



Determinants of COVID-19 Vaccine Hesitancy of the Population of the Gaweye Health District (DS) in Niger

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Abstract

Introduction: One of the most promising strategies for reducing the transmission of COVID-19 is vaccination. It is in this context that we initiated this study, the objective of which was to study the determinants of hesitancy to vaccinate against COVID-19 among the population of the DS of Gaweye.

Method: This was a cross-sectional, descriptive and analytical study. The data was collected from August 15 to 31, 2022. The study population consisted of people aged 18 and over in the general population of the Gaweye health district. The data were collected using a questionnaire during an individual interview after informed consent and then analyzed with R software.

Results: A total of 436 people were surveyed. In our study, 264 people surveyed, or 60.56%, were hesitant to be vaccinated against COVID-19. Respondents in the 25-59 age group were 2.71 times more likely to be hesitant to get vaccinated. Furthermore, respondents who thought that it was not important to be vaccinated had an 8.66 times the risk of hesitating to be vaccinated. Respondents who did not trust health workers were 6.96 times more likely to hesitate to get vaccinated. Respondents who did not recommend the coronavirus vaccine to others were 59.59 times more likely to be hesitant to get vaccinated.

Conclusion: It appears from our study that the majority of respondents were hesitant to be vaccinated (60.56%) and several influencing factors were found that can be used to implement strategies so that the population better accepts vaccination.

Keywords: Vaccine Hesitancy; COVID-19; Vaccination; Niger

Introduction

The current pandemic caused by the novel coronavirus SARS-COV-2 (COVID19) that began in late 2019 in China's Hubei province [1] has profoundly shaken our societies in health,

economic, political, psychological and social terms. We can thus put its exceptional character into perspective and note its many similarities with the great epidemics of the past, such as the Black Death of the medieval period or, closer to home, the Spanish flu [2].

To deal with this epidemic, The governments of the countries initially chose to confine the population to prevent the spread of the virus. Niger has taken similar measures with the closure of training centres, places of worship, a ban on gatherings of more than 10 people, and the wearing of masks [1,3,4]. Faced with the magnitude of the pandemic, the world has embarked on the research and manufacture of COVID-19 vaccines. As of April 30, 2023, 71.1% of the world's population has received at least one dose of a COVID-19 vaccine and 65.4% have received two doses. Only 17.6% of people living in low-income countries have received at least one dose. In Niger, vaccination began on March 3, 2021 and as of April 2023: 39.2% of the population received their 1st doses of vaccine, including 34.4% with an initial full vaccination protocol [4]. Whereas, the global goal to achieve herd immunity is to vaccinate 70% of the population of each country [4], which notes low vaccination coverage despite the availability and effectiveness of the vaccine in reducing transmission. Effective immunization programmes are needed to address this low immunization coverage. The economic and humanistic impact of the COVID-19 pandemic is enormous on a global scale. There is no definitive cure, which is accelerating the development and approval of COVID-19 vaccines, providing a unique opportunity to prevent and control COVID-19. COVID-19 vaccine acceptance is a critical determinant of vaccine uptake and likelihood of controlling the COVID-19 pandemic. Developing strategies to reduce public hesitancy and increase confidence is critical to the implementation of immunization programs.

However, the infodemic context, characterized by the dissemination of false (misinformation) or misleading (disinformation) anti-vaccine information, accentuates the population's hesitancy towards the COVID-19 vaccine [5]. Several studies have investigated COVID-19 vaccine hesitancy in the population [5-11]. To our knowledge, no studies have been carried out in Niger. It is therefore imperative to understand the factors associated with vaccine hesitancy and the extent of vaccine hesitancy in order to model successful vaccination strategies. This is one of the significant barriers to achieving herd immunity. This study aims to assess factors associated with COVID-19 vaccine hesitancy in a sample of the population of the Gaweye Health District

Materials and Methods

This was a descriptive and analytical cross-sectional study from August 15 to 31, 2022. Included in our study are the population of Gaweye District over the age of 18 who agreed to participate in the study. We used proportional sampling based on the population density of each neighbourhood to obtain a representative sample of each neighbourhood. Next, we surveyed people over the age of 18. In each neighbourhood, we used the route method. Public squares, fadas, markets were chosen as landmarks. The investigator places himself at the centre of the landmarks; He chooses a direction with a bottle. He selects the first dealership on the right in the direction indicated. The targets included present were questioned and then he selected the other concessions step by step until he reached the number of people per neighborhood. Data were collected using a pre-established questionnaire. The questionnaire uses measures as employed in other studies based on COVID-19 surveys [12] and was guided by the survey design recommendations of the WHO SAGE Working Group on Vaccine Hesitancy. Data collection was carried out by community health workers (CHWs) from the Gaweye Prefectural Health District. The questionnaire was scanned from KoboToolBox. Data were collected on the following variables: contextual influences, individual and group influences, vaccine- or vaccine-specific influences, and vaccine hesitancy. The data were analysed by the R software in its version 4.1.3. The association between the dependent variable and the independent variables was tested using the Chi-square test (comparison of proportions), with a significance threshold of 5%. Logistic regression binary modelled factors associated with vaccine hesitancy to account for confounding factors. All variables with p-values less than 0.25 were retained for the initial models. The step-by-step top-down selection procedure was used in each model to build the final model. Variables that do not improve the model are removed one by one. The likelihood ratio test was used to compare nested models. Thus, variables associated with vaccine hesitancy were incorporated into the model. The robustness of the model was studied by removing people one by one (leave-one-out) and by looking for multicollinearity. The suitability of the model was studied using the Hosmer and Lemeshow test and by the AUC of the ROC curve. This allowed us to have the adjusted Odds Ratio.

Ethical considerations

We obtained verbal authorization from the district chief to carry out the survey as well as from the chiefs of the various districts.

Verbal consent was obtained from all participants aged 18 years and older prior to the start of the interview. The data was collected anonymously and confidentially.

Results

Univariate analysis

A total of 436 people were surveyed, and the distribution according to the different variables gives the following results.

The average age of respondents was 35.28 years, with a standard deviation of 13.73 years. The 25-59 age group accounted for 70.40%. Male accounted for 63.76% of our study. The unmarried accounted for 52.52%. The proportion of individuals with secondary education was 32.11%. Respondents who had not received vaccination in adulthood accounted for 54.36% of our study. The rich accounted for 39.45%. Respondents who trusted the Nigerien government to fight the coronavirus epidemic accounted for 59.63% of our study (Table 1).

Poor	26	6,00
Medium	66	15,13
Rich	172	39,45
Richer	154	35,32
Trust in the Nigerien government		
Yes	260	59,63
Not	176	40,37

Table 1: Distribution of Respondents by Contextual Influences (N = 436).

In our study, 69.27% of respondents thought it was important to get vaccinated. The proportions of respondents who thought it is useful to get vaccinated to protect against COVID-19 and that it was not responsible to get vaccinated against COVID-19 were 51.84% and 63.76%, respectively. The proportion of respondents who believed that vaccination will not protect them against COVID-19 was 54.13% and respondents who believed that vaccination will not help in the fight against the spread of the coronavirus represented 57.11%. Respondents who thought the vaccine was safe accounted for 63.30% in our study.

In our study, respondents who thought that people important to them (family) would not want them to be vaccinated when the vaccine is available represented 53.66%. In the coming months, 88.99% of respondents did not intend to regularly inform themselves about the COVID-19 vaccine.

In 90.14% of cases, respondents had heard something bad about COVID-19 vaccines. In addition, 97.25% thought that health workers should provide information and support that is appropriate and necessary for immunization. In our study, respondents who would need to know as much as possible about the coronavirus vaccine accounted for 84.41%. Regarding the recommendation of the vaccine, 64.45% did not recommend the COVID-19 vaccine to others.

In our study, 264 respondents, or 60.56%, were hesitant to get vaccinated against COVID-19 (Table 2).

Bivariate analysis

More than half of the individuals surveyed in our study (60.56%) were hesitant to get vaccinated against COVID-19. We looked for an association between vaccine hesitancy and the variables that were described.

Variables	Absolute Frequency	Percentage (%)
Age range		
Under 25 years of age	96	22,00
25-59 years	307	70,40
60 years and older	33	7,60
Genre		
Masculine	278	63,76
Feminine	158	36,24
Marriage Situation		
Married	207	47,48
Unmarried	229	52,52
Educational attainment		
Secondary	140	32,11
University	138	31,65
Uneducated	96	22,02
Primary	62	14,22
Adult Vaccination Experience		
Not	237	54,36
Yes	94	21,56
I don't know	105	24,08
Economic Wellness Quintile		
Poorer	18	4,10

COVID-19 vaccine hesitancy	Absolute Frequency	Percentage (%)
Yes	264	60,56
Not	172	39,44

Table 2: Distribution of respondents by COVID-19 vaccine hesitancy (N = 436).

The proportion of the uneducated who were hesitant to get vaccinated was 85.42% while that of the educated was 54.98%. The proportion of respondents who had not had an adult vaccination experience who were hesitant to be vaccinated was 65.50% while that of respondents who had had an adult vaccination experience was 42.55%. These associations were statistically significant ($p < 0.001$).

The proportion of those who thought it was not important to get vaccinated and were hesitant to get vaccinated was 95.52% while that of those who thought it was important to get vaccinated was 45.03%. The proportion of respondents who thought that getting vaccinated would not help them fight the spread of the coronavirus and who were hesitant to get vaccinated was 85.54% while that of respondents who thought that getting vaccinated would help fight the spread of the coronavirus was 27.27%. These associations were statistically significant ($p < 0.001$).

The proportion of those who would not need to know as much as possible about the coronavirus vaccine and were hesitant to get vaccinated was 86.76%, while that of those who would need to know as much as possible about the coronavirus vaccine was 55.7%. The proportion of respondents who did not think they would recommend the coronavirus vaccine to others and were hesitant to get vaccinated was 89.32%, while the proportion of respondents who thought they would recommend the coronavirus vaccine to others was 8.39%. These associations were statistically significant ($p < 0.001$).

Multivariate analysis

The aim of this study was to model COVID-19 vaccine hesitancy by showing the factors associated with COVID-19 through a consistent approach. After the follow-up of all the procedures that allowed us to obtain the final model, the Hosmer-Lemeshow test ($p = 0.06688$) showed us a good fit of the model. Variables with

variance inflation factors (VIF: measure of multicollinearity) close to 1, show us the robustness of the model and that the factors are not influenced by correlation with other factors. The following results were noted (Table 3).

Variable	Vaccine hesitancy		
	Adjusted GOLD	IC (95%)	P-value
Age range			
Under 25 years of age	Ref		
25-59 years	2,71	[1,13-6,48]	0,025
60 years and older	1,82	[0,43-7,63]	0,415
Trust in the Nigerien government			
Yes	Ref		
No	1,9	[0,84-4,32]	0,123
Important to get vaccinated			
Yes	Ref		
Not	8,66	[2,65-28,27]	<0.001
Future vaccine will not pose a health risk			
Yes	Ref		
Not	0,52	[0,23-1,16]	0,112
Will help protect my family from the virus			
Yes	Ref		
Not	2,07	[0,98-4,35]	0,056
The vaccine could put my health at risk			
Yes	Ref		
No	0,57	[0,27-1,19]	0,136
Trust in health workers			
Yes	Ref		
No	6,96	[2,86-16,91]	<0,001
Recommending the vaccine to others			
Yes	Ref		
No	59,59	[24,82-143,07]	<0,001

Table 3: Summary of Multivariate Analysis.

OR = Odds Ratio CI = Confidence Interval.

Respondents in the 25-59 age group had a 2.71-fold risk of vaccine hesitancy (OR = 2.71; 95% CI [1.13-6.48]; $p = 0.025$).

In addition, respondents who thought it was not important to get vaccinated were 8.66 times more likely to be hesitant to get vaccinated (OR = 8.66; 95% CI [2.65-28.27]; $p < 0.001$).

Respondents who did not trust health workers were 6.96 times more likely to be hesitant to be vaccinated (OR = 6.96; 95% CI [2.86-16.91]; $p < 0.001$).

Respondents who did not recommend the coronavirus vaccine to others were 59.59 times more likely to be vaccine hesitant (OR = 59.59; 95% CI [24.82-143.07]; $p < 0.001$).

Discussion

We conducted a cross-sectional, descriptive and analytical study to assess COVID-19 vaccine hesitancy in 2022 in Niger after COVID-19 vaccination started. In our conceptual framework, we drew on the model of the WHO SAGE group, which ranked the factors that influence vaccine hesitancy in a systems approach matrix that groups factors into three broad categories of influences: contextual influences, individual and group influences, and vaccine- or vaccine-specific influences. A questionnaire was developed and used to collect a total of 436 data samples.

In our study, the majority of respondents were hesitant to get vaccinated against COVID-19. Previous surveys around the world have reported various estimates, ranging from 23 to 97 percent [8,13,14]. There is therefore a variability in the rate of vaccine hesitancy from one country to another and this could be related to misinformation, insufficient communication about the disease and about vaccination. Indeed in Africa, the means of communication not only on the disease but also on the vaccine were insufficient and did not reassure the population. Especially since there had been rumors such as the vaccine will lead to infertility that were conveyed on social networks, places of worship, marches [11,15-17]. In addition, this high vaccine hesitancy rate could significantly limit the possibility of achieving herd immunity against SARS-CoV-2 in order to prevent hospitalizations, catastrophic health care costs, and deaths. This rate can also be explained by the youth of the Nigerien population in general and that of Niamey in particular. Indeed, according to the National Institute of Statistics, the average age of the population of Niamey was 22 years old according to the

latest general population census [18]. In addition, the youth of the African population is well known and described by several studies [11,15,16,19,20].

In our study, logistic regression showed that several factors were associated with COVID-19 vaccine hesitancy. Indeed, vaccine hesitancy was associated with the 25-59 age group. This association has been found in other studies in Africa, Europe and Asia [8,21-23] but did not corroborate with some studies [24-27]. This result of our study can be explained by the youth of the Nigerien population. This is because young people are generally less likely to develop severe forms of COVID-19 and therefore less concerned about vaccination compared to older people with high morbidity and mortality [8,20,28]. In addition, the willingness to be vaccinated against Covid-19 gradually increases with age groups from 45 years old compared to the younger age category of 18 to 24 years according to Kessels., *et al.* [28]. Among the factors, those who thought it was not important to get vaccinated were also associated with vaccine hesitancy. This poor attitude towards vaccination was consistent with the results of several studies [11,26,29,30] And this can be explained mainly by rumours circulating on social networks about the vaccine and the time it took to manufacture it. Indeed, in a mixed study conducted in Senegal, one of the respondents said: "I'm hesitant because of the rumors I've heard about the vaccine; That's the first aspect, the second aspect is that I'm confused about how long it takes to create it. That's why I'm hesitating for the moment and waiting a little time to understand how this will manifest itself in the country (Male, 37 years old, hesitant)" [11]. These concerns of the respondents show that the authorities must give an important place to vaccination in awareness campaigns in order to give the population confidence on this issue and also to further motivate people to get vaccinated against COVID-19. Vaccine hesitancy was also associated with a lack of trust in health workers and the fact that respondents did not recommend the coronavirus vaccine to others. The results of several studies were consistent with our study [25,29,31,32]. In fact, according to a cross-sectional study in the United States, lack of trust was the second most common reason for answering "no" to the intention to get vaccinated. In this study, lack of trust encompasses lack of trust in vaccines, health workers, government and CDC, pharmaceutical companies, and vaccine development or testing processes, as well as references to conspiracy theories [32].

The limitations of this study are the data collection that was carried out by several interviewers, there may be a collection bias due to variation in the translation of the questions into the local language despite the fact that the interviewers were trained before the start of the collection to limit this bias and the cross-sectional nature of these data limits our ability to draw conclusions about causality. In addition, a qualitative approach would provide a better understanding of some information on vaccine hesitancy.

Conclusion

Several studies have been carried out around the world to assess COVID-19 vaccine hesitancy and associated factors that could influence it, but to our knowledge, there has been no study in Niger. Indeed, our study is a first in Niger and it appears that the majority of respondents were hesitant to be vaccinated (60.56%) and several influencing factors were found such as poor attitudes and perceptions towards the vaccine, the youth of the population and these factors are well found in the model of the WHO SAGE group. Additional studies with a qualitative component at the national level are needed to understand exactly the reasons for this huge rate of COVID-19 vaccine hesitancy in order to put in place strategies to increase the population's acceptance of vaccination.

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