourage me."

These aforementioned perceptions influence vaccine uptake. Thus, the reluctance in taking the vaccine was more noticed in the statement of info 4:

"I am afraid, and it is not only in this vaccine, but I think badly to take the vaccine".

Informant 6 highlights the influence of institutional determinants on adherence to the Covid-19 vaccine, when he states to this effect:

"The media discussion about the different types of vaccines, their side effects, acceptance and rejection between the government and the pharmaceutical industries has really reduced the trust on these vaccines."

3.2.1.3. Meaning of Covid-19 vaccines

In this sub-section, the influence of rumors on the adherence of health personnel to Covid-19 vaccines is highlighted. Rumors are a phenomenon of transmission, broad of a story with pretension of truth and revelation by any formal or informal means of communication. This is what we know, having heard it. These rumors are:

"The vaccine is deadly"; "elderly and co-infected are targets"; "side effects exist".

More specifically, the news obtained, like a health personnel (info 5) will say that:

"Rumors have greatly influenced adherence to this vaccination against Covid-19".

Info 8, on the other hand, reflects a strong consideration of rumors on the adherence of health personnel:

"There are always rumors in the neighborhood, and many listen to these rumors instead of asking for the right information maybe in their hospitals in order to make the right decision. This influences adherence to the Covid-19 vaccination."

Also, others have highlighted the content of these rumors, as well as the testimonies, by stating the following:

"We can see that these rumors have told us that this vaccine is deadly. Others have said that after

taking the vaccine you will die or your health will go bad, and we all live in the shadow of rumors" (info 2)
"Many have been skeptical about vaccines. Many have different opinions and, for example, some have testified about the poor quality of vaccines without even knowing what they are" (Info 7)

One respondent will go on at length without stop about the role of rumors on adherence to the Covid-19 vaccine. These rumors make co-infected and elderly people the preferred targets for the Covid-19 vaccine and not health personnel. He states:

"Social media could easily influence people who aren't inductive enough to engage in studies and figure out for themselves what is right and what is wrong. Because false information spreads faster than good information" (Info 4)

Side effects following the Covid-19 vaccine were cited by health personnel as they reported on a set of ideas that they have about the subject. These ideas may come either from their culture or from their personal experience. According to them, there is a multitude of side effects or generalized discomfort (fever, fatigue, dizziness, weakness). For the majority of respondents, the Covid-19 vaccine has adverse health effects and may even develop contagion risks among patients. This is explained by the words of info 05:

"For close family members who have taken it, most of them have experienced discomfort, weakness, dizziness and mild symptoms of Covid-19."

Several illnesses can occur after taking the vaccine. This is reflected in the words of one respondent (Info 4):

"The side effects, we have read about them in the studies on blood clotting, heart failure and also weakness, curves during pregnancy."

While it is true that scientist who have done studies are aware of a multitude of side effects, some are skeptical about taking the vaccine. Indeed, respondent 01 asserts that,

"I don't have any adverse effects because I haven't taken any vaccine."

However, despite the mistrust of some respondents towards the vaccine, others have no problems and perceive it is as any other vaccine that may have fever as a side effect. This is also reflected in respondent 07 who said,

"These side effects are like any other side effect of any vaccine."

3.2.2. Institutional determinants

The institutional determinants refer to the strategies for raising awareness about the Covid-19 vaccines

(vaccination strategies), role of working institution and the processes for involving the population following the Covid-19 vaccine.

3.2.2.1. Confidence and awareness strategies

First of all, with regard to awareness strategies, 4 out of 8 health personnel surveyed think that there is very little awareness of the vaccine. Indeed, Info 2 states:

"...(..).. eh from Covid-19 onwards, it's still basic. I remember very well at the time of HIV/AIDS, there were posters everywhere, every radio and television were advertising, but with Covid-19, it is still basic awareness. No concrete elements have been developed to massively disseminate this information."

Secondly, in relation to people's perceptions of the Covid-19 awareness strategies, many felt that the strategy was limited and needed improvement. Ultimately, in terms of the process of engaging people in the Covid-19 vaccine, the majority of respondents are not confident or motivated about the vaccine due to pervasive negative rumors and limited outreach. This is evident in the words of respondent 8 who said,

"There are always rumors in the neighborhood, and many listen to these rumors instead of asking for the right information maybe in their hospitals (...) this influences adherence to the Covid-19 vaccination."

3.2.2.2. Working institution's influence

The place of work has an impact on vaccine adherence. For some respondents, awareness is raised in

the hospitals and the strategy is done by a chain (snowball), i.e., managers-staff-patient. According to a respondent

(Info 7),

"(...) our directors have been vaccinated and have encouraged each health department head to sensitize their personnel to be vaccinated."

Informant 3 clearly puts it in her words that:

"For now, the vaccine is available in the Cite-verte health district Hospital where we work. As a nurse, we are very much sensitized every morning and during coordination meetings and we also transmit this information to our patients."

This implies an implication of the hospital and every health institution, and the big role they have to play on vaccine compliance and acceptance. Putting in play the hospitals, and health centers in which these health

personnel work into encouraging them to get vaccinated, a majority will adhere.

3.2.2.3. Motivation of health personnel

It is important to situate the need for motivation. When asked about what can be done to motivate health personnel to get the vaccine against Covid-19, some were clear to say that sensitization, counselling, massive posters and implementation of educational talks on Covid-19 to all patients who come to the hospital, beginning with health personnel, the main source of sensitization.

For this respondent, in order to create motivation, it would be necessary to

"first eliminate all possible mutations and make sure that taking the vaccine will not lead to any future complications, neither for us nor for our children." (Info 8).

Another respondent vividly proposes the following in her words (Info 2):

"The first thing I think is to ensure an immediate health care after taking the vaccine. Because if for example I receive the vaccine, I have to be sure that after taking the vaccine, the cost of any side effect will be covered by insurance" Informant 3 says that:

"We need to do a lot of counselling to people. Many will say that we have always been having cough, catarrh, and we must stick to our traditional means of treatment. So, we need to intensify counselling on matters of Covid-19, just like we do in the HIV unit of the hospital."

4. Discussion

In this study, we aimed at analyzing the sociocultural and institutional determinants of adherence to Covid-19 vaccination among health personnel in the Cite-verte health district Yaounde Cameroon.

4.1. Sociocultural determinants of adherence to Covid-19 vaccination

4.1.1. Knowledge on Covid-19 vaccination

It is worth noting that while the Covid-19 vaccines authorized by WHO, and those present in Cameroon are incredibly effective at reducing the risk of developing serious illness and death, no vaccine is 100% effective. A small percentage of people still get ill from Covid-19 even though they have been vaccinated. Limited information about the risk of vaccinated people passing the virus to others if they are infected still exist, as lack of transparency keeps looming doubts and reducing overall knowledge on the various vaccine types and specificities.

Several preventive methods exist, but our study clearly points out vaccination, barrier measures and traditional form of medicines. A majority of the health personnel preferred barrier measures like hand washing, wearing of

face masks and keeping social distancing in protecting them from contacting the disease to vaccination [3]. Though vaccination is a primary preventive therapy, we need to refocus on its goal. It is worth noting that there is not sufficient knowledge due to lack of interest by most health personnel. If health personnel lack interest in these vaccines and Covid-19 as a whole, then the dissemination of the right messages to patients and clients who come to the hospital for counseling and other matters will not certainly be done, thus further reducing vaccine coverage rates.

Talking about the role of auto medication, religion and cultural beliefs in this Covid-19 subject long debated upon, when faced with symptoms of Covid-19, many run towards auto medication as their preventive therapy. Auto medication is a dangerous phenomenon that is slowly increasing on vaccine hesitance. Our study ties to that of a community-based survey carried out in India where more than 50% of the respondents had positive attitudes towards the Covid-19 vaccines but could not adhere due to practices of auto medication. The prevalence of vaccine hesitancy in this study was 40.7% [4].

4.1.2. Perception of the Covid-19 vaccine effectiveness and confidence

In our study, the majority of respondents have a relatively poor perception of this vaccine. Some people consider that Covid-19 does not exist, and do not understand why they should be prevented from something that is not real. A small part of them also believe that it is not the same vaccine that the Europeans and Americans are injecting. Some people consider the disease as a simple flu, thus showing the disinterestedness of the health workers to this vaccine. This is in line with a study carried out on the sociodemographic determinants to adherence of Covid-19 vaccination among health personnel in Yaoundé Cameroon. Here, religious belief was significantly associated with the adherence of health personnel to Covid-19 vaccination [5]

Our findings are contrary to those of an online survey carried out in mainland China on intention to Covid-19 vaccination uptake [6]. The study demonstrated that knowledge of the Covid-19 vaccine and risk perception of Covid-19 positively influenced their attitude toward the uptake of a Covid-19 vaccine.

The extended theory of planned behavior appears to be an efficient model with the focus on attitude, knowledge, risk perception towards a behavior change. Since many have not sought to know about Covid-19 and its vaccines, less sensitization of the vaccine types is causing recently a poor adherence [6].

4.1.3. Meaning and Attitude towards vaccine adherence

From our study, the attitudes of health personnel can be characterized as being hesitant. From the respondent's profile, only 3/8 health personnel took at least a dose of the vaccine, with just 02 being fully vaccinated against Covid-19. Our study is contrary to that of Danabal and colleagues (2021) in a community based study on attitudes towards Covid-19 vaccines and vaccine hesitancy in urban and rural communities. He found in his study that 50% of the respondents had positive attitudes towards Covid-19 vaccines [7]. This difference nonetheless could be due to the fact that he carried out his study in the whole community of 564 persons who had not been vaccinated yet through a multistage random sampling, where as we used both a systematic and convenience sampling method in our study comprising of only health personnel.

Our study is also contrary to a rapid systematic review on health care workers attitudes and related factors towards Covid-19 vaccination. Li and colleagues (2021) mobilized 13 studies and found that vaccine adherence ranges from 27,7% to 77,3% as health personnel had positive attitude towards future Covid-19 vaccines. This is because this study was carried out in the developed country and more still before the start of vaccine deployment [8].

Following studies on the extended theory of planned behavior in explaining the intention to Covid-19 vaccination uptake by Fan and colleagues (2021), they found that subjective norms and perceived behavioral control were not significant predictors for the intention to uptake Covid-19 vaccination ($R^2=0,49$), but he concluded that the TPB appears to be an efficient model with the focus on attitude, knowledge and risk perception [6].

Rumors and gossips have placed a great hindrance to the adherence of health personnel. Most of them talked of the fact that they are scared because they heard that this vaccine can cause mutations, and even death in the long run. This goes in line with a study on Covid-19 vaccination and the power of rumors carried out by Dasgupta and colleagues (2021). In their study, they found that rumors just like in time past continues to impact negatively on vaccine acceptance, discouraging people not to tune in as they can concentrate on issues that will shape perceptions around the vaccines including product development, prioritization strategies, program rollout activities, and adverse effects following immunization and adverse effects of special interest [9].

4.2. Institutional determinants

Several institutional determinants are associated to vaccine adherence. Some of these determinants include:

knowledge on vaccination centers ($\chi^2=0,000$), the working institution's influence ($\chi^2=0,000$), vaccine confidence ($\chi^2=0,000$), and experience of vaccine stock out ($\chi^2=0,002$). Nevertheless, after logistic regression, only working institution's influence ($p=0,000$; complete dose), vaccine confidence ($p=0,000$; complete dose and $p=0,012$; incomplete dose) and experience of vaccine stock out ($p=0,005$; incomplete dose) were significantly associated to Covid-19 vaccine adherence among health personnel

4.2.1. Knowledge on vaccination centers

Susceptibility to vaccine adherence is also higher among health personnel with knowledge of vaccination points, 32.5% (15.0% + 17.5%). The intensity of this association is medium ($V_{cramer} = 0.272$). Nevertheless, using multivariate analysis, knowledge on vaccination centers had no influence on vaccination adherence level. This clearly shows that having knowledge on the various vaccination centers does not determine if one will get vaccinated or not.

A motivating factor must be involved in causing the set behavior. From the theory of motivation, the progression principle will place health personnel who have knowledge on vaccination centers more susceptible to get vaccinated than health personnel who are not aware of the vaccination centers [10]. If they know, they may see the need of getting the vaccine, but if there is no idea on such, the need might be reduced. Also, from

the theory of planned behavior, the intensity of the intention is affected by attitude, subjective norms and perceived behavioral control. Having the ability of always getting vaccinated alongside knowledge of the vaccination centers could enhance on the intensity of the intention to get vaccinated.

4.2.2. Working institution's influence

Specifically, 70.8% (30.8%+40.0%) of health workers were more likely to take at least one dose of Covid-19 vaccine after their working institution's influence. That is, they are 37.69 [95%, 10.04-141.58, P-value=0.000] times more likely to be fully vaccinated than not vaccinated when required by the hospital. This study ties to that carried out on Covid-19 vaccination coverage among hospital-based health care personnel in the United States. Their study suggests that in the bid to protect both patients and staff, it is recommended that Covid-19 vaccination mandates as a condition of employment for health personnel by many experts and professional organizations [11].

This nevertheless is contrary to one study carried out in China which proved that vaccine acceptance range according to hospital rules. In his study, he pointed out many who clearly stated voluntary acceptance and not a mandate for work [8].

Also, in a study carried out by Mangurian & Halley, (2021) on caring for the caregivers, they clearly put out vaccinating essential members of the health care team as a strategy to limiting the spread of the virus [12].

4.2.3. Vaccine confidence

Talking on the confidence health personnel have on the various Covid-19 vaccines, those who are confident in the Covid-19 vaccines are 19.85 [95%, 5.33-73.96, P-value=0.000] and 4.90 [95%, 1.42-17.00, P-value=0.012] times more likely to be fully or incompletely vaccinated than not vaccinated, respectively. From the theory of planned behavior (TPB), the attitude toward the behavior, the subjective norm, and the perceived behavioral control led to the formation of a behavioral intention (vaccine hesitancy). Also, our study goes in line with a study carried out in Ghana on determinants to Covid-19 vaccine acceptance. Here, personal vulnerability was significantly associated to vaccine adherence, and this can be translated to the confidence they have [13]

Our study could boost of only a few who could say they are sure of its safety, but the problem lies in the strategies of immunization. Though some lack total confidence, others are not sure at all. This ties to a systematic review carried out in China by Li and colleagues (2021) in which they found out that concerns for safety, efficacy and effectiveness and distrust of the government were barriers to vaccine adherence [8].

To add, a community based household survey on factors associated with vaccine acceptance in India proved that most people who did not get vaccinated were worried about side effects. This is in line with our study, as lack of vaccine confidence is a major hindrance to vaccine acceptance even among health personnel [14]. Also, concerns about long term side effects has been found associated in a study on the acceptance of Covid-19 vaccination among health system personnel [15]. Efforts need to be made to convince the public and this must start with the health care providers standing on the frontline in accepting this vaccine.

4.2.4. Experience of vaccine stock out

Very little data is yet to be available to clearly state if it is possible to get the second dose or third dose of Covid19 with another vaccine type in case of stock out. This is the case with AstraZeneca which is out of stock since august 2021. Being a two-dose vaccine, those who collected the first dose are unable to be completely immunized till date.

Those who experienced stockouts of one type of vaccine were 7.06 [95%, 1.79-27.88; P-value=**0.005**] times more likely to be incompletely vaccinated. In situations where a second dose of AstraZeneca is not available, WHO's Strategic Advisory Group of Experts (SAGE) has stated that a second dose of Pfizer or Moderna can be used though mild side effects may occur [16], but nevertheless, Cameroon has not yet received through donations any dose of Moderna yet.

Sometimes, at the time of getting a particular vaccine type in a given vaccination center, the vaccine administrators realize that they do not have that particular vaccine anymore, or the vaccine present in the cold chain is expired. This will cause the individual to move again from one place to another, causing fatigue due to limited vaccines and vaccination centers. This is related to the aspect of vaccine inequity as a study on energy, environment, economic and social equity (4E) pressures on Covid-19 vaccination mismanagement. In this study put forth by Jiang and colleagues (2021), in the vaccination cycle from vaccine development to waste management, vaccine management systems must be solid to allow vaccines for all and prevent viral circulation in the ecosystem [17].

4.2.5. Immunization strategies to enhance motivation

The ministry of public health is deploying several vaccination strategies to enhance vaccination coverage rate in the country. Knowledge as to whether these strategies are not yielding fruits as the efforts put in place are still shallow. Our study is in line with a study on the determinants of Covid-19 vaccine acceptance in Ghana, as health personnel in trying to know what they think of the immunization strategies put in place, think the provision of safe vaccination platforms and messages that takes away their personal vulnerability is important in allowing people to make informed decisions. [13]

Information plays a key role, on where to get the vaccine and its importance. But considering the fact that there has not been any mass publicity about the vaccine and other encouragement plans, those who are fortunate to be in a health institution where the vaccine is administered may have the chance to easily receive one. I wonder whether other persons who are not in a health institution will have knowledge on campaigns, or on where to get vaccinated. In trying to draw up tendencies, we could hypothesize that if vaccine adherence among health personnel is still as low as 27,2% in a study carried out in this health district, with health personnel being in health institutions and having an upper hand in easy access to the vaccines, what more about non health workers who have no links [5]. Intense communication and door to door sensitization strategies must be enhanced rapidly if a collective immunity must be achieved.

4.3. Study limitations

This study is limited to the health facilities in the Cite-verte health district Yaounde Cameroon. Despite the rule of generalization 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 any part of the world. Detailed studies to see the adherence in other health districts is necessary.

Also, the study was carried out in hospitals during working hours. It is important to emphasize that the responses obtained may not be exhaustive of what they had to say as a few answered just to get rid of our presence.

To add, we realized during our analysis that several questions like attitude towards other vaccines were not introduced in our questionnaire. This did not allow us to characterize and better appreciate the sociocultural determinants of health personnel to Covid-19 vaccine adherence.

Furthermore, we did not also seek to know the reasons that prompt for the choice of being vaccinated or not. A study can be carried out in this light to understand the choice of getting a vaccine.

For the in-depth interview, we only chose by a non-probabilistic convenience method, 08 health personnel willing to participate in the interview. This gives room to bias as some may not be open in expressing their mind.

4.4. Conflicting interest

The author declares that there are no conflicting interests

4.5. Acknowledgments

We render gratitude to God the Father Almighty for permitting us to write down this work. We are grateful to all those who participated in one way or the other to see to it that this work reaches at this stage.

5. Conclusion

A need to develop sensitization mechanisms to reach out to all high at-risk groups like the aged, those having comorbidities and health personnel, while encouraging the general population to get vaccinated. We also recommend that communication against Covid-19 vaccines be predominantly psychosocial and well spelled out through diverse platforms. A lot of stigmas surround the vaccines as many spread false news on these vaccines that are not necessarily true. Improving on vaccine adherence needs reducing the doubts and negative perspective many hold on the disease and its vaccine. To achieve this, we must tell people what is going on by explaining how long immunity will last, suggesting nearest vaccination spots and different vaccine types, providing clear communication using well designed posters, ensuring vaccine supplies meet the cold chain requirements and properly training vaccine administrators on how to correctly administer and handle vaccines.

Most importantly, more data and information on the safety and efficacy of these vaccines should be provided on every social media with transparency.

References

- [1] A. Staff, "WHO'S top 10 threats to global health in 2019," *ANMJ*, May 03, 2019. <https://anmj.org.au/whostop-10-threats-to-global-health-in-2019/> (accessed Dec. 05, 2021).
- [2] J. B. Nachega, N. A. Sam-Agudu, J. W. Mellors, A. Zumla, and L. M. Mofenson, "Scaling Up Covid-19 Vaccination in Africa — Lessons from the HIV Pandemic," *N. Engl. J. Med.*, vol. 385, no. 3, pp. 196–198, 2021, doi: 10.1056/NEJMp2103313.
- [3] J. Wang *et al.*, "Acceptance of COVID-19 Vaccination during the COVID-19 Pandemic in China," *Vaccines Basel*, vol. 8, no. 3, p. 482, 2020, doi: 10.3390/vaccines8030482.
- [4] A. N. Battarbee *et al.*, "Attitudes Toward COVID-19 Illness and COVID-19 Vaccination among Pregnant Women: A Cross-Sectional Multicenter Study during August–December 2020," *Am. J. Perinatol.*, no. Journal Article, 2021, doi: 10.1055/s-0041-1735878.
- [5] J. A. N. Chefor *et al.*, "Sociodemographic and Clinical Determinants of Adherence to Covid-19 Vaccination among Health Personnel of the Cite Verte Health District in Yaounde Cameroon," vol. 15, no. 1, p. 15, 2022.
- [6] C.-W. Fan *et al.*, "Extended theory of planned behavior in explaining the intention to COVID-19 vaccination uptake among mainland Chinese university students: an online survey study," *Hum. Vaccines Immunother.*, vol. 17, no. 10, pp. 3413–3420, 2021, doi: 10.1080/21645515.2021.1933687.
- [7] K. G. M. Danabal, S. S. Magesh, S. Saravanan, and V. Gopichandran, "Attitude towards COVID 19 vaccines and vaccine hesitancy in urban and rural communities in Tamil Nadu, India – a community based survey," *BMC Health Serv. Res.*, vol. 21, no. 1, p. 994, Dec. 2021, doi: 10.1186/s12913-021-07037-4.
- [8] M. Li *et al.*, "Healthcare workers' (HCWs) attitudes and related factors towards COVID-19 vaccination: a rapid systematic review," *Postgrad. Med. J.*, no. Journal Article, p. postgradmedj-2021-140195, 2021, doi: 10.1136/postgradmedj-2021-140195.
- [9] R. Dasgupta, P. Mishra, and K. Yadav, "COVID-19 vaccination and the power of rumors: Why we must 'Tune in,'" *Indian J. Public Health*, vol. 65, no. 2, pp. 206–208, 2021, doi: 10.4103/ijph.IJPH_89_21.
- [10] "Theory of Motivation - an overview | ScienceDirect Topics." <https://www.sciencedirect.com/topics/socialsciences/theory-of-motivation> (accessed Nov. 18, 2022).
- [11] H. E. Reses, E. S. Jones, D. B. Richardson, K. M. Cate, D. W. Walker, and C. N. Shapiro, "COVID-19 vaccination coverage among hospital-based healthcare personnel reported through the Department of Health and Human Services Unified Hospital Data Surveillance System, United States, January 20, 2021September 15, 2021," *Am. J. Infect. Control*, vol. 49, no. 12, pp. 1554–1557, Dec. 2021, doi: 10.1016/j.ajic.2021.10.008.
- [12] C. Mangurian and M. C. Halley, "Caring for the Caregivers — Covid-19 Vaccination for Essential Members of the Health Care Team," *N. Engl. J. Med.*, vol. 384, no. 9, pp. e33–e33, 2021, doi: 10.1056/NEJMp2101339.

- [13] S. Abdul-Manan, A. I. Abdullai, and B. G. Yussif, "Determinants of COVID-19 Vaccine Acceptance in Ghana," *Int. J. Health Sci. Res.*, 2022, doi: 10.52403/ijhsr.20220124.
- [14] S. D. Marathe, S. Bassi, N. Thapliyal, B. Prakshale, V. Shah, and S. R. Salunke, "Factors associated with COVID-19 vaccine hesitancy: a community-based household survey in Pune district of Maharashtra, India," *J. Glob. Health Rep.*, 2022, doi: 10.29392/001c.37940.
- [15] D. J. Parente *et al.*, "Acceptance of COVID-19 Vaccination Among Health System Personnel," *J. Am. Board Fam. Med. JABFM*, vol. 34, no. 3, pp. 498–508, Jun. 2021, doi: 10.3122/jabfm.2021.03.200541.
- [16] A. A. Nawwar, J. Searle, R. Singh, and I. D. Lyburn, "Oxford-AstraZeneca COVID-19 vaccination induced lymphadenopathy on [18F] Choline PET/CT-not only an FDG finding," *Eur. J. Nucl. Med. Mol. Imaging*, vol. 48, no. 8, pp. 2657–2658, 2021, doi: 10.1007/s00259-021-05279-2.
- [17] P. Jiang *et al.*, "Energy, environmental, economic and social equity (4E) pressures of COVID-19 vaccination mismanagement: A global perspective," *Energy Oxf.*, vol. 235, no. Journal Article, pp. 121315–121315, 2021, doi: 10.1016/j.energy.2021.121315.