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Acceptability of Immunization against COVID-19 by the Populations of the Kasenga State Health Area in the Uvira Health Zone, DR Congo

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Abstract

Introduction: COVID-19 was an emerging disease putting all public health systems in countries around the world in a state of emergency. To be able to prevent its spread and morbidity and mortality, several appropriate strategies were necessary, such as vaccination. The latter has been the subject of controversy. The objective of the present study is therefore to evaluate the factors associated with the acceptance of this vaccine within the population of the Kasenga State Health Area. A result which will shed light on future strategies to be put in place for possible new vaccines. **Methodology**: Is a prospective and analytical cross-sectional study conducted over a period of approximately 1 month from January 5 to February 5, 2024. A survey questionnaire in Kobotoolbox was useful for collecting data. STATA software was very important for us in analyzing the data collected. **Results:** Prevalence of vaccination against COVID-19 among the population of the Kasenga State Health Area is 37.5% (28.4 - 45.6). The study revealed that reluctance is observed among most of the population for different reasons, including, first and foremost, the deliberate aspect of not wanting to take the vaccine (46.6%) and rumors that this antigen is dangerous and harmful (32.9%). 72.5% of respondents believe

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that the COVID-19 vaccine is a fabrication, unhealthy and that the disease itself never existed. The study proved that there was a statistical relationship between age (p = 0.001) and adherence to vaccination. And the refusal of respondents to recommend the vaccine to loved ones was a factor associated with non-adherence to vaccination (OR = 7.901, 95% IC [3.028 - 20.615], p = 0.000). **Conclusion:** Vaccination against COVID-19 was not well accepted by the population of the study site. Raising public awareness and involving community leaders and political-administrative authorities, which has not been done well, would play an important role in the good perception of the disease, of the vaccine and therefore in its adherence.

Keywords

COVID-19, Vaccination, Kasenga State Health Area, Associated Factors, Uvira Health Zone, City of Uvira

1. Introduction

Pandemic coronavirus disease (COVID-19), caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), is a highly infectious disease, first described based on a cluster of cases in China [1]-[3]. The outbreak of the new coronavirus was declared a public health emergency of international Concern (PHEIC) on January 30, 2020, and a pandemic on March 11, 2020, by the World Health Organization (WHO) [4] [5].

Coronaviruses are a family of viruses that infect both animals and humans, causing potentially zoonotic diseases. They can cause mild illnesses similar to the common cold or more serious diseases such as severe acute respiratory syndrome linked to Coronavirus infection (SARS-Cov) [6].

In late 2019, a new form of pneumonia caused by an emerging coronavirus named SARS-Cov 2 emerged in China [3], and according to the WHO, this virus is responsible for the current pandemic [3] [7].

Beyond the morbidity and mortality linked to COVID-19, the pandemic has had a major impact on the reorganization of the healthcare system, from screening to palliative care [3] [8].

Unfortunately, the African continent has not been spared, even if it remains the least affected continent [9]. Healthcare workers are one of the groups most at risk. More worryingly, the emergence of variants is complicating the response to this pandemic by affecting the quality of treatment and prevention [9].

The Democratic Republic of Congo (DRC) has faced three waves of COVID-19 since May 07, 2021, and the vaccination campaign has struggled to get off the ground given both cultural (practice of traditional medicine) and logistical (with damaged or impassable roads and insecurity) constraints. However, the population's acceptance of this vaccine has not been evident in many parts of the world [10].

In response to the pandemic, vaccines were developed in record time. This rapid development gave rise to a degree of mistrust among the population, including healthcare personnel, as to the efficacy, safety, and security of these vaccines [11] [12]. This hurts adherence to vaccination [9]. In the Uvira Health Zone, vaccine prevalence against COVID-19 was 2.23% in 2021, 1% in 2022 and 2% in 2023 [13]. The acceptance of vaccination against COVID-19 by the population has emerged as a real challenge linked to false rumors leading to misinformation among the population on the effectiveness of vaccination against COVID-19 [14]. The literature proves that lack of confidence in the COVID-19 vaccine (61.8%) and fear of side effects (33%) were factors associated with refusal to be vaccinated [14].

In South Kivu, some opinions from the population are converging towards blaming the political authorities, who are corrupt, for getting the vaccine accepted at all costs in the country via teachers who have money (North and South Kivu) [15].

Thus, the originality of the present work is to address the aspect of consideration of the vaccine against COVID-19 within the population of the Uvira Health Zone, more precisely in the health area of Kasenga State. The objective is to analyze not only the level of knowledge and the attitude that the population had towards this vaccine but also to discover the factors linked to its rejection. The result of the present study will provide more clarity, strategies to follow and weaknesses to avoid at all costs for possible future new vaccines in order to maximize their acceptance.

2. Methodology

Type, location and design of the study: This is a prospective and analytical cross-sectional study conducted over a period of 1 month, from January 5 to February 5, 2024.

This study was carried out in the form of a direct interview using a pre-established questionnaire essentially covering questions relating to the following parameters: the level of knowledge, the prevalence of adherence to vaccination, attitudes-related issues and factors associated with COVID-19 vaccine refusal.

The study was carried out among the population of the Kasenga State Health Area, which is one of the 26 health areas of the Uvira Health Zone, specifically in the town of Uvira.

The Kasenga State Health Area is in the municipality of Mulongwe town of Uvira and straddles two different neighborhoods, including Kakombe and Kasenga. The health area is limited to the North by the Kavimvira River and the Kavimvira Health Area, to the South by the Mulongwe River and the Mulongwe State Health Area, and to the West by National Road No. 5 and the Kasenga CEPAC Health area and to the East by Lake Tanganyika.

Population and Sample Size: The Kasenga State health area has a population

of 22,064 (total population). The sample size was calculated based on the following Schwartz formula:

$$n = \frac{\left(e^2 \cdot p \cdot q\right)}{d^2}$$

For a minimum expected sample of $n + n/10$, n: minimum size to obtain significant results for an event and a fixed level of risk. e: Confidence level (the typical value of the 95% confidence level) was 1.96 p: Probability of occurrence of the event or prevalence of the pathology q: Complement of $p = 1 - p$ d: margin of error or the degree of precision (usually set at 5% or 0.05) [16]. With a sexual prevalence estimated at 2% in 2023 according to the report of the Central Office of the Uvira Health Zone [13], the calculated sample size was 30 plus 10% of 30 or 33 households to be surveyed. To be more representative, we decided to increase this sample to 120 households surveyed (*i.e.* an addition of 300%). The simple random sampling technique allowed us to form our sample.

Data collection: Data was collected using a survey questionnaire via direct interviews with the target population. Cobotoolbox software was used to collect the data.

The designed research protocol was pre-tested with 10 people to assess its level of adequacy. This allowed us to revise it and adapt it for a better understanding of all according to the suggestions provided to us by the people pre-tested in this same community. The collected data were subsequently downloaded onto an Excel spreadsheet before exporting them to other specific processing software.

Statistical analyses: After collecting the data via Cobotoolbox (https://ee.kobotoolbox.org/x/Kehov49s), we imported the Excel file from Kobocollect and processed it using the STATA 15 software for more specific analyses. All analyzes were carried out using Stata 15 software (StataCorp, College Station, TX). The degree of significance retained for all analyzes was previously set at 5% ($p < 0.05$).

Means accompanied by their standard deviation or median were used to describe quantitative variables and percentages to describe categorical variables.

Bivariate analyzes were conducted between our dependent variable which is the fact of having been vaccinated or not and our independent variables. For qualitative variables, the Chi2 test and the Fisher test were used depending on the theoretical numbers. Analysis of normality of continuous variables was performed using the Shapiro-Wilk test. The distribution of quantitative variables was compared using the Student test for variables following a normal distribution and Man Whitney test for variables not following a normal distribution.

Bivariate logistic regression models were constructed to estimate the association between the dependent variable and the independent variables.

3. Ethics

Ethical approval was granted to the study by the Institutional Ethics Committee

of the Higher Institute of Medical Techniques of Uvira, DRC (approval letter No. ISTM/UVIRA/CEM/11/2024). Informed consent was obtained before participation in the study. Anonymized data was used for analysis, interpretation and reporting purposes.

4. Results

Let's say that the median age of our respondents was 32 years (25 - 51), with a majority of them in the age group of 21 to 40 years (43.7%). The median age of those who agreed to get the COVID-19 vaccine was 35 (26 - 49), while that of those who never took it was 31 (25 - 52). The female gender was in the majority at 52.5%, while the secondary level was a priority at 48.74%, while the illiterate represented 18.49%. Many of our respondents were married (73%) and predominantly of the Protestant religion (55%). Age (p-value = 0.0001) and respondents' attitudes/whether or not they could recommend others to get vaccinated (p-value = 0.0000) had a significant relationship with COVID-19 vaccination-19 (Table 1).

Table 1. Sociodemographic information and vaccination prevalence.

Features	Total	Vaccinated		
		Yes (%)	No (%)	p-value
Age	32 (25 - 51)	35 (26 - 49)	31 (25 - 52)	**0.0001**
Sex				
Male	57 (47.5)	24 (53.33)	33 (44)	**0.322**
Female	63 (52.5)	21 (46.67)	42 (56)	
Age				
16 to 20 years old	18 (15.13)	7 (15.56)	11 (14.86)	**0.432**
21 to 40 years old	52 (43.7)	19 (42.22)	33 (44.59)	
41 to 60 years old	33 (27.73)	17 (37.78)	16 (21.62)	
61 to 80 years old	16 (13.45)	2 (4.44)	14 (18.92)	
Religion				
Jehovah's witnesses	6 (5)	3 (6.67)	3 (4)	**0.631**
Protestant	66 (55)	28 (62.22)	38 (51.67)	
Catholic	29 (24.17)	8 (17.78)	21 (28)	
Branhamist	7 (5.83)	2 (4.44)	5 (6.67)	
Others	12 (10)	4 (8.89)	8 (10.67)	
Marital status				
Bachelor	34 (28.33)	12 (26.67)	22 (29.33)	**0.174**
Married	73 (73)	31 (68.89)	42 (56)	
Widow	13 (10.83)	2 (4.44)	11 (14.67)	

Continued

Level of education of respondents				
Illiterate	22 (18.49)	7 (15.56)	15 (20.27)	**0.864**
Primary	16 (13.45)	6 (13.33)	10 (13.51)	
Secondary	58 (48.74)	24 (53.33)	34 (45.95)	
University	23 (19.33)	8 (17.78)	15 (20.27)	
Attitude of respondents (can they recommend vaccinated people to others)				
Yes	64 (53.33)	37 (82.22)	27 (36)	**0.000**
No	56 (46.67)	8 (17.78)	48 (64)	

72.5% of respondents believe that the COVID-19 vaccine is a fabrication, harmful and that the disease itself never existed (Rumour against couple sterility, Harmful to health, Pure and simple assembly, Non-existent disease, and I don't trust this vaccine). Relatives of those surveyed have almost the same prejudices since 43% of them believe that the antigen against COVID-19 is harmful to human health.

The main source of information on the antigen against COVID-19 is the Media (radio, television, social networks, etc.). 76.2% of those questioned said they were not aware that one of their loved ones was vaccinated.

Concerning what is said about the COVID-19 vaccine, this amounts to saying given this table that 52.5% of people believe that this antigen is very dangerous. On the other hand, 29.1% of those questioned would trust their Pastors and others their Parents (15.8%). However, a somewhat positive attitude was observed, as 55% of those surveyed said they could advise others to take this antigen.

The socio-economic status of the majority of respondents was low at 48.3%, and only 46.6% had an average level. Among the whole, small traders represented 24.1%, followed by miscellaneous workers at 29.1%.

From Table 2, we can deduce that the prevalence of taking the COVID-19 vaccine is 37.5% (28.4 - 45.6) compared to 62.5% who declared having never taken it. Among the reasons given were the deliberate aspect of not wanting to take it (45.3%) and rumors that this antigen is dangerous and harmful (32%). Among them, 18.6% would be ready to take it if it was presented to them.

Table 2. Vaccination status.

Variable	Frequency	Percentage
Are you vaccinated against COVID-19		
No	75	62.5
Yes	45	37.5

Continued

If not, why?		
Rumors that it's dangerous	24	32
Church ban	3	4
I do not want it	34	45.3
It was never offered to me	14	18.6

It appears from Table 3 that after the final model of the logistic regression test (final model), the fact that the respondents refused because they were not ready to recommend the vaccine to their loved ones was a factor associated with refusal of vaccination (p = 0.0000).

Table 3. Factors associated with COVID-19 vaccination.

Variables	Bivariate analysis			Multivariate analyzes			Final Model		
	Odds Ratio	95% CI	p	Odds Ratio	95% CI	p	Odds Ratio	95% CI	p
Sex									
Male	Ref								
Female	1.45	[0.69 - 3.05]	0.32						
Age									
16 to 20 years old	Ref								
21 to 40 years old	1.105	[0.36 - 3.33]	0.85	1.39	[0.28 - 6.75]	0.678			
41 to 60 years old	0.598	[0.18 - 1.92]	0.39	0.59	[0.08 - 4.12]	0.569			
61 to 80 years old	4.45	[0.76 - 25.85]	0.09	5.35	[0.41 - 69.24]	0.19			
Religion									
Jehovah's witnesses	Ref								
Protestant	1.35	[0.25 - 7.23]	0.72						
Catholic	2.6	[0.43 - 15.81]	0.29						
Branhamist	2.5	[0.25 - 24.71]	0.43						
Others	2	[0.27 - 14.78]	0.49						
Marital status									
Bachelor	Ref								
Married	0.73	[0.31 - 1.71]	0.48	0.94	[0.23 - 3.72]	0.93			
Widower widow	3	[0.56 - 15.82]	0.19	2.91	[0.28 - 29.54]	0.36			

Continued

Level of education of respondents									
Illiterate	Ref								
Primary	0.77	[0.20 - 3.00]	0.71	2.89	[0.45 - 18.43]				
Secondary	0.66	[0.23 - 1.86]	0.43	2.31	[0.46 - 11.59]				
University	0.87	[0.25 - 3.02]	0.83	4.63	[0.76 - 27.96]				
Attitude of respondents (can they recommend vaccinated people to others)									
Yes	Ref								
No	8.22	[3.34 - 20.18]	**0.0000**	9.75	[3.52 - 27.01]	**0.0000**	8.22	[3.34 - 20.18]	**0.0000**

5. Discussion

A priori, let us specify that the median age of our respondents was 32 years (25 - 51). Our median age is almost the same as that found by Hossain *et al*. 2021 in Bangladesh, who reported a median age of 33 years [17].

Women are in the slight majority at 52.5%, with a sex ratio of 1.1 in favor of women, which rhymes with the results of several other authors who have worked on this theme [9] [18] [19]. In the case of our study, this state of affairs is justified by the fact that we find the majority of Our results converge on age and sex in the study of Mutanda *et al*. 2023 [18].

The bride and groom in this study represented 73%, and the majority were of the Protestant religion (55%). This remains understandable because Protestants are visibly more numerous in the city than all other religious denominations.

Talking about the level of education, in our study, 81.51% of the participants were educated compared to 18.49% of the illiterate ones. Our result is almost similar to that of Sangho AHA [20], which found that 50.38% of educated people in the population of Sikasso. On the other hand, Traoré *et al*. [21] found 66.3% uneducated in the communes of Bamako.

It is appropriate to say that schooling could play a crucial role in the knowledge of COVID-19 and adherence to vaccination campaigns. The more educated we are, the more likely we are to understand the usefulness of vaccination and of adhering to it.

According to a statistical analysis carried out to look for possible relationships between the variables and adherence to vaccination, it emerged from this study that the age ($p = 0.0001$) and the attitudes of the respondents/the fact that whether or not they could recommend others to get vaccinated ($p = 0.0000$) had a statistically significant relationship with the prevalence of COVID-19 vaccination.

The perception of the antigen against COVID-19 is different among our respondents. It is still surprising to note that 72.5% of respondents believe that the COVID-19 vaccine is not only a pure and simple setup by multinationals but also harmful and that the disease itself has never existed for some; it is almost the same for their loved ones. This result is the same as that of Bulabula *et al*. and

that of Jules *et al*., for whom the respondents had qualified the SARS-Cov-2 disease as an imaginary disease (7.2%), others as "bad come out" (2.6%) and that the vaccine was not good to take [15] [22]. Medical controversies and scientific uncertainty, embodied by characters marginalized by scientific authorities, such as Didier Raoult, Luc Montagnier, Christian Perronne or Laurent Mucchielli (presented as misunderstood, dominated, mistreated, but rebellious and resistant geniuses), have favored suspicions among certain hyper-connected and permeable Guadeloupean citizens, who were especially sensitive to the hypothesis of relationships of power, domination and censorship, of which these researchers would have been victims [23]. Other studies have nevertheless proven the opposite, in which the level of knowledge of the disease was high, and at least their respondents believed in a high percentage of the existence of this pathology. In the study by Camara M. [24], 94.4% of respondents believed in the existence of coronavirus disease, which corroborated the results of Diarra S., who reported that 78.91% of participants in his study also believed in the existence of this pathology [25]. The lack of belief in the existence of this Coronavirus disease in the case of our research makes the population more vulnerable and leads them to adopt a behavioral relaxation in the face of this vaccine, which is a risk to their health.

However, it also amounts to saying that in our study, those close to the respondents have the same prejudice. This was confirmed by the fact that 76.2% of our target mentioned having not known or seen anyone in their neighborhood being vaccinated. It is entirely reasonable that someone who firmly believes in the non-existence of the disease and the harmful state of the antigen cannot be vaccinated.

What do people (family, neighbors, and friends of respondents) say about the COVID-19 vaccine? Our results indicate a very negative attitude towards this. 52.5% of people believe that this antigen is very dangerous and harmful. Consequently, its adoption is not there. Awareness raising about this pandemic or the vaccine has not been effective or convincing. This is the case of the study by Barry *et al*. [26], which states that given the excessive liberalization and democratization of information and communication in the digital age, the infodemic or infobesity constitutes an obstacle to the uptake of anti-COVID-19 vaccination or health promotion in general.

It is still clear that certain people would have an influence on the population and would support awareness sessions to increase the success rate. According to this research, most respondents mentioned having more confidence in their Pastors (29.1%) and others in their Parents (15.8%) than in the health service or political-administrative authorities. It is essential to be able to convince this category of people who will, in turn, convince the population of their obedience.

A paradox is observed: people who have treated the COVID-19 vaccine of all ills higher, at 55%, affirm that they can advise those around them to take this antigen. As whom would say, "Listen to what I say but not to what I do."

In the same vein, it is appropriate to point out that the socio-economic level of

most respondents was low at 48.3% and whose small business (including all small trades for survival) was the main source of income, while for Ammar, it was average to 83.4% of cases which can be linked to life in Tunisia.

This result corroborates those of Diarra S. and Camara M. [24] [25], who also found trade to be the respondents' main activity, accounting for 30% and 33%, respectively.

The standard of living would be a significant determinant in the field of public health, and it is therefore important that particular attention be devoted to it.

Referring to practice, most respondents have never been vaccinated against COVID-19 (62.5%). Therefore, vaccination prevalence is 37.5% (28.4 - 45.6). Our result regarding vaccination status corroborates that of Abdou [2], for whom the vaccination rate was 38.84%, while for us, it was 37.5% [2]. This rate remains high compared to the rate found by Fadiga [21] in Bamako, which was 17.4% [14]. This difference can be explained by the fact that our sample was made up mainly of educated people, which may influence their adherence to vaccination.

As for the perception of vaccination against COVID-19 among the unvaccinated, the study revealed that reluctance is observed among many of them for different reasons, including, first and foremost, the deliberate aspect of not wanting to take it (45.3%) and rumors that this antigen is dangerous and harmful (32%). On the other hand, acceptance of the vaccine is observed among 18.6% who would be willing to take it if it was presented to them. These results corroborate those of Abdou S. in Mali [2], for whom the vaccine acceptance rate among the unvaccinated was 19.40%. This rate was higher than that of studies conducted by Kanyike *et al*. in Uganda [27] and Saied *et al*. in Egypt [7], which was 37.3% and 35%, respectively.

On the other hand, in several studies carried out in the West, the levels of acceptance of the vaccine were higher. Tavolocco *et al*. [28] found an acceptance rate of 58% and 81.1% in Italy, according to the study by Barello S. *et al*. [29]. This difference can be justified by the fact that in the West, people believed in this disease, which visibly caused many deaths in front of everyone, unlike in Africa, where cases were almost rare, thus causing a certain amount of mistrust.

Wanting to establish a relationship between the educated and the illiterate on adherence to vaccination, a slight gap emerged, showing more vaccinated among the educated (38.5%) than among the illiterate (33.33%). However, wanting to look for the association between adherence to vaccination and the level of study, the study did not prove any statistical association. However, this gap can be justified by the fact that logically, the educated are supposed to understand the situation as it presents itself scientifically. It was revealed above in our results that a large part of the respondents did not believe in the existence of the disease (72.5%), which is a dangerous attitude towards the disease, unlike other studies in which almost all of the people surveyed believed in the existence of this COVID-19 pathology [30]. This is, on the other hand, a positive aspect predisposing to adherence to the vaccine.

6. Conclusions

Perception and support for the COVID-19 vaccine were negative in our research location because rumors about the non-existence of the disease and, by extension, about the danger of the vaccine on health were more widespread within the community surveyed. Added to this is the need for the population to have more confidence in the leaders likely to influence possible change. This state of affairs leads us to say that in the future, to lead to the acceptance of a new vaccine capable of saving lives.

It is therefore essential that political and health authorities, all those concerned, can get involved in strengthening community awareness strategies in the event of epidemics and pandemics, as well as work to restore confidence in the population under their jurisdiction.

The population must take charge of their health by seeking information from health professionals and political-administrative authorities.

State of Knowledge on the Subject

COVID-19 is a fearsome and highly contagious pandemic that has killed several thousand people around the world. Vaccination against this pathology is the currently recognized means of combating it.

Contribution of Our Study to Knowledge

The prevalence of taking the vaccine among our respondents is low. False rumors surrounding the non-existence of this pathology and the harmfulness of the vaccine have largely contributed to vaccination non-compliance.

Contribution of the Authors

Design of the subject, *analysis*, *compilation of data and writing of the manuscript*: Derrick Bushobole Akiba, Bushambale Fataki Robert, Amuri Madabali Eric. *Text correction*: Bukuru Mudage Faustin, Asende Luhendama Abel, Banyakwa Mitunda Christian, Martin Longolongo Kiza, Jacques Mutono Matongo, Paulin Mulogoto Rushanika, Emmanuel Nirambo Rujanjika, Saili Stay Mushobekwa and Byaombe Wangene Michel. *Research supervision and style correction*: Koba Mjumbe Criss and Manya Mboni Henry. All authors have read and approved the final version of this manuscript.

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Conflicts of Interest

The authors declare no conflict of interest.

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